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Guide to Chemical Management for E-Commerce Platforms

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Shenzhen Zero Waste Environmental Public Welfare Undertakings Development Center
REACH24H Consulting Group

深圳零废弃
Shenzhen Zero Waste

Shenzhen Zero Waste Environmental Public Welfare Undertakings Development Center (Shenzhen Zero Waste)

Founded in 2016, Shenzhen Zero Waste is also known as "Toxics-Free Corps." It primarily promotes the strict control of hazardous chemicals in consumer products through activities such as independent testing, scientific outreach, and corporate advocacy, aiming to protect the public from health risks. It is also dedicated to collaborating with all sectors of society to jointly promote the development of sound chemical management systems and industry practices.

REACH24H
瑞 欧 科 技

REACH24H Consulting Group

Founded in 2009 and headquartered in Hangzhou, China, it has established branches in Ireland, the UK, the United States, South Korea, Japan, Singapore, and Taiwan, creating a global 24-hour consulting service network. The service areas cover various industries such as industrial chemicals, agrochemicals and biocides, cosmetics, food and food contact materials, and pharmaceuticals. The company provides services including product compliance consulting and technical services, vertical media platforms and comprehensive business services, chemical testing, safety consulting, and digital solutions. Since its establishment, REACH24H has provided technical support to government agencies, industry associations, and international organizations, contributing to the development of industry guidelines and national standards, helping to promote the sustainable development of the industry and market environment. It offers professional and efficient product safety and market access solutions to clients, having served over 15,000 enterprises worldwide, including 103 Fortune 500 companies. It has completed tens of thousands of product registrations, filings, and consulting projects, providing high-quality technical services to eliminate technical trade barriers and promote global trade integration.

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INTRODUCTION

China is entering a new development paradigm guided by a high-quality development strategy — a shift from a model centered on scale and speed to one that prioritizes quality, sustainability, and long-term value creation. This transition aims to raise income levels, diversify the supply of goods and services, and foster a higher quality of life for the Chinese people.

Consumption plays a foundational role in supporting economic stability. Improving product quality standards and ensuring consumer goods safety are essential to closing the gap between supply and demand. In 2022, China's State Administration for Market Regulation, in coordination with other ministries, released the Action Plan for Further Improving the Quality of Products, Projects, and Services (2022–2025), which sets clear priorities for aligning supply with rising market expectations and advancing the nation's quality development strategy. The plan also addresses several areas involving toxic and hazardous chemicals — including food safety, pesticide and veterinary drug residues, heavy metals, and contaminants — as well as stricter limits on hazardous substances in children's products, school supplies, and home furnishings.

Chemicals[i] are essential to modern life, providing significant material benefits. However, many also carry inherent toxicity that can harm human health and the environment. The presence of toxic and hazardous chemicals in products is a major source of consumer exposure. As retail continues to shift online, the presence of such substances in products sold on e-commerce platforms has grown — from toys and clothing to stationery and fresh food. Incidents of non-compliance have been uncovered both by regulators and by civil society and consumer investigations.

Globally, regulators are beginning to address the unique challenges posed by e-commerce to chemical safety. The European Union's 2020 Chemicals Strategy for Sustainability specifically flagged online retail as a new area of concern. Earlier initiatives such as the Product Safety Pledge — joined by major platforms including Alibaba — reflect growing pressure for platforms to strengthen internal risk controls and take responsibility for product safety, including chemical-related hazards.

China has introduced a range of regulations and national standards to restrict the use of certain chemicals in specific product categories in order to ensure product quality and safety. Laws such as the Consumer Rights Protection Law and the Product Quality Law establish the right of consumers to be protected from harm to their personal health and property when purchasing and using goods. Additionally, the E-Commerce Law clearly stipulates that e-commerce platforms bear corresponding liability when the products they provide cause harm to consumers. Products containing toxic and hazardous chemicals pose significant risks to consumer health and safety. If e-commerce platforms fail to fulfill their obligation to protect consumers from such risks when selling these products, they may face direct compliance liabilities. The 2022–2025 Action Plan further calls for enhanced product traceability and quality control in online retail and livestreaming commerce, placing greater responsibility on platforms to ensure product and food safety.

Chemical substances in products can pose risks throughout their entire lifecycle — from manufacturing to use and disposal. Therefore, chemical safety is not just a matter of product quality but a core issue in pollution prevention and environmental protection. Internationally, countries and regions are placing increasing emphasis on the sustainable transformation of chemicals. Among the 17 UN Sustainable Development Goals (SDGs) adopted in 2015, at least three are directly tied to sound chemicals management (SDGs 3, 6, and 12). In response, the United Nations Environment Programme (UNEP) outlined key tools and approaches for the sound

management of chemicals beyond 2020. Many countries have since enacted policies aimed at minimizing chemical-related risks and promoting the development of safer, more sustainable alternatives.

China is actively engaged in international chemicals governance, contributing to the development of global conventions and treaties. At home, the government continues to strengthen environmental and safety management of chemicals. In its 2022 national report, the 20th Party Congress reaffirmed environmental protection as a national priority and called for green and low-carbon development. This includes the control of emerging pollutants — many of which are chemical in nature — through limits on their presence in products and efforts to reduce environmental discharge.

Achieving these environmental and development goals — both internationally and domestically — depends on the proactive engagement of the private sector. China's environmental governance is evolving into a modern, multi-stakeholder model that integrates government oversight, corporate accountability, and public participation. In 2020, the Central Committee of the Communist Party and the State Council issued the Guiding Opinions on Building a Modern Environmental Governance System, which emphasized the importance of enterprise leadership and synergy between government, society, and industry. In this context, businesses are expected to play a central role in addressing chemical risks and advancing sustainable environmental outcomes.

Although e-commerce platform companies[1] are not chemical manufacturers, they serve as direct intermediaries between products and consumers — and therefore bear an irreplaceable responsibility for ensuring chemical transparency, safeguarding consumer health, and protecting the environment. This means enabling access to information on the presence, quantity, and potential risks of hazardous chemicals in products. To fulfill this role, platforms must establish proactive and effective chemical management systems. However, doing so presents challenges — especially given the complexity of chemical substances and the evolving policy and regulatory landscape.

Chemical management on e-commerce platforms is a continuous process. This report seeks to offer an actionable roadmap for platform companies in China, drawing from domestic regulations, international trends, multilateral initiatives, and industry best practices. The goal is to help e-commerce platforms — even those just starting out — develop strategic frameworks and practical measures for chemical management. By taking proactive steps, platforms can meet regulatory expectations, reduce compliance risks, improve product quality, and contribute to sustainable development — all while enhancing competitiveness in a rapidly evolving market.

1.Note: In this report, the term “e-commerce platforms” refers to “e-commerce platform operators” as defined in Article 9 of the E-Commerce Law — legal persons or unincorporated organizations that provide online venues, transaction facilitation, or information services for buyers and sellers to conduct independent transactions.

Part I

Why Chemical Management Matters for E-Commerce Platform Companies

1.1

Hazards of Chemicals

Chemicals have long been an indispensable part of modern material life. Numerous economic sectors such as agriculture, manufacturing, and the consumer goods industry rely heavily on chemicals. There are an estimated 40,000 to 60,000 industrial chemicals in commercial use, with 6,000 chemicals accounting for more than 99% of the total volume of industrial chemicals in commerce globally[2]. The chemical industry is the second largest globally. From 2000 to 2017, global chemical production nearly doubled, increasing from 1.2 billion tons to 2.3 billion tons[3]. In 2021, the total revenue of the chemical industry worldwide reached 4.73 trillion USD[4]. China is the world's largest chemical producer, with chemical sales reaching 1.54 trillion euros in 2020, accounting for 44.6% of the global market share. It is projected that by 2030, China will account for nearly half of the global chemical market[5].

Due to global population and economic growth, per capita chemical consumption is expected to increase. Additionally, growth in chemical-intensive industries, such as construction materials, electronic devices, and personal care products, will lead to an increase in the quantity and complexity of chemicals in products. New trade forms, such as e-commerce, allow chemicals to bypass traditional distribution channels, crossing different chemical regulatory frameworks across countries and regions. These trends will result in a rise in the overall volume of chemicals, as well as an increase in management complexity and the risks of chemicals entering food, crops, and the environment[6].

Unlike hazardous chemicals or those with acute toxicity, many chemicals found in everyday consumer products—such as construction materials, personal care products, furniture, food packaging, clothing, textiles, and pesticides—have a more gradual and often overlooked impact. However, existing research has shown that toxic and harmful chemicals have negative effects on human health and the environment. Further studies may reveal even larger negative impacts than previously known. According to data from the European Environment Agency (EEA) in 2018, approximately 62% of the 345 million tons of chemicals consumed in the EU in 2016 were hazardous to health.

2.UNEP. (2019). Knowledge Management and Information Sharing for the Sound Management of Industrial Chemicals. Montevideo: Secretariat of the Strategic Approach to International Chemicals Management. https://icca-chem.org/wp-content/uploads/2020/05/Knowledge_Information_Sharing_Study_UNEP_ICCA.pdf

3.UNEP. (2019). Global Chemicals Outlook II. From Legacies to Innovative Solutions: Implementing the 2030 Agenda for Sustainable Development. https://www.unep.org/resources/report/global-chemicals-outlook-ii-legacies-innovative-solutions

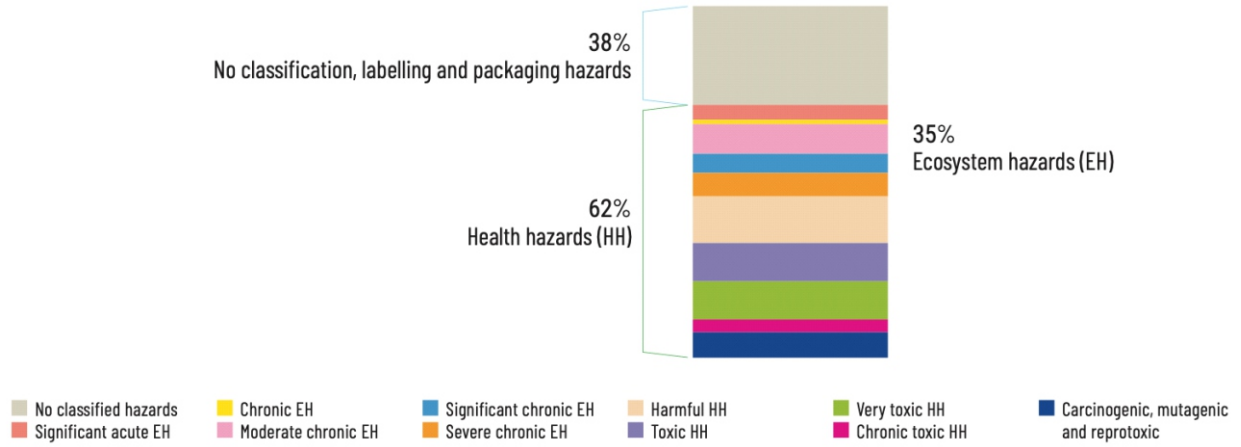
4.Statista. (2022). Total revenue of the chemical industry worldwide from 2005 to 2021.

https://www.statista.com/statistics/302081/revenue-of-global-chemical-industry/

5.CEFIC. (2022). 2022 Facts and Figures Of The European Chemical Industry. https://cefic.org/a-pillar-of-the-european-economy/facts-and-figures-of-the-european-chemical-industry/

6.Toxic Free Corps. (2021). The General Situation and Reform Progress of International Chemicals Management. http://www.toxicsfree.org.cn/html/6218971812.html

Figure 1: Share of the volume of chemicals consumed in the European Union in 2016 by hazard categories (based on European Environment Agency 2018)



Data from Eurostat (the statistical office of the EU) shows that 62 percent of the 345 million tonnes of chemicals consumed in the EU in 2016 were hazardous to human health; while 35 percent were hazardous to ecosystems.

Source: UNEP. Global Chemicals Outlook II.

1.1.1 Health Hazards

Chemical pollution is one of the largest environmental risk factors contributing to human disease and premature death. According to updated data from the World Health Organization (WHO) in 2021, an estimated 2 million lives were lost in 2019 due to exposure to selected chemicals—a significant increase from the 1.6 million estimated in 2016[7]. WHO has cautioned, however, that due to limitations in data availability, this figure reflects only a small subset of chemical exposure scenarios. In reality, daily human exposure to chemicals is pervasive and difficult to quantify.

Findings published in 2022 by The Lancet Commission on Pollution and Health further underscore the urgency: in 2019, pollution was responsible for 9 million deaths globally—equivalent to one in every six deaths. Of these, more than 1.8 million were directly attributed to toxic chemical exposure[8]. While progress has been made in reducing deaths from traditional pollution sources associated with extreme poverty, mortality from modern pollution—particularly air pollution and toxic chemical pollutants—has risen sharply in recent years.

The known health impacts of chemical exposure include carcinogenicity, and damage to the immune, respiratory, endocrine, reproductive, and cardiovascular systems. In the context of the COVID-19 pandemic, some researchers have raised concern over the adverse effects of certain chemicals on immune function. A compromised immune system may reduce vaccine efficacy and heighten susceptibility to infectious disease[9].

Human biomonitoring studies in the European Union have detected an increasing diversity of hazardous chemicals in blood and bodily tissues. These substances include pesticides, biocides, pharmaceuticals, heavy metals, plasticizers, and flame retardants, highlighting the widespread and growing burden of chemical exposure in the human population[10].

7.World Health Organization. (2021). The public health impact of chemicals: knowns and unknowns: data addendum for 2019 (No. WHO/HEP/ECH/EHD/21.01). https://www.who.int/publications/i/item/WHO-HEP-ECH-EHD-21.01.

8.Fuller, R., Landrigan, P. J., Balakrishnan, K., Bathan, G., Bose-O'Reilly, S., Brauer, M., ... & Yan, C. (2022). Pollution and health: a progress update. The Lancet Planetary Health, 6(6), e535–e547. https://doi.org/10.1016/S2542-5196(22)00090-0

9.European Commission. (2020). Chemicals Strategy for Sustainability Towards a Toxic-Free Environment.

10.European Commission. (2020). Chemicals Strategy for Sustainability Towards a Toxic-Free Environment.

Humans can be exposed to toxic and hazardous chemicals through multiple pathways, including the ingestion of contaminated food or drinking water—particularly from agricultural chemical pollution—as well as inhalation or dermal contact with consumer products containing toxic and hazardous substances. The United Nations Environment Programme, in the Global Chemicals Outlook II, highlights findings from global studies and sampling data, which reveal the presence of chemicals of high concern in food. These include lead, dioxins, imidacloprid, bisphenols, microplastics, methylmercury, inorganic arsenic, and pesticide residues[11].

For consumers, non-food consumer products are also a major source of toxic and hazardous chemical exposure and accumulation in the body. In response, the European Union's Chemicals Strategy for Sustainability has introduced risk management measures for certain chemicals used in consumer products such as food contact materials, toys, childcare articles, cosmetics, detergents, furniture, and textiles. These include substances known to cause cancer, gene mutations, reproductive and endocrine disruption. The strategy also calls for immediate and comprehensive assessment of chemicals in consumer products that affect the immune, neurological or respiratory systems, or that are toxic to a specific organ[12].

1.1.2 Environmental Hazards

Chemical pollution is intricately linked with other environmental issues such as climate change and biodiversity loss. The chemical manufacturing industry is itself a significant source of greenhouse gas emissions. Furthermore, climate change contributes to the release of persistent organic pollutants (POPs) as glaciers and permafrost melt, and increases the risks of chemical environmental hazards due to extreme weather events and disasters. A significant quantity of chemicals has been released into the environment, affecting both terrestrial and marine ecosystems, and presenting challenges to biodiversity conservation.

Numerous chemicals are present in the environment, including in the atmosphere, oceans, freshwater bodies, and soil, and they accumulate in the bodies of plants and animals. In addition to the well-documented issue of microplastics, at least hundreds of toxic and hazardous chemicals have been found in the oceans. Additionally, chemicals in the environment include brominated flame retardants in freshwater, perfluorinated compounds, polybrominated diphenyl ethers, heavy metals in soil, and others. These chemicals enter the food chain, further harming wildlife. Studies have found that birds in different regions globally contain polybrominated diphenyl ethers, and mercury levels in aquatic food webs are reaching concerning levels for both ecosystems and human health. For wildlife, prolonged or high levels of exposure to certain chemicals can lead to reproductive, immune, and neurological damage, and even death.

Endocrine-disrupting chemicals can also have detrimental effects on wildlife at very low concentrations (e.g., feminization of male fish, inhibiting reproduction, or causing population collapse). In agriculture, widespread use of pesticides harms pollinators and insects, ultimately jeopardizing ecosystem services such as crop pollination. Neonicotinoids, for example, which are among the world's most widely used insecticides, can affect the sperm count of male honey bees and reduce the number of queen bees. Adverse effects on pollinators, in turn, have direct effects on agricultural yields and food supplies[13].

The accumulation of these chemicals in the environment eventually leads to human health risks. A study in the EU examined 2,336 of the 15,000 substances registered under the EU REACH Regulation (The Regulation on the registration, evaluation, authorisation, and restriction of Chemicals)ii. Among these, carcinogenic and mutagenic substances, along with surfactants, were identified as the primary components of the top ten emerging chemical risks potentially present in the human food supply[14].

11.UNEP. (2019). Knowledge Management and Information Sharing for the Sound Management of Industrial Chemicals. Montevideo: Secretariat of the Strategic Approach to International Chemicals Management. https://icca-chem.org/wp-content/uploads/2020/05/Knowledge_Information_Sharing_Study_UNEP_ICCA.pdf

12.European Commission. (2020). Chemicals Strategy for Sustainability Towards a Toxic-Free Environment.

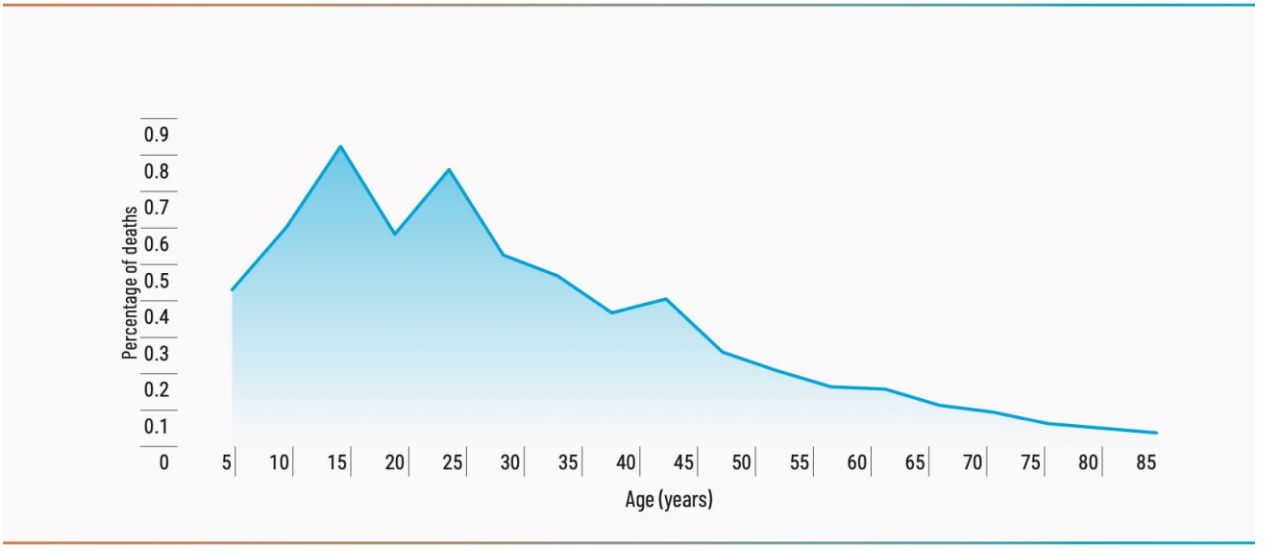
13.UNEP. (2019). Global Chemicals Outlook II. From Legacies to Innovative Solutions: Implementing the 2030 Agenda for Sustainable Development. https://www.unep.org/resources/report/global-chemicals-outlook-ii-legacies-innovative-solutions

14.European Environment Agency. (2020). The European environment - state and outlook 2020 Knowledge for transition to a sustainable Europe.

1.1.3 Hazards to Specific Groups

Children's health and development can be harmed by exposure to various toxic and hazardous chemicals. Due to their higher body surface to weight ratio and ongoing organ growth and development, children are particularly vulnerable to chemical exposure. Issues such as learning disorders, hyperactivity, and attention deficits may be linked to exposures of foetuses or infants to toxic and hazardous chemicals, including lead, mercury, manganese, dioxin, and polychlorinated biphenyls (PCBs). Fetal brain development is particularly sensitive to methylmercury and PCBs, which can impair neurons and synapses in the developing brain. A 2013 study in Europe found that 1.8 million children are born every year with methylmercury levels exceeding safety standards[15]. According to statistics from the World Health Organization (WHO), children and adolescents are disproportionately affected by the health impacts of toxic and hazardous chemicals compared to adults.

Figure 2. Percentage of deaths attributed to unintended poisonings by selected chemicals by age (Based on WHO data)



Source: UNEP. Global Chemicals Outlook II.

Health issues resulting from exposure to toxic and hazardous chemicals in workplaces and consumer products are particularly concerning for women. Breast cancer is one of the most commonly diagnosed forms of cancer worldwide, accounting for one in eight cancer diagnoses globally. In 2020 alone, approximately 2.3 million new cases of breast cancer were reported worldwide16. While social and genetic factors play a key role in the development of breast cancer, certain chemicals such as PCBs, ethylene oxide, and dioxins have also been identified as risk factors[17].

Exposure to toxic and hazardous chemicals has also been linked to reduced female fertility and infertility. Studies have associated reproductive health issues with exposure to substances including bisphenol A (BPA), chlorinated hydrocarbons, disinfection by-products, ethylene oxide, ethylene glycol esters, heavy metals, pesticides, phthalates, solvents, perfluorinated compounds (PFCs), and octyl/nonylphenols. These chemicals are either directly associated with infertility or with medical conditions that can lead to infertility in women[18].

15.Bellanger, M., Pichery, C., Aerts, D., Berglund, M., Castaño, A., Čejchanová, M., ... & DEMO/COPHES. (2013). Economic benefits of methylmercury exposure control in Europe: monetary value of neurotoxicity prevention. Environmental Health, 12, 1-10.

16.Arnold, M., Morgan, E., Rumgay, H., Mafra, A., Singh, D., Laversanne, M., ... & Soerjomataram, I. (2022). Current and future burden of breast cancer: Global statistics for 2020 and 2040. The Breast, 66, 15-23.

17.UNEP. (2019). Global Chemicals Outlook II. From Legacies to Innovative Solutions: Implementing the 2030 Agenda for Sustainable Development. https://www.unep.org/resources/report/global-chemicals-outlook-ii-legacies-innovative-solutions

18.Caterbow, A., & Johanna, H. (2016). Women and Chemicals, The impact of hazardous chemicals on women. Netherlands, Women in Europe for a Common Future (WECF), 33-40.

Women play a central role in the purchase and use of household consumer products, and are frequently exposed to cleaning agents, textiles, personal care items, and cosmetics — all of which often contain a wide range of chemical substances. For example, cosmetics involve the use of numerous chemical ingredients, some of which may cause allergic reactions or irritation at certain concentrations. In substandard or non-compliant products, prohibited substances with higher health risks may also be present.

Exposure to toxic and hazardous chemicals during pregnancy and breastfeeding can pose significant health risks to the fetus or infant. In fact, prenatal development is considered one of the most vulnerable stages for chemical-related health effects[19]. Persistent and bioaccumulative chemicals can remain in the human body long after initial exposure and may be transferred from mother to child in utero or through breast milk. Studies have shown a general association between high maternal exposure to phthalates and bisphenol A (BPA) during the perinatal period and abnormal pubertal development in children later in life[20].

1.2

Progress in the Management of Chemicals in Products

Chemicals contained in products may be released at any stage of the product's lifecycle — from production and use, to recycling and eventual disposal — potentially causing harm to human health and the environment. Therefore, the exchange of information related to chemicals, environmental and human health impacts, and technical considerations along the product value chain is critical for all stakeholders, including manufacturers, brand owners, retailers, end users, waste managers, and regulators.

In response to the growing global use of chemicals and the increasing recognition of their hazards through scientific research, countries around the world have been working to establish comprehensive and effective frameworks for chemicals management. As early as 1972, the United Nations Conference on the Human Environment in Stockholm recommended the establishment of an "International Register of Potentially Toxic Chemicals" (IRPTC) to provide sufficient information for assessing the risks chemicals pose to human health and the environment. By 1992, the United Nations Conference on Environment and Development (UNCED) formally incorporated chemicals management into the global sustainable development strategy through Agenda 21.

Since then, a series of major multilateral agreements on chemicals and waste have been adopted and entered into force, including the Montreal Protocol on Substances that Deplete the Ozone Layer, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, ILO Convention No. 170 concerning Safety in the Use of Chemicals at Work, ILO Convention No. 174 concerning the Prevention of Major Industrial Accidents, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, the Stockholm Convention on Persistent Organic Pollutants, and the Minamata Convention on Mercury. China has actively participated in the development and implementation of these agreements and is a party to most of them.

However, these targeted multilateral agreements and conventions each have limitations in scope and are not sufficient to comprehensively address the broad range of chemical safety challenges. In response, the first International Conference on Chemicals Management (ICCM1) was held in Dubai in 2006, bringing together ministers, national delegates, civil society representatives, and private sector stakeholders. At this conference, participants adopted the Strategic Approach to International Chemicals Management (SAICM).

SAICM set an overarching goal: to achieve the sound management of chemicals throughout their entire lifecycle so that, by 2020, the adverse impacts of chemical production and use on human health and the environment would be minimized. In 2009, at the second session of the International Conference on Chemicals Management (ICCM2), a review of progress led to the identification of eight Emerging Policy Issues (EPIs) requiring urgent attention. In addition to specific product types and chemical categories, these issues included the challenge of Chemicals in Products (CiP).

19.Crain, D. A., Janssen, S. J., Edwards, T. M., Heindel, J., Ho, S. M., Hunt, P., ... & Guillette Jr, L. J. (2008). Female reproductive disorders: the roles of endocrine-disrupting compounds and developmental timing. Fertility and sterility, 90(4), 911-940.

20.Berger K, Eskenazi B, Kogut K, Parra K, Lustig RH, Greenspan LC, et al. 2018. Association of prenatal urinary concentrations of phthalates and bisphenol and pubertal timing in boys and girls. Environ Health Perspect 126(9):97004,PMID:30203993,https://doi.org/10.1289/EHP3424

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SAICM’s 2020 goal was not achieved. In parallel, the European Union set its own target in 2013: to minimize the significant adverse effects of chemical production and use on human health and the environment by 2020. To advance this goal, the EU enacted more than 40 pieces of legislation — including both comprehensive, horizontal frameworks and sector-specific laws — positioning the EU as a global leader in chemicals management.

Among these, the most critical are the Regulation on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) and the Regulation on Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulation). REACH plays a preventive role by regulating chemicals entering the EU market through mechanisms such as the continually updated Substances of Very High Concern (SVHC) list and Annex XVII restriction list, aiming to reduce exposure to toxic and hazardous substances in consumer products.

In the United States, a significant step forward was taken with the 2016 amendment of the Toxic Substances Control Act (TSCA) through the Lautenberg Chemical Safety for the 21st Century Act (LCSA). This amendment empowered the U.S. Environmental Protection Agency to conduct risk evaluations of chemicals and enhanced transparency in chemical information.

Similar to the EU, China has adopted various sectoral and departmental regulations related to chemicals, but it has not yet established an integrated chemicals management framework equivalent to REACH. China's Regulations on the Safety Management of Hazardous Chemicals primarily target highly toxic, explosive, flammable, oxidizing, and corrosive chemicals, with little coverage of chemicals used in everyday consumer products.

For consumer goods, China has implemented laws such as the Product Quality Law of the People's Republic of China, the Administrative Measures on Pollution Control of Electronic Information Products, and a series of mandatory national standards. These include Toy Safety, Limits of Hazardous Substances in Indoor Decoration and Renovation Materials, and General Safety Requirements for Student Supplies, all of which regulate hazardous chemicals in specific product categories.In addition, programs such as Environmental Labelling Certification and Compulsory Product Certification (CCC) also touch upon chemical safety to varying degrees.

To address the longstanding absence of a general standard for chemical safety in consumer products, China’s Standardization Administration issued GB/T 39498-2020: Guidelines for the Control of Key Chemical Substances in Consumer Products in 2020. This standard, effective as of June 1, 2021, restricts 117 hazardous substances across

major consumer product categories in China. However, as a non-mandatory standard, its enforcement and impact remain limited.

Since 2018, when President Xi Jinping called for "dedicated and forward-looking research on the control of emerging pollutants" at the National Conference on Ecological and Environmental Protection, China has taken significant steps to address this issue. In May 2022, the General Office of the State Council issued the Action Plan for the Control of Emerging Pollutants, outlining a comprehensive national framework for managing such pollutants. During the 14th Five-Year Plan period, targeted control measures will be implemented for a number of priority emerging pollutants. The importance of this work was further emphasized in the report of the 20th National Congress of the Communist Party of China in October 2022, where the need to "carry out emerging pollutant control" was reaffirmed.

Globally, emerging pollutants of concern include persistent organic pollutants (POPs), endocrine-disrupting chemicals (EDCs), antibiotics, and microplastics. Among the specific measures outlined in the Action Plan for the Control of Emerging Pollutants is the strengthening of restrictions on concentration levels of priority emerging pollutants in products. Specifically, mandatory national standards will incorporate limits on the concentration of certain priority pollutants in relevant consumer products such as toys and school supplies, with strict oversight and enforcement. This aims to reduce environmental releases of emerging pollutants throughout the lifecycle of these products, particularly during their use phase.

Effective control of chemicals in products is increasingly recognized as a key pillar of sound chemicals management worldwide. Both international priorities and evolving national and regional policies point to a common direction: minimizing the adverse impacts of hazardous chemicals on human health and the environment through strengthened product-level regulation. For e-commerce platforms—whether operating domestically or engaging in cross-border trade—ensuring the chemical safety of products is becoming a clear and growing compliance obligation.

1.3

Existing Challenges in the Sale of Hazardous Chemicals and Products on E-Commerce Platforms

In recent years, e-commerce has emerged as a growing focus in the European Union's reviews of chemical hazards and related regulatory measures. The EU's Chemicals Strategy for Sustainability highlights that 30% of hazardous products on the EU market are linked to chemicals, with 90% of those being imported. It further notes that "online sales pose particular challenges," identifying e-commerce as one of the areas of "high risk of non-compliance" with chemicals legislation[21].

In 2020, the European Chemicals Agency (ECHA) conducted an enforcement project targeting online products and found widespread non-compliance. Under REACH restrictions, 87% of the inspected products sold online failed to meet regulatory requirements. These included both commercial and consumer goods such as textiles, leather goods, baby products, toys, and jewelry. Among the 2,600 products inspected, more than 1,800 contained carcinogenic, mutagenic, or reprotoxic (CMR) substances—such as lead and boric acid in solder used for welding. Other violations included phthalates in toys and cadmium in jewelry[22].

In response, ECHA has called for significantly stronger protections for online consumers. The EU is taking concrete steps to address chemical safety challenges in e-commerce, including the launch of the "Product Safety Pledge," an initiative joined by major retail platforms such as Alibaba, a leading China-based multinational e-commerce company. This initiative aims to enhance internal and external compliance mechanisms for chemicals sold online, thereby reducing health risks to EU consumers.

21.European Commission. (2020). Chemicals Strategy for Sustainability Towards a Toxic-Free Environment.

22.ECHA. (2021). Majority of inspected products sold online breach EU chemicals laws ECHA/NR/21/29. https://echa.europa.eu/-/majority-of-inspected-products-sold-online-breach-eu-chemicals-laws

Figure 3. "Product Safety Pledge" and Signatories

Source: European Commission

China has established itself as the world's largest online retail market, holding this position for 11 consecutive years. As of December 2023, the number of online consumers in China reached 915 million. In 2023, the total value of online retail sales of physical goods in China amounted to RMB 13 trillion (approximately USD 1.83 trillion), marking an 8.4% year-on-year increase and accounting for 27.6% of total retail sales of consumer goods[23]. Chinese e-commerce companies also occupied three of the top ten positions globally in terms of market capitalization in 2024[24].

The rapid development of online retail has expanded consumer access and emerged as a key driver of economic growth and consumption. At the same time, the environmental footprint of the industry has become increasingly evident. According to the Green E-commerce Action Guide: Addressing the Environmental Impacts of Retail E-commerce in China, the environmental impacts of retail e-commerce span multiple dimensions—including climate change, solid waste, biodiversity, sustainable food systems, and chemicals management[25].

Compared with well-documented challenges such as the solid waste and single-use plastic pollution driven by e-commerce and food delivery packaging, or the greenhouse gas emissions from e-commerce increasingly recognized in light of China's "dual carbon" goals (carbon peaking and carbon neutrality), the issue of toxic and hazardous chemicals in products sold via e-commerce platforms has yet to receive adequate attention. However, as previously discussed, rising compliance thresholds in global markets, the rollout of national policies such as China's emerging pollutants control strategy, and growing consumer awareness of health, sustainability, and product safety are all converging to make chemicals management in e-commerce an increasingly urgent priority.

The issue of toxic and hazardous chemicals in products sold on international e-commerce platforms has become a prominent concern for both government agencies and civil society organizations. In China, the presence of such chemicals in products sold via domestic e-commerce platforms has also drawn increasing attention in recent years from national regulatory authorities, civil society groups, and consumers.

Toxics-Free Corps, a nonprofit organization dedicated to promoting sound chemicals management and advocating for the control of toxic and hazardous substances in consumer products, has compiled an overview of products containing toxic and hazardous chemicals sold on Chinese e-commerce platforms. This was based on independent testing, data collection, and related investigations. The findings offer insight into key areas of concern regarding the presence of toxic and hazardous substances in China's online retail sector.

23.China.org.cn. (2021, February 3). China releases report: Country ranks as the world's largest online retail market for eight consecutive years. http://news.china.com.cn/txt/2021-02/03/content_77183331.htm

24.Ministry of Commerce, Cyberspace Administration of China, & National Development and Reform Commission. (2021). 14th Five-Year Plan for E-commerce Development.

25.Break Free From Plastic, SEE Foundation Jiangnan Project Center, Shenzhen Zero Waste, & Toxics-Free Corps. (2022). Green E-commerce Action Guide: Addressing Environmental Impacts of Retail E-commerce in China. One Planet Network. https://www.oneplanetnetwork.org/knowledge-centre/resources/green-e-commerce-action-guide-addressing-environmental-impacts-retail-e

1.3.1 Non-Food Consumer Products

Table 1. Summary of Excessive Levels of Toxic and Hazardous Chemicals Found in Non-food Consumer Products Sold on E-commerce Platforms (2019–2022), Based on Sampling Inspections by National and Local Market Supervision Authorities and Consumer Associations (Partial Data)

Toxic and Hazardous Chemical Substances and Associated Non-compliant Product Categories	Number of Reported Cases	Toxic and Hazardous Chemical Substances and Associated Non-compliant Product Categories	Number of Reported Cases
Phthalates	**70**	**Preservatives**	**4**
Children's clothing, footwear, accessories	49	Personal care cosmetics	2
Toys	16	Toys	2
Footwear	4	**Alkylphenol ethoxylates (APEOs)**	**2**
Children's home products	1	Clothing	2
PH Value	**54**	**Volatile organic compounds (VOCs)**	**2**
Clothing	21	Paints	2
Children's clothing, footwear, accessories	19	**Benzene**	**2**
Textiles	11	Stationery and similar items	2
Bedding products	3	**Overall migration (50% ethanol, 4% acetic acid)**	**1**
Heavy metals (Lead, Arsenic, Cadmium)	**36**	Other food-contact products	1
Children's clothing, footwear, accessories	36	**Phenol**	**1**
Formaldehyde	**12**	Toys	1
Furniture	7	**Short-chain chlorinated paraffins (SCCPs)**	**1**
Children's clothing, footwear, accessories	4	Footwear	1
Clothing	1	**Potassium permanganate consumption**	**1**
Boron	**8**	Other food-contact products	1
Toys	8	**Total volatile organic compounds (TVOC)**	**1**
Carcinogenic aromatic amines	**6**	Furniture	1
Clothing	3	**Melamine**	**1**
Textiles	1	Children's home products	1
Bedding products	1	**Heavy metals**	**1**
Children's clothing, footwear, accessories	1	Children's clothing, footwear, accessories	1
Dichloromethane-soluble	**6**	**Chromium (Ⅵ)**	**1**
Clothing	6	Children's clothing, footwear, accessories	1
Carbon monoxide CO	**5**		
Gas appliances and parts	5		
Total			**215**

Based on publicly available data collected from 2019 to 2022 through online searches of sampling inspections conducted by market supervision authorities and consumer associations, non-food consumer products sold on e-commerce platforms were found to frequently exceed national or other relevant standards for several toxic and hazardous chemical substances. These substances include phthalates, formaldehyde, heavy metals (arsenic, lead, cadmium), boron, and carcinogenic aromatic amines. These frequently detected toxic and hazardous chemicals were

mainly concentrated in children's clothing, footwear, and accessories; toys and stationery; textile products; and coatings.

Phthalates (PAEs), the most frequently detected hazardous chemical in the retrieved data, are widely used as plasticizers, lubricants, and effective organic solvents in consumer products. As semi-volatile organic compounds (SVOCs), phthalates can enter the human body through ingestion (e.g., via toys), inhalation of indoor dust, or even transplacental transfer. Their presence in consumer products has also been highlighted by UNEP in its Global Chemicals Outlook II as one of eleven priority chemical issues of concern.

Phthalates are classified as endocrine-disrupting chemicals (EDCs) and have been associated with reproductive disorders in both men and women, including decreased sperm quality, premature ovarian failure, and disruptions in pubertal development[26]. Products purchased on e-commerce platforms—particularly those intended for infants and children—frequently contain phthalates at levels exceeding regulatory limits. These include plastic toys, erasers, book covers, and children's footwear.

In 2019, testing revealed that only 25% of the "Little Yellow Duck" toys sold on China's top three e-commerce platforms (Taobao, JD.com, and Pinduoduo) complied with safety standards for plasticizer content. It was only after civil society advocacy that the excessive levels of plasticizers in these products were addressed[27]. In 2022, Toxics-Free Corps tested 90 of the top-selling erasers purchased from JD.com, Taobao, and Pinduoduo; 4% exceeded the legal limits for phthalates. In 2023, Toxics-Free Corps purchased 10 types of children's toy hoppers (bouncy balls) from Pinduoduo. Six of them exceeded the phthalate limits, resulting in a non-compliance rate of 60%. The highest phthalate concentration detected was 252 times higher than the regulatory limit. The same year, the organization tested 50 pairs of infant-sized PVC shoes purchased from Taobao, JD.com, Pinduoduo, Douyin, and Kuaishou; 44 pairs exceeded the phthalate limit, yielding a non-compliance rate of 88%, with the most extreme case exceeding the limit by 828 times.

Formaldehyde, a long-standing concern in the home furnishing and interior decoration sectors, continues to attract high levels of public attention. Yet despite this scrutiny, excessive formaldehyde levels are still being detected in e-commerce-sold products. In 2023, Toxics-Free Corps tested 45 small bed tables made of engineered wood purchased from JD.com, Taobao, and Pinduoduo. Of these, 39 exceeded formaldehyde emission limits, resulting in a non-compliance rate of 87%. The highest formaldehyde release level was 15 times above the permissible limit.

In addition to phthalates and formaldehyde, excessive levels of heavy metals detected in products sold via e-commerce platforms are also a widespread concern. Among them, lead is a well-known multisystem toxicant. Exposure can cause chronic damage to individuals across all age groups, weakening bodily systems and posing particularly serious risks to children and pregnant women. "Lead in paint" has been identified as one of the eight "emerging policy issues" requiring urgent action by the International Conference on Chemicals Management (ICCM), and UNEP's Global Chemicals Outlook II has further called for comprehensive regulation of lead across broader applications.

Nevertheless, lead levels exceeding safety limits have been found in various products sold online—including wall paints used in home renovation and lipsticks in the cosmetics sector[28] [29]. In August 2023, the Jiangsu Consumer Rights Protection Committee released the results of a comparative test on whitening and spot-removal products. Of the 45 batches tested, 7 were found non-compliant with relevant standards, with 5 of them exceeding the mercury limit by several hundred to over a thousand times. None of these seven non-compliant products had proper registration or filing information, and all were sourced from the Taobao platform[30].

Another group of chemicals—per- and polyfluoroalkyl substances (PFAS), including perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS)—has drawn significant attention due to their extreme persistence, mobility, and potential toxicity. PFAS are among the priority substances identified under China's emerging pollutants control efforts.

26.Hlisníková, H., Petrovičová, I., Kolena, B., Šidlovská, M., & Sirotkin, A. (2020). Effects and mechanisms of phthalates' action on reproductive processes and reproductive health: A literature review. International Journal of Environmental Research and Public Health, 17(18), 6811. https://doi.org/10.3390/ijerph17186811

27.Toxics-Free Corps. (2021, June 29). Press release: The third annual inspection of the Little Yellow Duck under joint oversight—this time, it passed with a smile. http://www.toxicsfree.org.cn/html/573098259.html

28.Toxics-Free Corps. (2021, August 27). Buying non-CCC-certified paint online brings high lead exposure risks! https://mp.weixin.qq.com/s/yYlbpQRSRi3ThYaeGOPDng

29.Toxics-Free Corps. (2019, April 18). 10 bestselling lipsticks (100,000+ sold): These 4 should definitely be avoided. https://mp.weixin.qq.com/s/SrKML81zi0Yr_zi0EXhPZg

30.CCTV 13. (2023, August 6). Weekly Quality Report. https://mp.weixin.qq.com/s/TCiCfgWS81sQ8s-vZ2YdYw

Because of their oil-, stain-, and water-resistant properties, PFAS are widely used in everyday products such as textiles, lubricants, surfactants, fire extinguishers and paints, non-stick cookware coatings, food packaging, electronic devices, fire-fighting gear, and fire-fighting foams. Toxics-Free Corps conducted PFAS testing on outdoor windproof gloves and found that all ten samples (100%) purchased from e-commerce platforms contained fluorotelomer alcohol 8:2 FTOH[31].

The European Union and multiple U.S. states have imposed restrictions on the use of PFAS in food contact materials, children's products, and toys

In the EU, specific limits have been established for perfluorocarboxylic acids (PFCAs) containing 9 to 14 carbon atoms, their salts, and related substances. For example, the content of perfluorooctane sulfonate (PFOS) and its derivatives must not exceed 1 μg/m² in textiles or other coated materials. The content of perfluorooctanoic acid (PFOA) and its salts must not exceed 0.025 mg/kg in substances, mixtures, or articles, and the combined total of PFOA-related substances (whether individually or in sum) must not exceed 1 mg/kg.

In the United States, California prohibits the intentional addition of PFAS in children's products and has established a limit of less than 100 ppm total organic fluorine. Colorado has banned the intentional addition of PFAS in carpets, fabric treatments, plant-based food packaging, children's products, and oil and gas products. Maine prohibits the sale of carpets, rugs, and fabric treatments containing intentionally added PFAS. Connecticut, Vermont, and Minnesota ban the use of PFAS in food packaging, while Maryland, New York, and Washington prohibit the presence of PFAS in food packaging made primarily from paper, cardboard, or other plant-derived materials[32].

1.3.2 Food and Food Contact Materials

As consumer purchasing habits continue to shift, an increasing number of people in China are choosing to buy fresh food products online, driving rapid growth in the fresh food e-commerce sector. In 2020, the market size of China's fresh food e-commerce industry reached RMB 458.49 billion (approximately USD 64.5 billion), representing a 64% increase compared to 2019. The sector is expected to maintain its high growth trajectory, with projections indicating that the market size will exceed RMB 1 trillion (approximately USD 140.8 billion) by 2023[33].

However, cases of excessive levels of contaminants and additives—such as pesticides, veterinary drugs, heavy metals, and microorganisms—in fresh food sold through online platforms are frequently reported. As a result, fresh food e-commerce platforms are often subject to administrative penalties from market regulators. These violations include: excessive levels of toxic and hazardous chemicals in aquatic products and edible agricultural products; the use of food additives in vegetable, meat, and fruit products exceeding legal limits, including colorants and preservatives banned by national regulations; residues of veterinary drugs in edible agricultural and bee products, including substances that are officially prohibited; and the illegal addition of pharmaceutical ingredients—such as stimulants like ephedrine and pseudoephedrine—in health supplements.

In August 2022, Toxics-Free Corps conducted laboratory testing on 18 samples of Gazami crab (Portunus trituberculatus) purchased from JD.com, Taobao, and Pinduoduo. The samples were selected from among the top-selling products on these platforms. Testing revealed that 16 out of 18 samples exceeded regulatory limits for cadmium, resulting in a non-compliance rate of 89%. The highest cadmium concentration detected was 4.8 times higher than the regulatory limit[34].

Cadmium is a toxic heavy metal harmful to both human health and ecosystems. It is recognized for its strong carcinogenic, teratogenic, and mutagenic effects. Cadmium can accumulate in the human body, causing severe damage to the kidneys, bones, and reproductive system. The International Agency for Research on Cancer (IARC) of the World Health Organization (WHO) has classified cadmium as a Group 1 carcinogen.

31.Toxics-Free Corps. (2022, August 5). Revealing the "forever chemicals" in outdoor gloves—PFAS: Investigation results. https://mp.weixin.qq.com/s?__biz=MzAwODc2Njk3OQ==&mid=2247551029&idx=1&sn=3fe0e477e99478798d3b35822f166c46&chksm=9b6b9b59ac1c124fb995cdc5aff3c4479eefed87075e5801d824e19fcba0f426c38de9efa7b2&scene=21#wechat_redirect

32.Zhang, L. (2023). Analysis and outlook on PFAS compliance requirements in consumer products in China, Europe, and the United States. Light Industry Standards and Quality, (02), 37–40. https://doi.org/10.19541/j.cnki.issn1004-4108.2023.02.004

33.iResearch. (2021). China fresh food e-commerce industry research report. https://pdf.dfcfw.com/pdf/H3_AP202105191492657272_1.pdf?1621446343000.pdf

34.Toxics-Free Corps. (2023). Investigation report on cadmium levels in Gazami crab (Portunus trituberculatus).

Table 2. Summary of Excessive Levels of Toxic and Hazardous Chemicals Found in Food Products Sold on E-commerce Platforms (2018–2021), Based on Sampling Inspections by National and Six Local Market Supervision Authorities and Consumer Associations (Partial Data)

Non-compliant Food Category	By-products/ Contaminants	Pesticides	Food Additives	Veterinary Drugs	Pharmaceutical Ingredients	Total
Fruit products	2		73		1	76
Edible agricultural products	25	23		13		61
Meat products	2		16	5		23
Vegetable products	6		16			22
Aquatic products	16		3			19
Bee products	1			13		14
Baked goods			14			14
Starch and starch-based products			11			11
Health supplements	3			1	3	7
Bean products	1		6			7
Processed grain products	2		5			7
Tea and related products		4			3	7
Beverages			5		1	6
Edible oils, fats, and related products	2		3			5
Roasted seeds and nuts products			5			5
Canned foods			5			5
Alcoholic beverages			5			5
Convenience foods	2		1			3
Seasonings			3			3
Potato products and puffed foods			3			3
Egg products	1		1			2
Frozen foods			2			2
Candy			1			1
Food for catering			1			1
Special dietary foods	1					1
Total	**64**	**27**	**179**	**32**	**8**	**310**

In addition to the intentional use or residue of chemical substances in food itself, there is another important source of chemical exposure—migration from food contact materials. These materials, such as plastics, paper, metals, inks, and adhesives, may contain toxic and hazardous substances that can leach into food. Once ingested, these chemicals can accumulate in the human body over time, potentially causing a range of toxic effects and harming human health.

Currently, plastic packaging accounts for over 50% of all food packaging in China[35]. With the growing popularity of takeout, the use of single-use plastic takeout containers has also risen sharply. During the manufacturing of plastic food packaging, various additives—such as antioxidants and plasticizers—may be used to meet performance requirements. These include substances like phthalates and bisphenol A (BPA), both known endocrine-disrupting chemicals (EDCs).

Paper-based food packaging is also often not made of pure paper alone. To achieve properties such as water, oil, and grease resistance, it is frequently coated with a plastic film. In the production of these materials, a range of chemical additives may be used, including phthalates, heavy metals, and BPA. White paper takeout containers may also contain optical brighteners. Some fast-food packaging is coated with PFAS-based oil-resistant layers. In addition, composite packaging materials, along with the inks and adhesives used on packaging surfaces, may also contain toxic and hazardous chemicals. These substances can migrate from the packaging into the food they come into direct contact with, as well as into the surrounding environment. Migration is particularly likely in the presence of water, alcohol, acidic or oily food matrices—especially oily foods—and under high-temperature conditions, all of which can accelerate the transfer of these hazardous substances from the packaging into food.

On e-commerce platforms—including food delivery services—consumer health and safety cannot be fully safeguarded if chemical control measures do not extend to food contact materials and packaging. Take mooncake trays as an example. In 2019, Toxics-Free Corps purchased five types of single-use plastic mooncake trays from e-commerce platforms and submitted them to a certified third-party laboratory for testing. The tests assessed the migration levels of four phthalates (DEHP, DBP, DINP, DAP) from the trays. Following a 10-day food contact simulation experiment, two PVC-based trays were found to have migrated plasticizers. One of them showed a DEHP migration level of 84.7 mg/kg[36], which is 55 times higher than the national standard limit.

In 2022, Toxics-Free Corps commissioned laboratory testing on infant edible oils purchased from three major e-commerce platforms. The results showed that 51% of the samples contained phthalates[37]. According to the Notice on Maximum Residue Limits of Phthalates in Food and Food Additives (Document No. [2011] 551) issued by the General Office of the Ministry of Health: "Phthalates are plasticizers that may be used in food packaging materials, but they are neither food ingredients nor food additives, and their intentional addition to food or food additives is strictly prohibited. When used in food packaging materials, phthalates must strictly comply with the Standard for the Use of Additives in Food Contact Materials and Articles (GB 9685-2016), including limits on the types, usage scope, and specific migration or residue levels. They must not come into contact with fatty foods or infant foods. The maximum residue limits for di(2-ethylhexyl) phthalate (DEHP), diisononyl phthalate (DINP), and dibutyl phthalate (DBP) in food and food additives are 1.5 mg/kg, 9.0 mg/kg, and 0.3 mg/kg, respectively."

Related studies have found that phthalate plasticizers in edible oils mainly originate from raw materials, concealed plastic seals, and packaging materials. Because plasticizers are not chemically bonded to the polymer structure of plastic products, they can readily migrate into edible oil products[38].

35.Lan, M., Li, H., Hu, L., Yang, Y., & Ying, G. (2021). Overview of environmental pollution from plastic food packaging materials. Asian Journal of Ecotoxicology, 16(5).

36.Toxics-Free Corps. (2020, June 7). World Food Safety Day: How much do you know about food packaging? https://mp.weixin.qq.com/s?__biz=MzAwODc2Njk3OQ==&mid=2247491149&idx=1&sn=500645a1a3fd6941ecc91abe10c1206a&chksm=9b688d21ac1f0437c4e1ca395f983642dbc010344be3a13e629a0c454e784065ea8b034a6f07&scene=178&cur_album_id=1372821715897909248#rd

37.Toxics-Free Corps. (2022, November 27). Is your baby's complementary food oil phthalate-free? | Investigation results. http://www.toxicsfree.org.cn/html/1853091751.html

38.Huang, W., & Zhao, X. (2016). Pathways and risk control of phthalate plasticizer contamination in edible oils. Journal of Food Safety and Quality, 8, 3108–3113.

1.3.3 Commercial Chemicals[iii]

The issue of toxic and hazardous chemicals on e-commerce platforms is not limited to the illegal use of chemicals and excessive pollution levels in food and non-food consumer products; it also includes the direct sale of toxic and hazardous commercial chemicals themselves. Such sales are generally governed by existing legal frameworks and are either clearly illegal or subject to strict regulatory control. For instance, the sale or promotion—whether directly on e-commerce or short video platforms, or indirectly through private channels—of certain banned chemicals or restricted-use pesticides constitutes a violation of relevant laws and regulations.

Mercury is a heavy metal known for its persistence, bioaccumulation, and toxicity. Even at extremely low concentrations, it poses significant risks to human health and aquatic and terrestrial ecosystems. The international community has reached broad consensus on the need for mercury control, leading to the adoption of the Minamata Convention on Mercury, which entered into force in China in 2017.

According to the Regulations on the Administration of Online Information on Hazardous Goods, entities engaged in the handling of hazardous goods are prohibited from publishing related information or establishing corresponding links on internet platforms other than their own official websites. Furthermore, they must obtain the appropriate value-added telecommunications business license for internet information services or complete a record-filing process for non-commercial internet information services. The hazardous goods referenced in these regulations include hazardous chemicals, and elemental mercury (pure mercury) is listed as a key hazardous chemical under China's stringent environmental management regime.

Nonetheless, environmental organizations have repeatedly found cases of elemental mercury being sold on e-commerce and short video platforms, with product descriptions often citing "alchemy" as its intended use39. Following advocacy and engagement from environmental groups, most platforms have implemented corrective measures such as product removal and keyword blocking. However, the sale of elemental mercury has not been fully eradicated from these online marketplaces.

As a subset of commercial chemicals, the sale of pesticides on e-commerce platforms also warrants close attention. According to research conducted by the environmental organization Nature Field, 20 types of restricted-use pesticides were found being sold across five major e-commerce and short video platforms. These included carbofuran, chlorpyrifos, daminozide, fipronil, cypermethrin, omethoate, and phorate, among others[40].

Article 21 of the Administrative Measures for Pesticide Business Licensing explicitly prohibits the online sale of restricted-use pesticides. In accordance with laws such as the Consumer Rights Protection Law and the E-commerce Law, internet platforms are obligated to conduct qualification reviews, oversee business activities, and ensure information disclosure for merchants operating on their platforms. Failure to fulfill these responsibilities—thereby enabling the unauthorized listing, sale, or promotion of toxic and hazardous commercial chemicals—exposes platforms to legal risks and makes them liable to corresponding legal consequences.

39.Huigui Huangye. (2021, December 3). Dangerous chemical mercury (quicksilver) can actually be freely traded on e-commerce platforms. https://mp.weixin.qq.com/s/ku2B9ah4JyqeqhuQu-iN8A

40.Nature Field. (2022, October 9). Are restricted-use pesticides still being illegally sold on major e-commerce and short video platforms? More than half are available online. https://weibo.com/1844019597/M9uFliqE4?type=repost

1.4

Advancing Proactive Chemical Management in E-Commerce Platforms

> "Consumer protection in the field of online transactions remains a key focus of consumer protection efforts in 2022. Specifically, it is necessary to further implement platform responsibilities, supervise platform operators in strictly fulfilling their duties of inspection, monitoring, and ensuring safety, promote cross-platform joint prevention and control as well as information sharing in response to illegal activities, guide platform operators to establish systems for disclosing standard contract terms, and require online business operators to genuinely fulfill their primary responsibility in safeguarding consumer rights."
>
> — Annual Report on the Protection of Consumer Rights and Interests in China (2021)

1.4.1 Reducing Compliance Risks and Meeting Regulatory Requirements

E-commerce platforms serve as the consumer-facing segment of the product distribution chain and bear an undeniable responsibility for safeguarding consumer health and safety. The United Nations Guidelines for Consumer Protection, revised by the United Nations Conference on Trade and Development (UNCTAD) in 2016, state that one of the key objectives is "to provide protection to consumers using electronic commerce that is no less than that afforded in other forms of commerce"[41]. China's 14th Five-Year Plan for the Modernization of Market Regulation also emphasizes the creation of a fair and competitive market environment. It calls for the strengthening of regulatory mechanisms for online market access and product quality and safety, and clarifies the responsibilities of various actors in online markets. This includes the obligation of platform enterprises to review and supervise the qualifications of merchants and the quality of goods sold on their platforms[42]. These provisions make clear that whether retail transactions occur online or offline, the level of consumer protection and the responsibilities borne by business operators should be equally robust.

The rapid growth of the retail e-commerce sector has brought economic prosperity and greater convenience to daily life, while also introducing new economic dynamics and governance challenges. China's E-commerce Law, adopted at the fifth session of the Standing Committee of the National People's Congress in August 2018, was a timely response to these challenges. It clearly stipulates that e-commerce operators must fulfill obligations related to consumer rights protection and environmental protection, and bear responsibility for the quality of their products and services.

Article 37 of the E-commerce Law specifies that e-commerce platform operators shall bear civil liability as sellers of goods or providers of services for any business explicitly marked as self-operated. For third-party (non-self-operated) businesses, Article 38 states that if a platform operator knows or should have known that a vendor on its platform is selling goods or providing services that fail to meet requirements for personal and property safety, or otherwise infringe upon consumers' legitimate rights and interests, and fails to take necessary actions, the platform operator shall be jointly liable with the vendor. Moreover, for products or services related to consumer life and health, if the platform operator fails to verify the qualifications of the vendor or neglects its duty to ensure consumer safety, resulting in consumer harm, it shall bear corresponding legal responsibility in accordance with the law.

E-commerce platforms have repeatedly been fined by market regulatory authorities for selling products containing toxic and hazardous chemicals. Without adopting proactive and forward-looking chemicals management measures, these platforms are likely to remain trapped in a reactive mode of compliance—exposed to growing regulatory risks and rising operational costs. These risks and costs will only intensify as domestic and international laws and policies continue to expand the scope and stringency of chemical controls.

41.UNCTAD. (2016). United Nations guidelines for consumer protection (Revision). United Nations Conference on Trade and Development. https://unctad.org/system/files/official-document/ditccplpmisc2016d1_en.pdf

42.State Council of the People's Republic of China. (2022, January 27). Notice of the State Council on issuing the 14th Five-Year Plan for the modernization of market regulation. http://www.gov.cn/zhengce/content/2022-01/27/content5670717.htm

1.4.2 Costs of Passive Chemical Management by E-Commerce Platforms

"Significant knowledge gaps remain regarding the impacts of chemicals on health and the environment."

— European Environment Agency (EEA), European Environment — State and Outlook 2020 (SOER 2020)

Only a very small proportion of chemicals currently in commercial use have undergone comprehensive toxicity and safety testing. As scientific evidence continues to accumulate, the toxic effects of certain chemicals are being increasingly revealed. At the same time, the expanding global production and diversity of chemicals are amplifying the potential environmental and health risks they pose. Consumer products are among the main channels through which the general population is exposed to toxic and hazardous chemicals. If e-commerce platforms fail to proactively and effectively manage the chemical safety of the products they sell, they risk facing escalating business threats and costs associated with chemical-related issues—including fines, lawsuits, product recalls, and damage to brand reputation.

Enterprises that do not take the initiative to understand the chemicals and associated risks in their products, and that fail to adopt precautionary management measures, will be left to passively respond to the increasing frequency and complexity of product safety issues. Estimates suggest that, due to the strengthening of chemical regulations, global corporate compliance costs for products are projected to reach USD 1.3 billion by 2022[43]. In recent decades, several well-known brands and retailers have faced lawsuits and fines for selling products containing toxic and hazardous chemicals—some even leading to bankruptcy in extreme cases. In the United States, regulatory agencies fined several major retailers a combined USD 138 million over a three-year period for failing to properly manage products that became hazardous waste when damaged or returned by customers. These companies included Walmart, Target, Walgreen Co., CVS Health, and Costco Wholesale[44].

In the e-commerce sector specifically, Amazon was exposed in 2019 for selling stationery products containing excessive levels of lead and cadmium, with some children's items exceeding legal limits for lead by up to 80 times. That same year, media reports identified 4,152 products on Amazon's website that failed to meet safety standards, were falsely labeled, or belonged to categories banned from sale by national regulations. Amazon subsequently recognized the need to invest heavily in order to prevent the sale of potentially harmful or expired products and to rebuild consumer trust[45].

E-commerce platforms in China have also been fined by regulatory authorities for selling products with excessive levels of hazardous chemicals. For instance, on January 26, 2022, the Shanghai Pudong New Area Market Supervision and Administration Bureau issued two administrative penalty decisions to Freshippo (known as Hema in Chinese, a retail platform for groceries and fresh goods owned by Alibaba Group). The penalties stemmed from two batches of Gazami crab (Portunus trituberculatus) that failed random inspections. The violations involved "the sale of edible agricultural products containing pathogenic microorganisms, pesticide residues, veterinary drug residues, biotoxins, heavy metals, and other substances harmful to human health, with concentrations exceeding national food safety standards". Freshippo was ordered to forfeit its illegal gains and fined a total of RMB 100,000 (approximately USD 14,000)[46]. In February 2022, Dingdong Maicai was fined more than RMB 200,000 (approximately USD 28,000) by the Shanghai Municipal Market Supervision Bureau for selling agricultural products such as mantis shrimp and sturgeon that contained cadmium levels exceeding safety limits[47].

43.Environmental Defense Fund. The Roadmap to Sustainable E-commerce. https://business.edf.org/insights/the-roadmap-to-sustainable-e-commerce/

44.Rossi, M. (2014). The Business Case for Knowing Chemicals in Products and Supply Chains.

45.Break Free From Plastic, SEE Foundation Jiangnan Project Center, Shenzhen Zero Waste, & Toxics-Free Corps. (2022). Green e-commerce action guide: Addressing environmental impacts of retail e-commerce in China. One Planet Network. https://www.oneplanetnetwork.org/knowledge-centre/resources/green-e-commerce-action-guide-addressing-environmental-impacts-retail-e

46.CNR News. (2022). Cadmium levels exceed limits in Gazami crabs sold by Shanghai Freshippo; seven penalties issued in 2022. http://www.cnr.cn/shanghai/tt/20220211/t20220211525738594.shtml

47.China Food Newspaper. (2022). Fresh food e-commerce: "Freshness" is the foundation of survival. http://www.cnfood.cn/article?id=1506558177893908482

1.4.3 Leveraging the Value Chain to Fulfill Environmental Responsibilities

Effective ecological and environmental protection at the national level depends on concrete implementation by enterprises. In 2020, the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council issued the Guiding Opinions on Building a Modern Environmental Governance System, which clarified the responsibilities and roles of various actors—government, enterprises, society, and the public—in environmental protection. The document emphasizes the importance of government leadership, while recognizing the central role of enterprises, and aims to establish a modern, multi-stakeholder system of environmental co-governance.

"Implement the green management responsibilities of e-commerce platforms, improve platform rules, and guide the formation of green production and consumption patterns."

— 14th Five-Year Plan for E-commerce Development

To fulfill their principal responsibility in environmental governance, enterprises must undertake a comprehensive assessment of their environmental impacts and adopt measures to strengthen environmental risk management, thereby enhancing both environmental and compliance management capacities. Chemical management—already a growing compliance challenge for e-commerce platforms—clearly stands out as one of the key environmental responsibility issues that enterprises must address.

The Action Plan for the Control of Emerging Pollutants, released in May 2022, calls for strengthened control over priority emerging pollutants in products through the establishment of concentration limits. For pollutants subject to such limits, the requirements will be incorporated into mandatory national standards for products such as toys and school supplies, and enforcement will be strictly monitored to reduce environmental releases of emerging pollutants during product use. These product categories—commonly sold on e-commerce platforms—are frequently found to contain excessive levels of toxic and hazardous chemicals. E-commerce platforms, therefore, have a responsibility to ensure compliance with these concentration limits and to reduce environmental emissions associated with their products.

"Encourage e-commerce enterprises to firmly establish a sense of principal responsibility for ecological and environmental protection, and to regard ecological conservation and sustainable development as fundamental principles of corporate development."

— Notice by the General Office of the Ministry of Commerce on Promoting the Green Development of E-commerce Enterprises

Since the onset of the COVID-19 pandemic, e-commerce has played an increasingly prominent role in stimulating consumption and expanding domestic demand. It has contributed to improving the quality and efficiency of consumption, continuously expanded the scale of the consumer market, and emerged as a major driver of economic recovery and a catalyst for the rebound of consumer activity[48]. As a new engine of economic growth, e-commerce demonstrates strong development resilience, cutting-edge technological innovation capacity, and resource integration capabilities.

E-commerce platforms function as strategic hubs within the value chain and wield what is often referred to as "platform power"[49]. With this power comes a heightened responsibility to engage in social governance and market oversight—roles that extend beyond those of ordinary market participants[50].

By serving as a bridge between the supply and demand sides, e-commerce platforms are uniquely positioned to advance green management responsibilities. On the upstream side, they can incorporate environmental compliance and sustainability requirements into platform governance, embedding sustainability criteria into platform policies and procurement frameworks. Downstream, they can harness their extensive consumer reach to promote green products and encourage sustainable consumption patterns—creating a feedback loop that reinforces sustainable practices across the supply chain. With their broad influence over actors throughout the value chain, e-commerce platforms have significant potential to drive coordinated and impactful environmental action[51].

48.Department of E-Commerce and Informatization, Ministry of Commerce. (2022). Report on the development of China's online retail market in the first half of 2022.

49.Lynskey, O. (2017). Regulating platform power (LSE Law, Society and Economy Working Paper No. 1/2017). London School of Economics and Political Science. http://eprints.lse.ac.uk/73404/1/WPS2017-01_Lynskey.pdf

50.Liu, H. (2021). The genesis of platform power: Mechanisms of re-centralization in networked society. Beijing Cultural Review.

51.Break Free From Plastic, SEE Foundation Jiangnan Project Center, Shenzhen Zero Waste, & Toxics-Free Corps. (2022). Green e-commerce action guide: Addressing environmental impacts of retail e-commerce in China. One Planet Network. https://www.oneplanetnetwork.org/knowledge-centre/resources/green-e-commerce-action-guide-addressing-environmental-impacts-retail-e

> "Promote e-commerce platforms, shopping malls, supermarkets, and other distribution enterprises in actively advancing green and low-carbon products. Promote green innovation in e-commerce and commercial circulation, drive upstream suppliers and service providers to green their production processes, and encourage downstream enterprises, merchants, and residents to voluntarily engage in green procurement."
>
> — Implementation Plan for Promoting Green Consumption

This role is further emphasized in the Implementation Plan for Promoting Green Consumption, released in 2022 by the National Development and Reform Commission and other agencies, which highlights the platforms' intermediary position between production and consumption. It calls on them to harness their green innovation capacity to drive the transformation of the entire value chain toward sustainability.

As e-commerce platforms take a more proactive role in chemicals management, they can contribute on multiple fronts. On the one hand, they can establish platform rules that require suppliers and merchants to ensure chemical compliance, disclose information on chemical substances in products, and encourage upstream actors to design and manufacture non-toxic and more sustainable chemicals from the outset. On the other hand, platforms can support consumer education to raise awareness, proactively provide chemical information and labeling, and thereby empower consumers to make greener choices.

1.4.4 Responding to Sustainable Expectations from Conscious Consumers and Responsible Investors

Demand for safe, green, and sustainable products has long shifted from a niche interest to a mainstream trend. In 2021, a global consumer survey spanning 17 countries found that 85% of consumers believed they had significantly increased their green purchasing choices in recent years[52]. In the field of chemical-related products, research by the NYU Stern School of Business estimated that between 2015 and 2019, sales of products incorporating green chemistry grew 12.6 times faster than their conventional counterparts, and 5.4 times faster than the overall market. By 2019, products using green chemicals accounted for more than 14% of the total market share. Even the COVID-19 pandemic did not slow the momentum of the green chemistry sector. Long-term market analysis projected a compound annual growth rate (CAGR) of 6.6% to 11.5% for the green chemistry industry during the 2020–2025 period[53].

> "The extent and pace at which companies in different countries develop more sustainable and inclusive business models will directly determine whether the SDGs can be achieved. At the same time, the challenges outlined by the SDGs will also impact all businesses."
>
> — SDG Business Guide (GRI, United Nations Global Compact, WBCSD)[55]

In China, recent findings show that consumers have consistently prioritized issues related to health, well-being, and responsible consumption over the past five years. Among a range of sustainability topics, "Good Health and Well-being" and "Responsible Consumption and Production" have emerged as the most closely followed. These areas—deeply connected to personal health, safety, and daily life—often hold greater immediate relevance for consumers than more abstract or long-term concerns such as climate change[54].

Importantly, these priorities align directly with Goals 3 and 12 of the United Nations 2030 Sustainable Development Goals (SDGs), both of which are intimately tied to the sound management of chemicals. The SDGs have become a key reference framework for national governments in developing sustainable development strategies and have also shaped corporate sustainability agendas worldwide. For businesses, aligning with the SDGs helps identify global priorities, anticipate emerging challenges, and uncover opportunities for long-term, sustainable growth.

52.Businesswire. (2021, October 14). Recent study reveals more than a third of global consumers are willing to pay more for sustainability as demand grows for environmentally-friendly alternatives. https://www.businesswire.com/news/home/20211014005090/en/Recent-Study-Reveals-More-Than-a-Third-of-Global-Consumers-Are-Willing-to-Pay-More-for-Sustainability-as-Demand-Grows-for-Environmentally-Friendly-Alternatives

53.Golden, J., Handfield, R., Daystar, J., Kronthal-Sacco, R., & Tickner, J. (2021). Green chemistry: A strong driver of innovation, growth, and business opportunity. Industrial Biotechnology, 17(6), 311–315. https://doi.org/10.1089/ind.2021.29232.jgo

54.SynTao & Jiemian News. (2020). China sustainable consumption report: New trends in sustainable consumption under a moderately prosperous society. https://mp.weixin.qq.com/s/nwVxDFlXkuKqfZvbwysa9Q

55.GRI, United Nations Global Compact, & World Business Council for Sustainable Development (WBCSD). (2018). SDG Compass: The guide for business action on the SDGs. https://sdgcompass.org/

Figure 4. Chemical Management Targets within the United Nations Sustainable Development Goals (SDGs)

Goal 3 Ensure healthy lives and promote well-being for all at all ages

Target 3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination.

Goal 6 Ensure availability and sustainable management of water and sanitation for all

Target 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping, and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse globally.

Goal 12 Ensure sustainable consumption and production patterns

Target 12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water, and soil to minimize their adverse impacts on human health and the environment.

As global environmental challenges—including climate change, biodiversity loss, and resource overconsumption—grow increasingly urgent, ESG investing has become a mainstream trend in international capital markets. The COVID-19 pandemic further underscored the importance of ESG integration. According to MSCI's 2021 Global Institutional Investor Survey, 90% of large institutional investors (managing over USD 200 billion in assets) indicated plans to increase ESG investments, with 55% planning a significant increase[56].

Data from the Global Sustainable Investment Alliance (GSIA) shows that in 2020, sustainable investments accounted for 35.9% of total managed assets in mature markets, reaching USD 35.3 trillion—a 15% increase from two years earlier[57]. Governments and stock exchanges worldwide, including in China, are accelerating efforts to promote ESG disclosure. These requirements are increasingly shifting from voluntary guidelines to mandatory frameworks.

To support businesses in meeting evolving regulatory expectations and enhancing CSR disclosure, the China Chain Store & Franchise Association (CCFA) released the Guidance on Corporate Social Responsibility Management for Chain Stores & E-Commerce Platforms: 2021 Edition. For e-commerce platforms, the guidelines help identify material CSR issues across environmental, social, and governance dimensions. Notably, social indicators such as "ensuring product quality and safety" and "promoting green and sustainable procurement" are directly linked to sound chemicals management[58].

In MSCI's ESG rating framework, chemical safety is categorized alongside product quality and safety under the social dimension of evaluation[59]. The Sustainability Accounting Standards Board (SASB), which develops ESG disclosure standards tailored to specific industries, includes relevant metrics for the retail sector. According to SASB's disclosure guidelines, retailers are required to "describe how they prioritize the reduction and/or elimination of toxic and hazardous chemicals in the products they sell, how these priorities are communicated to suppliers and enforced, and whether suppliers are encouraged or required to consider the use of alternative chemicals in product formulations"[60].

MSCI ESG Rating Indicators	SASB Standards – Retail Sector
• Product Responsibility	• Product Sourcing, Packaging, and Marketing
– Chemical Safety	– Assessment and management of risks and/or hazards associated with chemicals in products

56.MSCI. (2021). MSCI investment insights 2021: Global institutional investor survey. https://www.msci.com/documents/1296102/22910163/MSCI-Investment-Insights-2021-Report.pdf

57.Global Sustainable Investment Alliance (GSIA). (2021). 2020 global sustainable investment review. https://www.gsi-alliance.org/wp-content/uploads/2021/08/GSIR-20201.pdf

58.China Chain Store & Franchise Association (CCFA). (2021). Guidance on Corporate Social Responsibility Management for Chain Stores & E-Commerce Platforms: 2021 Edition. https://download.wezhan.cn/contents/sitefiles2035/10175544/files/440559..pdf

59.MSCI. (n.d.). ESG Ratings. https://www.msci.com/zh/esg-ratings/

60.SASB. (2018). Multiline and Specialty Retailers & Distributors: Sustainability Accounting Standard. https://www.sasb.org/wp-content/uploads/2018/11/Multiline_and_Specialty_Retailers_Distributors_Standard_2018.pdf

M&G Stationery, in its 2023 Environmental, Social and Governance (ESG) Report, outlines the chemical management system it has put in place. This includes the establishment of a Chemical Management Committee, the formulation of a Chemical Management Policy and a restricted substances list, the development of a phase-out list aligned with the EU REACH regulation, and proactive public engagement to raise awareness about chemical safety. Through these transparent practices, the company aims to improve consumer understanding of the safety of children's stationery products[61].

Major international e-commerce companies—such as Amazon, Walmart, Target, and IKEA—have gradually begun to disclose their chemical management practices in ESG or sustainability reports. In contrast, Chinese e-commerce platforms have yet to place sufficient emphasis on chemical management. Their approach remains largely reactive, focused primarily on meeting basic compliance requirements, and chemical management is generally absent from their ESG or sustainability disclosures. However, as both domestic and international investors and regulators increasingly prioritize chemical risk, and as consumers become more conscious of their rights to health and safety, the cost and risk of maintaining a passive stance will continue to grow. While developing a proactive chemical management strategy may require greater initial investment in capital and human resources, the long-term benefits are expected to far exceed the costs.

61.Shanghai M&G Stationery Co., Ltd. (2024). 2023 Environmental, Social and Governance (ESG) Report. https://www.mg-pen.com/uploadfiles/2024/04/20240401092019078.pdf

Part II

Goals and Principles of Chemical Management for E-Commerce Platforms

2.1 Overarching Goals

Retail e-commerce platforms, as direct providers of products and services to consumers, bear responsibility not only for ensuring product quality and protecting consumer health and safety, but also for contributing to both national and global efforts in environmental and chemical governance. In developing and implementing proactive chemical management strategies, these platforms should align with the principles and objectives of global chemical governance—particularly in relation to the management of "chemicals in products." Such strategies should also draw on the United Nations Sustainable Development Goals (SDGs), relevant corporate social responsibility benchmarks, and ESG rating frameworks. By leveraging their commercial reach and societal influence, e-commerce platforms can play a pivotal role in advancing chemical safety and sustainable development.

Overarching Goals

To uphold and promote the protection of human health and the environment by progressively minimizing the presence and impact of toxic and hazardous chemicals across the platform's operations and value chains—guided by legal and contractual responsibilities, and in proportion to the platform's business scale and social influence.

2.2 Guiding Principles

Priority-Driven Approach

As commercial entities, platform companies must navigate a wide range of stakeholder interests. However, within this complex landscape, the protection of human health and the environment from the adverse impacts of chemical use and pollution must be prioritized to enable a transformative shift in chemical management policies, measures, and outcomes. A priority-driven approach means that platforms should go beyond merely fulfilling legal and contractual obligations—obligations that are often insufficient to truly safeguard consumer health and ecological well-being. Instead, companies are encouraged to take proactive action across their broader spheres of influence, benchmark against international best practices, and elevate their operational standards to ensure the long-term health rights of consumers and the sustainable development of the platform itself.

Results-Oriented Action

Effective chemical management must ultimately be evaluated based on tangible results, not merely on stated intentions or activities undertaken. A results-oriented approach calls for the establishment of verifiable and measurable goals and indicators. It also implies that progress is iterative—built step by step through ongoing refinement of policies, methods, and processes—in pursuit of continuous improvement.

Expertise-Led Management

Chemical management is a highly specialized field. Platforms cannot rely solely on existing knowledge or general management practices; rather, they must develop new domain-specific understanding and use it as the foundation for establishing a robust chemical management system. This includes applying core principles of sound chemicals management—such as prevention and risk mitigation, life cycle thinking, prioritization, safe substitution, and the public's right to know—all of which must be progressively integrated into platform practices.

Leveraging Strengths While Facing Challenges

Comprehensive chemical management remains underdeveloped in China, and is still a relatively unfamiliar area for most retail e-commerce platforms. Platforms will inevitably face considerable challenges in the early stages. However, addressing these challenges directly and engaging stakeholders openly is key to rapid progress. At the same time, platforms possess distinctive advantages—particularly in data, digital infrastructure, and operational agility. Harnessing these strengths and aligning them with chemical management objectives can produce stronger results and generate models for wider adoption.

Multi-Stakeholder Collaboration

Chemical management involves a diverse array of stakeholders. Ensuring broad-based participation is essential to developing policies and actions that respond to varied needs and unlock collective capacities. Consumers and civil society organizations remain underrepresented in this process and should be more actively engaged. Achieving this requires accessible and timely information sharing, as well as open and effective communication channels to support meaningful stakeholder involvement.

Part III
Roadmap to Chemical Management for E-Commerce Platforms

Compliance	Beyond Compliance
Scoping Regulatory Landscapes and Setting Platform Rules	Corporate Chemicals Management Strategy and Policy
Developing a Priority Chemicals and Products List	Developing an Extended Priority Chemicals and Products List
Whole-Process Management	Building a Chemical Inventory and Conducting Chemical Footprint Measurement
	Consumer Communication
	Information Disclosure and Collaboration

Building a chemical management system within e-commerce platforms to effectively safeguard consumer health and enhance long-term business sustainability is a gradual process that cannot be achieved overnight. A phased approach is recommended, beginning with the establishment of a compliance-based chemical management framework. From there, platforms can move beyond compliance to develop a robust, well-functioning system that is integrated into their broader sustainability strategies.

Achieving compliance requires platforms to gain a comprehensive understanding of relevant laws, regulations, and standards, and to use this foundation to formulate priority lists of hazardous chemicals and high-risk products. It also involves implementing whole-process management processes to monitor and respond to violations involving toxic and hazardous substances in products sold on the platform.

Going beyond compliance entails expanding the scope of priority chemical and product lists to include substances that may not yet be regulated by existing laws but are known to pose significant risks. In addition to full life-cycle management, a beyond-compliance strategy also includes establishing internal chemical inventories and footprints, promoting safer alternatives, enhancing information disclosure and collaboration across the supply chain, and strengthening communication with consumers. It requires setting clear targets and tracking progress over time.

Ultimately, going beyond compliance means embedding chemical management into the company's overall sustainability strategy—establishing a comprehensive and standalone framework of policies and actions dedicated to responsible chemical governance.

3.1 Regulatory Compliance

Ensuring compliance with laws, regulations, and policy oversight in their operating markets is the baseline for business survival and growth. However, repeated cases in recent years—where products sold via e-commerce platforms exceeded mandatory national chemical standards and triggered enforcement actions—underscore persistent gaps in regulatory compliance across the retail e-commerce sector. To address this gap, compliance departments should take a more proactive role. Even without adding new departments or staff, companies can rapidly improve their chemical compliance, reduce regulatory risks and costs, and strengthen consumer trust.

3.1.1 Scoping Regulatory Landscapes and Setting Platform Rules

China has established a relatively comprehensive policy and regulatory framework to protect consumers from the hazards of chemicals in both food and non-food consumer products, alongside standards for product information disclosure and quality monitoring in e-commerce transactions. These frameworks are continuously updated to align with evolving economic and social conditions, and enterprises are expected to stay fully informed of and up to date with such developments.

Table 3. Relevant Laws and Regulations on Toxic and Hazardous Chemicals in Consumer Products

Category	Name
Laws	Criminal Law, Product Quality Law, Food Safety Law, Law on the Protection of Consumer Rights and Interests, Civil Code,E-commerce Law, Solid Waste Law, Administrative Reconsideration Law, Administrative Litigation Law, Civil Procedure Law
Judicial Interpretation	Interpretation by the Supreme People's Court on Several Issues Concerning the Application of Law in the Trial of Civil Public Interest Litigation Cases Involving Consumption
Administrative Regulations	Regulations on the Implementation of the Law on the Protection of Consumer Rights and Interests, Regulations on the Supervision and Administration of Cosmetics, Regulations on Certification and Accreditation, Regulations on the Implementation of the Food Safety Law
Ministerial Rules	Administrative Measures on the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products, Provisions on the Supervision and Administration of Children's Cosmetics, Administrative Measures for Toothpaste Supervision, Interim Measures for the Administration of Online Live Marketing, Measures for the Supervision and Administration of Online Transactions, Interim Provisions on the Administration of Consumer Product Recalls, Interim Provisions on the Supervision and Administration of Market Regulation Enforcement, Measures for the Penalty of Infringement on Consumer Rights and Interests, Interim Measures for Handling Complaints and Reports in Market Regulation, Regulations on the Administration of Online Information Related to Dangerous Goods

To fulfill its obligations under the Stockholm Convention, China has banned the production, circulation, use, import, and export of the following chemicals: DDT, chlordane, mirex, alpha-hexachlorocyclohexane, beta-hexachlorocyclohexane, polychlorinated biphenyls (PCBs), toxaphene, pentachlorobenzene, hexabromobiphenyl, tetra- and pentabromodiphenyl ethers, hexa- and heptabromodiphenyl ethers, hexachlorobenzene, lindane, endosulfan, hexabromocyclododecane, hexachlorobutadiene, polychlorinated naphthalenes, pentachlorophenol and its salts and esters, decabromodiphenyl ether, short-chain chlorinated paraffins, perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride, technical endosulfan and its isomers (cis- and trans-), triclosan, and perfluorohexane sulfonic acid (PFHxS), its salts, and related compounds. Growers and manufacturers are prohibited from intentionally adding these substances during production processes.

At the end of 2022, the Ministry of Ecology and Environment, together with five other ministries, jointly issued the List of New Pollutants for Priority Control (2023 edition). In addition to several of the chemicals mentioned above, the list also includes other substances subject to restricted use, as shown in the following table:

Table 4. Additional Restricted-Use Chemicals Listed in the List of New Pollutants for Priority Control (2023 Edition)

Chemical	Control Measures
Perfluorooctanoic acid (PFOA), its salts, and related compounds	Production and use are prohibited, except for the following specific uses: (1) Photolithography or etching processes in semiconductor manufacturing; (2) Photographic coatings for film; (3) Oil- and water-repellent textiles that protect workers from hazardous liquid-related health and safety risks; (4) Invasive and implantable medical devices; (5) Production of perfluorooctyl bromide using perfluorooctyl iodide for pharmaceutical applications; (6) Production of polytetrafluoroethylene (PTFE) and polyvinylidene fluoride (PVDF) for high-performance, corrosion-resistant gas filtration membranes, water filtration membranes, medical membrane fabrics, industrial waste heat exchangers, and industrial sealants designed to prevent VOC and PM2.5 leakage; (7) Production of perfluoroethylene-propylene copolymer (FEP) used in high-voltage power transmission cables.
Dichloromethane	(1) Banned in the production of paint strippers containing dichloromethane; (2) Prohibited for use as an ingredient in cosmetics, in accordance with the Technical Specifications for the Safety of Cosmetics.
Chloroform	(1) Banned in the production of paint strippers containing chloroform; (2) According to GB 38508—Limits of Volatile Organic Compounds in Cleaning Agents, the combined content of dichloromethane, chloroform, trichloroethylene, and tetrachloroethylene must not exceed 0.5% for water-based cleaning agents, 2% for semi-aqueous cleaning agents, and 20% for organic solvent-based cleaning agents.
Nonylphenol	(1) Prohibited as an adjuvant in the production of pesticide products; (2) Prohibited in the production of nonylphenol ethoxylates; (3) Prohibited as an ingredient in cosmetics, according to the Technical Specifications for the Safety of Cosmetics.

According to the Catalogue for Guiding Industrial Restructuring (2024 Edition) and the Opinions on Further Strengthening Plastic Pollution Control issued by the National Development and Reform Commission and the Ministry of Ecology and Environment, as of the end of 2022, the production and sale of the following plastic products are prohibited: single-use expanded polystyrene tableware, single-use plastic cotton swabs, personal care products containing plastic microbeads, ultra-thin plastic shopping bags with a thickness of less than 0.025 mm, and polyethylene agricultural mulch films with a thickness of less than 0.01 mm.

As of December 20, 2021, China had established approximately 5,241 national standards (including 1,383 mandatory national food safety standards) and 5,263 industry standards, forming a relatively comprehensive and structured national standard system for consumer products. By March 2024, several additional national standards had been newly developed or revised. This report highlights only a selection of commonly used standards that include chemical-related indicators.

National standards for food products include:

Table 5. Chemical Indicator Items in National Food Safety Standards and Related Guidance Documents (Partial)

Standard Number / Document	Title
GB 2762-2022	National Food Safety Standard – Maximum Levels of Contaminants in Foods
GB 2763-2021	National Food Safety Standard – Maximum Residue Limits for Pesticides in Food
GB 31650-2019	National Food Safety Standard – Maximum Residue Limits for Veterinary Drugs in Food
GB 31650.1-2022	National Food Safety Standard – Maximum Residue Limits for 41 Veterinary Drugs in Food
GB 31608-2023	National Food Safety Standard – Tea
GB 2760-2024	National Food Safety Standard – Standards for the Use of Food Additives
Health Office Supervision Letter [2011] No. 551	Notice from the General Office of the Ministry of Health on the Maximum Residue Limits of Phthalates in Food and Food Additives
-	List of Non-Edible Substances That May Be Illegally Added to Food and Food Additives Prone to Misuse

National standards and technical guidance documents for non-food consumer products containing chemical indicators include:

Table 6. National Standards for Non-Food Consumer Products Containing Chemical Indicator Items

Non-Food Consumer Product	National Standard
Food Contact Materials	● GB 4806.1-2016 General Safety Requirements for Food Contact Materials and Articles ● GB 4806.2-2015 National Food Safety Standard – Nipples ● GB 4806.3-2016 National Food Safety Standard – Enamelware ● GB 4806.4-2016 National Food Safety Standard – Ceramic Products ● GB 4806.5-2016 National Food Safety Standard – Glass Products ● GB 4806.7-2023 National Food Safety Standard – Plastic Materials and Articles for Food Contact ● GB 4806.8-2022 National Food Safety Standard – Paper and Paperboard Materials and Articles for Food Contact ● GB 4806.9-2023 National Food Safety Standard – Metal Materials and Articles for Food Contact ● GB 4806.10-2016 National Food Safety Standard – Coatings and Coating Layers for Food Contact Use ● GB 4806.11-2023 National Food Safety Standard – Rubber Materials and Articles for Food Contact ● GB 4806.12-2022 National Food Safety Standard – Bamboo and Wood Materials and Articles for Food Contact ● GB 4806.13-2023 National Food Safety Standard – Composite Materials and Articles for Food Contact ● GB 4806.14-2023 National Food Safety Standard – Printing Inks for Food Contact Materials and Articles ● GB 4806.15-2024 National Food Safety Standard – Adhesives for Food Contact Materials and Articles ● GB 9685-2016 Standards for the Use of Additives in Food Contact Materials and Articles

Non-Food Consumer Product	National Standard
Infant and Toddler Products	● GB 43631-2023 Basic Safety Technical Specification for Paper Products for Infants and Children ● GB 28482-2012 Safety Requirements for Infant Pacifiers ● GB 31701-2015 Safety Technical Code for Textile Products for Infants and Children ● Announcement No. 15 (2011) by the Ministry of Health and Five Other Departments: Prohibition of Bisphenol A in Infant Feeding Bottles
Children's Products	● GB 6675-2014 Toy Safety ● GB 30585-2014 Safety Technical Specification for Children's Footwear ● GB 30002-2013 Children's Toothbrushes ● GB 28477-2012 Safety Technical Requirements for Children's Umbrellas ● GB 14748-2006 Safety Requirements for Baby Strollers ● GB 14747-2006 Safety Requirements for Children's Tricycles ● GB 28007-2011 General Technical Requirements for Children's Furniture ● GB 21027-2020 General Safety Requirements for Student Products
Apparel and Textiles	● GB 18401-2010 National General Safety Technical Code for Textile Products ● GB 20400-2006 Limit of Harmful Substances in Leather and Fur ● GB 25038-2010 Health and Safety Technical Code for Rubber Footwear
Coatings	● GB 24409-2020 Limit of Harmful Substances in Automotive Coatings ● GB 30981-2020 Limit of Harmful Substances in Industrial Protective Coatings ● GB 38469-2019 Limit of Harmful Substances in Marine Coatings ● GB 38468-2019 Limit of Harmful Substances in Indoor Floor Coatings ● GB 24613-2009 Limit of Harmful Substances in Coatings for Toys ● GB 18581-2020 Limit of Harmful Substances in Wood Coatings ● GB 18582-2020 Limit of Harmful Substances in Architectural Wall Coatings ● GB 8771-2007 Maximum Allowable Levels of Soluble Elements in Pencil Coatings
Home Decoration and Furnishing Products	● GB 18580-2017 Formaldehyde Emission Limits for Artificial Boards and Their Products Used in Interior Decoration and Refurbishing Materials ● GB 18584-2001 Limit of Harmful Substances in Wood Furniture for Interior Decoration and Refurbishing Materials ● GB 18585-2023 Limit of Harmful Substances in Wallpaper for Interior Decoration and Refurbishing Materials ● GB 18587-2001 Emission Limits of Harmful Substances in Carpets, Carpet Linings, and Carpet Adhesives for Interior Decoration and Refurbishing Materials ● GB 18586-2001 Limit of Harmful Substances in PVC Sheet Flooring for Interior Decoration and Refurbishing Materials ● GB 18583-2008 Limit of Harmful Substances in Adhesives for Interior Decoration and Refurbishing Materials ● GB 28481-2012 Limit of Harmful Substances in Plastic Furniture

Non-Food Consumer Product	National Standard
Cosmetics	● Technical Specification for the Safety of Cosmetics (2015 Edition) (2021 revision: NMPA Announcement on Updating the List of Prohibited Ingredients in Cosmetics) ● Catalogue of Used Cosmetic Ingredients (2021 Edition) ● NMPA Announcement on Updating the List of Prohibited Ingredients in Cosmetics (2021, No. 74) ● NMPA Announcement on Incorporating 21 Standards, Including the pH Test Method for Water-in-Oil Cosmetics, into the Technical Specification for the Safety of Cosmetics (2015 Edition) (2023, No. 41) ● NMPA Announcement on Incorporating 19 Standards, Including General Principles for Sample Pretreatment in Cosmetic Toxicological Testing, into the Technical Specification for the Safety of Cosmetics (2015 Edition) (2024, No. 12)
Household Chemical Products (Excluding Cosmetics)	● GB 38508-2020 Limit of Volatile Organic Compounds (VOCs) in Cleaning Agents ● GB 33372-2020 Limit of Volatile Organic Compounds (VOCs) in Adhesives ● GB 24330-2020 General Safety Technical Requirements for Household Pesticide Products ● GB 38456-2020 Hygienic Requirements for Antibacterial and Bacteriostatic Detergents ● GB 38850-2020 Inventory of Raw Materials for Disinfectants and List of Prohibited and Restricted Substances ● GB 38507-2020 Limits of Volatile Organic Compounds (VOCs) in Inks
Others	● GB 19342-2013 Toothbrushes ● GB 39669-2020 General Safety Technical Requirements for Toothbrushes and Oral Care Devices ● GB 28480-2012 Regulations on the Limits of Hazardous Elements in Jewelry ● GB 39552.1-2020 Sunglasses and Sunglass Lenses – Part 1: General Requirements ● GB 38400-2019 Limits on Toxic and Hazardous Substances in Fertilizers ● GB 28489-2022 Limits of Hazardous Substances in Musical Instruments ● GB 43352-2023 Limits of Heavy Metals and Specific Substances in Express Packaging

The national recommended standards for non-food consumer products that include chemical indicator items are as follows:

Table 7. National Recommended Standards for Non-Food Consumer Products with Chemical Indicator Items

Non-Food Consumer Product	National Recommended Standards
General	● GB/T 39498-2020 Guidelines for the Control of Key Chemical Substances in Consumer Products – Non-Food Consumer Products

Non-Food Consumer Product	National Recommended Standards
Infant and Toddler Products	● GB/T 42802-2023 General Technical Requirements for Infant Bathing Accessories ● GB/T 42801-2023 General Technical Requirements for Everyday Sports Protective Gear for Infants and Children ● GB/T 42803-2023 General Technical Requirements for Supporting Facilities in Mother-and-Baby Rooms ● GB/T 42804-2023 General Technical Requirements for Infant Soothing Devices ● GB/T 42805-2023 General Technical Requirements for Household Safety Products for Infants ● GB/T 42806-2023 General Technical Requirements for Infant Tableware and Feeding Utensils ● GB/T 28004.1-2021 Part 1: Infant Diapers ● GB/T 40227-2021 Infant Waist Stools ● GB/T 39508-2020 Knitted Clothing for Infants and Children ● GB/T 35270-2017 Infant Carriers (Bags) ● GB/T 35448-2017 Infant Walking Harnesses ● GB/T 33734-2017 Woven Bedding for Infants ● GB/T 33271-2016 Woven Garments for Infants ● GB/T 23158-2008 Safety Requirements and Testing Methods for Import and Export Infant Sleeping Bags
Children's Products	● GB/T 43002-2023 Quality Inspection and Evaluation for Children's Furniture ● GB/T 41411-2022 Children's Watches ● GB/T 41002-2022 General Technical Specification for Children's Bags ● GB/T 38880-2020 Technical Specifications for Children's Masks
School Uniforms and Textbooks	● GB/T 23328-2009 Woven School Uniforms ● GB/T 22854-2009 Knitted School Uniforms ● GB/T 31888-2015 School Uniforms for Primary and Secondary Students ● GB/T 17227-2014 Hygienic Requirements for Textbooks for Primary and Secondary School Students
Footwear, Apparel, and Textiles	● GB/T 18885-2020 Technical Requirements for Eco-Textiles ● GB/T 21295-2014 Technical Requirements for Physical and Chemical Properties of Garments ● GB/T 22756-2017 Leather Sandals ● GB/T 35611-2017 Green Product Evaluation – Textile Products (Non-Food Consumer Goods)

Non-Food Consumer Product	National Recommended Standards
Coatings	● GB/T 22374-2018 Floor Coating Materials ● GB/T 19250-2013 Polyurethane Waterproof Coatings ● GB/T 24100-2009 Radiation Shielding Coatings for X-ray and Gamma-ray ● GB/T 35602-2017 Green Product Evaluation – Coatings ● GB/T 23994-2009 Limits of Specific Harmful Elements in Coatings for Human Contact ● GB/T 21473-2008 Color Paste for Tinting Systems ● GB/T 23996-2009 Solvent-Based Metal Panel Coatings for Interior Decoration ● GB/T 27811-2011 Natural Resin Wood Coatings for Interior Decoration ● GB/T 34676-2017 Interior Wall Coatings for Children's Rooms ● GB/T 33394-2016 Water-Based Wood Coatings for Children's Rooms
Home Furnishing and Interior Decoration Products	● GB/T 39600-2021 Formaldehyde Emission Classification for Wood-Based Panels and Their Products ● GB/T 24137-2009 Wood-Plastic Decorative Panels ● GB/T 16799-2018 Leather for Furniture ● GB/T 42996.1-2023 Guidelines for the Control of Key Chemicals in Furniture – Part 1: Wooden Furniture ● GB/T 42996.2-2023 Guidelines for the Control of Key Chemicals in Furniture – Part 2: Upholstered Furniture ● GB/T 35601-2017 Green Product Evaluation – Wood-Based Panels and Wooden Flooring ● GB/T 35605-2017 Green Product Evaluation – Wall Materials ● GB/T 35607-2017 Green Product Evaluation – Furniture ● GB/T 35608-2017 Green Product Evaluation – Thermal Insulation Materials ● GB/T 35609-2017 Green Product Evaluation – Waterproof and Sealing Materials ● GB/T 35610-2017 Green Product Evaluation – Ceramic Tiles (Boards) ● GB/T 43017-2023 Green Product Evaluation – Lighting Products ● GB/T 42169-2022 Green Product Evaluation – Household Gas Appliances ● GB/T 42065-2022 Green Product Evaluation – Kitchen and Bathroom Hardware Products ● GB/T 35603-2017 Green Product Evaluation – Sanitary Ceramics ● GB/T 35604-2017 Green Product Evaluation – Architectural Glass ● GB/T 35606-2017 Green Product Evaluation – Solar Water Heating Systems ● GB/T 35612-2017 Green Product Evaluation – Wood-Plastic Products
Recycled Plastics	● GB/T 40006.1-2021 Recycled Plastics – Part 1: General Principles ● GB/T 40006.2-2021 Recycled Plastics – Part 2: Polyethylene (PE) Materials ● GB/T 40006.3-2021 Recycled Plastics – Part 3: Polypropylene (PP) Materials ● GB/T 40006.4-2021 Recycled Plastics – Part 4: Polyolefin (PO) composite materials ● GB/T 40006.5-2021 Recycled Plastics – Part 5: Acrylonitrile-Butadiene-Styrene (ABS) Materials

Non-Food Consumer Product	National Recommended Standards
Recycled Plastics	● GB/T 40006.6-2021 Recycled Plastics – Part 6: Polystyrene (PS) and Impact Polystyrene (PS-I) Materials ● GB/T 40006.7-2021 Recycled Plastics – Part 7: Polycarbonate (PC) Materials ● GB/T 40006.8-2021 Recycled Plastics – Part 8: Polyamide (PA) Materials ● GB/T 40006.9-2021 Recycled Plastics – Part 9: Polyethylene Terephthalate (PET) Materials
Other Products	● GB/T 39084-2020 Green Product Evaluation – Express Packaging Materials ● GB/T 39020-2020 Green Product Evaluation – Cleaning Products ● GB/T 28004.2-2021 Part 2: Adult Diapers ● GB/T 40718-2021 Green Product Evaluation – Tires ● GB/T 35613-2017 Green Product Evaluation – Paper and Paper Products ● GB/T 33761-2017 General Principles for Green Product Evaluation ● GB/T 20878-2007 Grades and Chemical Composition of Stainless Steel and Heat-Resistant Steel ● GB/T 26572-2011 Requirements on the Concentration Limits of Certain Restricted Substances in Electrical and Electronic Products ● GB/T 15593-2020 Polyvinyl Chloride Plastics for Blood Transfusion (Fluid) Devices ● GB/T 39761.1-2021 Green Product Evaluation – Household Appliances – Part 1: Refrigerators, Air Conditioners, and Washing Machines

The following national recommended standards apply to product information disclosure and quality monitoring in e-commerce transactions:

Table 8. National Recommended Standards for Product Information Description and Quality Monitoring in E-Commerce Transactions

Standard Number	Title
GB/T 42893-2023	Implementation Guide for Quality Monitoring of E-Commerce Transaction Products
GB/T 37538-2019	Specifications for Online Quality Monitoring of E-Commerce Transaction Products
GB/T 38358-2019	Sampling Methods for Quality Monitoring of E-Commerce Products
GB/T 39570-2020	Image Display Requirements for E-Commerce Transaction Products
GB/T 35411-2017	Display Requirements for Product Information on E-Commerce Platforms
GB/T 32703-2016	General Rules for Releasing Quality Information of Prepackaged Products in E-Commerce Transactions
GB/T 36061-2018	General Specification for Traceability of E-Commerce Transaction Products
GB/T 40107-2021	Product Information Description for E-Commerce Transactions – Office Products
GB/T 38282-2019	Product Information Description for E-Commerce Transactions – Artworks

GB/T 38126-2019	Product Information Description for E-Commerce Transactions – Tea
GB/T 36599-2018	Product Information Description for E-Commerce Transactions – Furniture
GB/T 36601-2018	Product Information Description for E-Commerce Transactions – Toys
GB/T 36602-2018	Product Information Description for E-Commerce Transactions – Plastic Materials
GB/T 36603-2018	Product Information Description for E-Commerce Transactions – Coal
GB/T 36317-2018	Product Information Description for E-Commerce Transactions – Home Renovation and Building Materials
GB/T 33986-2017	Product Information Description for E-Commerce Transactions – Food Contact Plastic Products
GB/T 33989-2017	Product Information Description for E-Commerce Transactions – Travel Services
GB/T 33995-2017	Product Information Description for E-Commerce Transactions – Household Products
GB/T 33245-2016	Product Information Description for E-Commerce Transactions – Auto Parts
GB/T 32928-2016	Product Information Description for E-Commerce Transactions – Home Appliances
GB/T 32929-2016	Product Information Description for E-Commerce Transactions – Digital Products
GB/T 32702-2016	Product Information Description for E-Commerce Transactions – Books
GB/T 32670-2016	Product Information Description for E-Commerce Transactions – Apparel
GB/T 32054-2015	Product Information Description for E-Commerce Transactions – Electronic Components

In 2021, the Central Committee of the Communist Party of China and the State Council issued the National Standardization Development Outline, which called for improving standards to expand domestic demand, continuously enhancing the quality and standards of consumer products, and comprehensively promoting consumption. On May 26, 2023, the State Administration for Market Regulation, the Ministry of Industry and Information Technology, and the Ministry of Commerce jointly issued the Notice on the Action Plan for Strengthening Standardization in the Consumer Goods Sector. The plan sets out that by 2025, China will establish a new consumer goods standard system characterized by a dual emphasis on government and market-driven supply, mutual promotion of domestic and international standardization work, and full coverage of the production-distribution-consumption chain—effectively linking the supply and demand sides. This system aims to enhance the overall competitiveness of China's consumer goods.

The plan identifies nine key areas: household appliances, consumer electronics, home decoration and furnishing products, textile and apparel products, infant and elderly care products, cosmetics and household chemicals, stationery and leisure products, traditional cultural products, and food and related products. It also calls for strengthening the foundation of mandatory national standards for consumer product safety. Efforts will be accelerated to streamline and consolidate mandatory standards, and new national compulsory standards will be introduced for key product categories such as household appliances, furniture, lighting products, toys and children's products, and electric bicycles.

Additionally, the plan proposes the development of cross-sector and cross-industry general mandatory national safety standards for consumer products, focusing on chemical and mechanical/physical safety, along with corresponding general testing method standards. It also encourages the development of standards for product labeling and identification to clearly disclose critical quality and safety information, ensuring transparency and symmetry in consumer information.

These developments signal further refinement of China's consumer product chemical safety standard system. Enterprises should stay abreast of these updates and take timely action to ensure that products sold through online platforms meet the new regulatory requirements.

3.1.2 Developing a Priority Chemicals and Products List

In accordance with relevant laws, regulations, and mandatory standards governing the control of chemicals in products, a Priority Chemicals and Products List should be developed, publicly disclosed, and regularly updated. Enterprises may formulate their own Priority Chemicals and Products List based on current regulatory requirements concerning concentration limits and restrictions or bans on certain products. Alternatively, they may refer to or adopt lists developed by third-party organizations in alignment with applicable Chinese laws and regulations. Enterprises are encouraged to set phased management targets for these high-concern chemicals and products, with the aim of ensuring that all products sold on e-commerce platforms comply with existing national chemical safety standards as swiftly as possible.

Drawing on long-standing observation and advocacy experience concerning chemical safety issues on Chinese e-commerce platforms, Toxics-Free Corps analyzed data from 2023, including regulatory spot checks, domestic and international product recalls, and public reporting. This data revealed frequent cases of chemical standard exceedances in product categories such as infant and children's products, clothing, footwear, and household textiles. Drawing on these findings—and referencing widely recognized chemical control lists both within China and internationally—Toxics-Free Corps identified chemicals and products characterized by a high frequency of exceedance and subject to mandatory national standards. This work culminated in the development of the Toxics-Free Corps Priority Chemicals and Products List (2024 edition) (Appendix I), specifically tailored to the context of China's retail e-commerce sector. The list is intended to be updated on a regular basis to reflect emerging trends and regulatory developments.

3.1.3 Whole-Process Management

a) Upstream Prevention

Building on the Priority Chemicals and Products List, proactive measures should be implemented to prevent risks at the source, including substantive vetting of sellers operating on e-commerce platforms. Key actions include:

- In accordance with Article 27 of the E-Commerce Law, requiring sellers applying to operate on the platform to submit verifiable information such as identity, address, contact details, and administrative licenses. This information must be verified, recorded in registration archives, and subject to regular review and updates;
- Pursuant to Article 15 of the E-Commerce Law, ensuring that platform sellers prominently and continuously display on their product pages the relevant business license information, administrative licenses associated with their business operations, or indicators of exemptions from market entity registration, along with accessible links to such information;
- Actively screening and managing sellers that are not exempt from business registration but are engaged in the sale of high-concern chemicals or products listed in the Priority Chemicals and Products List;
- Requiring platform sellers to disclose on their product pages essential product safety and quality information, including product brand, manufacturer, and applicable standards (except where exempted by law);
- For products subject to mandatory certification, registration, filing, or other administrative licensing, requiring sellers to provide and publicly disclose relevant documentation, including but not limited to: China Compulsory Certification (CCC) information (e.g., certificate photos, certificate numbers, images of physical certification marks), China Environmental Labeling (Ten-Ring Label), cosmetic registration or filing numbers, labels for children's cosmetics, pharmaceutical approval numbers, and pesticide or veterinary drug registration numbers;
- For products listed in the Priority Chemicals and Products List, requiring sellers to provide and publicly disclose supporting documentation demonstrating compliance with relevant chemical safety requirements;
- Enhancing consumer awareness and information transparency by prompting consumers—on relevant product pages—to review seller credentials and chemical safety compliance information;
- For products prohibited or restricted from sale (such as Lindane cream, plastic cotton swabs, and expanded polystyrene food containers), incorporating restrictions into platform rules and publicly issuing notices; implementing listing restrictions, providing clearly visible reporting channels, using keyword blocking or search filters, and issuing alerts and guidance messages to consumers;
- Establishing public complaint and reporting mechanisms within the consumer interface (e.g., on the platform website or mobile app), with particular attention to safeguarding the rights of consumers who have not placed an order ("non-transactional consumers").

Exemptions from Market Entity Registration and Chemical Management

Article 10 of the E-Commerce Law stipulates that e-commerce operators must register as market entities in accordance with the law. However, exemptions apply to individuals selling self-produced agricultural or household products, those offering convenience services based on personal skills that do not require a license by law, and those engaging in sporadic and small-scale transactions, as well as other activities explicitly exempted under laws and administrative regulations.

Article 15 further requires that e-commerce operators display on their homepage—prominently and continuously—information such as their business license, administrative permits related to their operations, or clear indications of exemption status under Article 10, or provide links to such information.

Together, these provisions establish the legal obligation for e-commerce businesses to operate transparently by displaying relevant licenses and permits. They also imply a corresponding responsibility for platform enterprises to conduct pre-entry verification of sellers' qualifications, to ensure disclosure of operating credentials, and to facilitate such disclosures.

However, for an extended period, the legal definition of exemptions—especially in the case of "sporadic and small-scale transactions"—remained ambiguous, creating a regulatory grey area. This uncertainty made it difficult to determine which sellers could legitimately claim exemption from registration under the guise of small-scale operations. In practice, some relatively large sellers exploited this ambiguity to evade oversight.

From the perspective of safeguarding product quality and safety, whether a seller is registered as a market entity and thereby included in routine regulatory oversight plays a pivotal role. In 2019, the Toxics-Free Corps conducted an investigation into the validity and compliance of China Compulsory Certification (CCC) information for plastic yellow duck toys sold by the same company across two different e-commerce platforms.

In the first round of research on Platform A, no significant difference was observed in the CCC compliance rate between sellers with and without business registration—it hovered around 40–50% for both, indicating overall poor performance. In the second round, a clear distinction emerged: registered sellers had a CCC compliance rate of 91%, while unregistered sellers remained at 50%, similar to the first round. This indicates that formally registered businesses had become significantly more attentive to the disclosure and compliance of CCC information.

On Platform B, most sellers were registered, and CCC compliance rates exceeded 60%, surpassing the rates for unregistered sellers on Platform A. This suggests a positive correlation between market entity registration and CCC compliance for plastic toys.

Furthermore, the same investigation by Toxics-Free Corps found a strong correlation between compliance with CCC certification and compliance with phthalate plasticizer limits in yellow duck toys. This highlights that how platforms interpret and enforce exemptions from market registration may influence their performance in chemical management.

In March 2021, the State Administration for Market Regulation issued the Administrative Measures for Online Transactions, which provided a clear legal definition of "sporadic and small-scale" as "individuals engaging in online transactions with an annual turnover not exceeding RMB 100,000 (approximately USD 14,080)." This provided a firm legal foundation for platform enterprises to take targeted enforcement actions.

b) Ongoing Oversight and Monitoring

- Develop and implement routine and special monitoring plans based on the Priority Chemicals and Products List, including regular spot checks to assess whether listed products meet compliance standards;
- Establish a robust system for gathering and responding to information and public sentiment, capable of triggering appropriate actions by enforcement departments. Sources of information should include market supervision authorities, consumer associations, civil society organizations, consumer advocacy groups, and the general public.

c) Post-Market Actions and Enforcement

Upon receiving credible information that a product sold by a platform-based seller fails to meet chemical safety standards:

- **Rapid Response:** In the absence of a merchant appeal, verify the information and delist the non-compliant product within five working days of receiving the report[62];
- **Enforcement:** Impose penalties or warnings on the relevant sellers in accordance with the law or platform rules; prohibit sellers with repeated chemical safety violations from continuing to sell on the platform;
- **Extended Inspection:** Conduct sampling inspections of similar products and take corrective actions against any newly identified non-compliant items;
- **Consumer Notification:** Issue consumer risk alerts or warnings as appropriate;
- **Product Recalls:** Assist and urge manufacturers, in accordance with the law, to recall non-compliant products;
- **Regulatory Reporting:** Promptly report or provide updates to the market supervision authorities regarding the violation and the platform's corresponding actions;
- **Legal Accountability:** Assume joint liability or other relevant responsibilities as stipulated by the E-Commerce Law and related regulations.

62.Note: In cases where a merchant files an appeal, the actual processing time may be difficult to estimate. However, based on prior experience from Toxics-Free Corps, the process may take approximately 20 to 30 days.

Article 32 of the E-Commerce Law:E-commerce platform operators shall develop platform service agreements and transaction rules that clearly define the rights and obligations related to access to and removal from the platform, assurance of product and service quality, protection of consumer rights and interests, and safeguarding of personal information.

Upon receiving product sampling failure information released by market supervision authorities—where the findings are not directly targeted at this specific platform:

- **Coordinated Prevention and Control:** Within five working days, delist the identical product from the platform and implement other necessary corrective measures, referring to the procedures outlined under cases involving “credible information about chemical non-compliance in products sold by platform-based sellers”.

3.2 Beyond Regulatory Compliance

Ensuring legal compliance represents only the minimum requirement for operating lawfully. To genuinely fulfill their corporate social responsibilities and protect consumers from the health hazards posed by toxic and hazardous chemicals, enterprises must go beyond compliance.

First, with respect to the vast array of industrial chemicals currently on the market, regulatory controls on toxic and hazardous substances are significantly lagging behind. Due to historical reasons, tens of thousands of chemicals already in use have not undergone adequate scientific testing to verify their safety for human health and the environment. As countries work to close this regulatory gap, scientific understanding of chemical hazards continues to evolve. As a result, existing regulations alone cannot guarantee chemical safety, and mere compliance does not fully eliminate the risk posed by toxic and hazardous substances.

In 2022, the report of the 20th National Congress of the Communist Party of China once again emphasized the importance of “addressing emerging pollutants.” Regulatory controls on hazardous substances in products are expected to tighten further. In 2023, the Ministry of Ecology and Environment issued the List of New Pollutants for Priority Control (2023 Edition) (hereinafter referred to as the "List"), which came into effect on 1 March 2023. The List includes 14 types of emerging pollutants across four categories, subject to bans, restrictions, or discharge limits. For example, short-chain chlorinated paraffins (SCCPs)—commonly used in the manufacture of school bags, rubberized tracks, and children's toys—are slated for phase-out by the end of 2023. In addition to SCCPs, two major classes of perfluorinated compounds are also being phased out, and restrictions have been imposed on the use of perfluorooctanoic acid (PFOA) substances in items such as water- and oil-repellent clothing, baking paper, and gastroscope tubes.

With accelerating efforts to regulate chemicals—especially those embedded in products—both domestically and globally, it is foreseeable that more substances will come under regulatory control. However, effective chemical management at the product level takes time. A reactive, compliance-only approach cannot respond swiftly to changes in standards and regulations. Only by taking proactive steps—developing corporate chemical management strategies and policies—can enterprises mitigate future compliance risks.

At the same time, going beyond compliance and establishing a corporate chemicals management strategy can bring long-term business value to e-commerce platforms. Platforms can leverage their influence to establish supply chain systems that manage chemicals throughout their life cycle. By working with suppliers, they can reduce or substitute toxic and hazardous chemicals across the entire process—from green design and manufacturing to green logistics—while lowering material and energy consumption and minimizing waste generation during chemical production. In doing so, enterprises can reduce chemical-related health risks and environmental impacts, offer consumers greener and more sustainable products, demonstrate their commitment to sustainable development, and lead the growth of emerging markets for sustainable consumption.

3.2.1 Corporate Chemicals Management Strategy and Policy

Chemicals management is directly linked to product quality and safety, making it an unavoidable responsibility for e-commerce platforms. To address this issue, platforms should set clear goals and strategies and develop a formal corporate chemicals management policy. Taking into account the platform's operational model and market positioning, the chemicals management strategy should be embedded into the company's broader strategic and operational framework. This includes allocating dedicated funding and personnel, establishing board-level engagement mechanisms, and implementing systems for strategic oversight and performance evaluation. Supporting mechanisms such as information disclosure, incentives, training, and internal safeguards should also be put in place.

1) Corporate Chemicals Management Policy

A corporate chemicals management policy is a public declaration outlining how a company manages chemicals across its products, materials, supply chain, and operations—particularly to avoid the use of substances that are not yet regulated but are of concern and warrant priority control.

Many retailers, including e-commerce platforms, have already issued their own chemicals management policies. In addition, numerous non-profit organizations have developed model policy templates that companies may refer to when formulating their own strategies.

Relevant Resources

Environmental Defense Fund (EDF): Model chemicals policy for retailers of formulated products

One Planet Network (OPN) : Guidelines for Providing Product Sustainability Information in E-commerce

Toxic-Free Future: Retailer Report Card, Scoring Rubric

Target's Chemicals Management Vision Statement

Target's priority is to sell products with a positive impact on the lives of our guests and communities, and to ensure worker and guest safety throughout our value chain and operations. To continue our leadership and demonstrate our commitment, we have established a cohesive chemicals management framework across all our product categories and operations. We believe that this robust approach to managing chemicals will accelerate similar efforts across the industry. Together, we can further reduce the presence of unwanted chemicals in the homes and workplaces of millions of people, helping to enhance their health and well-being.

A Chemicals Management Policy May Include the Following Elements:

a) Vision Statement

The vision statement reflects the company's commitment and determination toward chemicals management externally, while internally fostering shared understanding and joint efforts.

b) Scope of the Policy

A company's chemicals management policy typically applies to all products, packaging, and operations to ensure the health and safety of customers and employees. For e-commerce platforms, the chemicals policy should, depending on the business model, apply to both private-label products and those sold by third-party vendors on the platform. Platforms may start by managing priority chemicals in select product categories and gradually expand the policy's scope to cover a broader range of products.

c) Supply Chain Management

Effective chemicals management requires the active participation of the supply chain. The company's chemicals policy should be communicated throughout the supply chain, and information on chemicals used in products should be obtained from suppliers. Access to more comprehensive chemical information from suppliers enables better risk assessment, the setting of chemicals control targets, and the disclosure of chemical information to consumers.

Environmental and resource impacts occur throughout the product lifecycle—from raw material extraction to manufacturing and transportation. Companies may develop relevant guidelines to engage the supply chain in green and sustainable practices, thereby reducing environmental and

Walmart's Chemical Management Requirements for Suppliers

Since January 2015, Walmart requires suppliers to provide full ingredient disclosure for all formulated products sold at Walmart and Sam's Club, with information accessible online. For private brand products, Walmart collaborates with WERCS, a third-party service provider, to manage all proprietary product formulations. Walmart maintains confidentiality of supplier formulations. Through WERCS, Walmart's private brand suppliers ensure that the chemical substances in their products comply with the U.S. Environmental Protection Agency's (EPA) Safer Choice standards or the Consumer Specialty Products Association's (CSPA) Consumer Product Ingredient Communication Initiative. Ingredient information for private brand products within the scope of Walmart's Sustainable Chemistry Policy is made available on product pages at Walmart.com and Samsclub.com.

resource impacts across the product lifecycle, or prioritize the procurement of sustainable products. Regular life cycle assessments (LCAs) and environmental product declarations for key products can be used to publicly share environmental information with consumers, enhancing product sustainability and promoting the green consumer market alongside chemical risk control.

d) Consumer Information Disclosure

Transparent and reliable chemical information in products helps consumers make better purchasing decisions and enhances brand trust and customer loyalty. Companies should commit to providing information on the composition and concentration of chemicals in their products, ensuring that the information is accessible and easy to understand.

e) Substitution of Hazardous Chemicals

This objective outlines the company's commitment to not only reducing or eliminating toxic and hazardous substances in products while delivering high-quality offerings, but also to promoting the development and use of safer, greener alternatives from the outset. Priority should be given to suppliers whose products incorporate safer alternative chemicals.

f) Public Commitment

The company is committed to transparency in its chemicals management by publicly disclosing its policy and reporting on implementation progress through an annual report.

2) Governance and Operational Integration of Chemicals Management

Similar to other key ESG or sustainability issues, the effective implementation of corporate chemicals management strategies requires the establishment of an internal governance framework and mechanisms for board-level engagement. Under the leadership of the board of directors, companies should establish a coordinating body that includes senior management and is responsible for overseeing the execution and performance of chemicals management. The strategy should be effectively communicated across the organization and to relevant staff, supported by appropriate capacity-building initiatives. Regular reviews of progress should be conducted, and incentive mechanisms should be put in place to motivate employees.

Enterprises may appoint designated staff members as Chemicals Management Officers, responsible for overseeing chemicals-related matters. Their responsibilities include internal coordination across relevant departments and external engagement to facilitate the exchange of chemical information with suppliers and customers. These officers can be drawn from existing compliance, supply chain and procurement, or sustainability teams.

The day-to-day responsibilities of a Chemicals Management Officer may include:

- Coordinating the development and regular updates of the Priority Chemicals and Products List;
- Communicating the company's chemicals management strategy and Priority Chemicals and Products List to suppliers, collecting and reviewing suppliers' chemicals management information, and responding to related inquiries;
- Supporting the marketing department by providing chemical safety information for consumer communication;
- Serving as the company's point of contact for external communications on chemicals management.

Chemicals of High Concern

- Persistent, bioaccumulative, and toxic (PBT);
- Very persistent and very bioaccumulative (vPvB);
- Carcinogenic, mutagenic, or toxic to reproduction (CMR);
- or any other chemical for which there is scientific evidence of probable serious effects to human health or the environment that give rise to an equivalent level of concern—such as endocrine disruption or neurotoxicity;
- or a chemical whose breakdown products result in a CoHC that meets any of the above criteria.

3.2.2 Developing an Extended Priority Chemicals and Products List

Beyond regulatory standards and controls, many chemicals—due to their associated health and environmental risks—have been included in lists of toxic and hazardous substances published by governments, institutions, civil society organizations, and scientific bodies. To safeguard consumer health and protect the environment, companies should proactively identify such priority chemicals in their products and packaging and take action to restrict their use. As chemicals management continues to advance both domestically and internationally, an increasing number of these high-concern substances are expected to come under mandatory regulation.

1) Principles and Approaches

Companies can adopt a phased strategy, starting with a select group of high-risk chemicals or products and progressively updating and expanding the list. In developing an Extended Priority Chemicals and Products List, the following factors should be considered in an integrated manner:

- The frequency and volume of the toxic and hazardous chemical substances present in products
- The exposure risks of such substances across the product life cycle—including manufacturing, use, and disposal stages
- Chemicals that are soon to be subject to mandatory regulatory controls
- Potential harm to vulnerable populations, such as children and pregnant women
- Toxic and hazardous substances that are of particular concern to consumers, civil society groups, and other stakeholders
- Market access requirements, such as compliance with local chemicals regulations in overseas e-commerce markets
- Competitive positioning and brand alignment, including the use of sustainable green chemicals or certified products

From the chemical perspective, companies can identify and manage substances that warrant priority control. For example, certain toxic and hazardous chemicals—such as short-chain chlorinated paraffins (SCCPs) and perfluorooctanoic acid (PFOA)—have already been included in the List of New Pollutants for Priority Control (2023 edition). These substances should be proactively addressed, with their use in consumer products prohibited except under specified exemptions.

From the product perspective, companies should consider the likelihood of exposure among vulnerable populations, such as pregnant women and young children. Based on cases of non-compliant chemicals detected on Chinese e-commerce platforms, product categories that may warrant priority control include: children's toys, stationery and related products, children's apparel, footwear and accessories, cosmetics, clothing, textiles and fashion items, shoes, jewelry, personal accessories, household textiles, bedding products, tableware, coatings, fertilizers, and seafood products.

2) Reference Resources

A wide range of external resources is available to support e-commerce platforms in developing an Extended Priority Chemicals and Products Lists. Companies can refer to annexes of relevant international chemical conventions, regional priority control chemical lists, national voluntary standards and guidelines, draft lists of chemicals under consideration for pollution control, chemical inventories disclosed by peer companies, lists provided by environmental organizations or advocacy groups, as well as databases maintained by third-party service providers. These resources can serve as important references for identifying and managing chemicals of concern.

Table 9.Reference Materials for Developing a List of Risk Chemicals /Products for Priority Control

Category	Reference Resources
International Conventions / Frameworks	• Annexes A, B, and C of the Stockholm Convention • Annex of the Minamata Convention • Strategic Approach to International Chemicals Management (SAICM): Eight Emerging Policy Issues
Regional Governance / International Organization Lists	• Substances of Very High Concern (SVHC) List under the EU REACH Regulation • Group 1 Carcinogens List by the International Agency for Research on Cancer (IARC), WHO • 11 Issues of Concern (IoCs) identified in Global Chemicals Outlook II
National Guidelines / Standardized Lists	• List of New Pollutants for Priority Control (2023 edition) • Guideline for the Use Control of Key Chemical Substances in Consumer Products (GB/T 39498–2020) • Catalogue of Chemicals for Priority Control
Lists by Relevant Third-Party Organizations	• GreenScreen® List Translator™, Clean Production Action • Chemicals of High Concern (CoHC) List, Chemical Footprint Project (CFP) • Substitute It Now (SIN) List, ChemSec • Chemicals of High Concern Briefings, Toxic-Free Future • SAFER™ Chemical Assessments, ChemForward
Third-Party Chemical Management Services	• Toxnot • Scivera

Toxics-Free Corps compiled an Extended Priority Chemicals and Products List (2024 edition) (Appendix II) by reviewing data from 2023—including regulatory spot checks, domestic and international recalls, and public opinion monitoring—focusing on chemicals found in baby and children's products, clothing, footwear, and home textiles. Drawing from both domestic and international high-priority chemical control lists, substances and products with relatively low recall frequency or lacking current mandatory national standards were identified. This list is regularly updated to reflect emerging risks.

3) Actions Related to the Extended Priority Chemicals and Products List

- E-commerce platforms should communicate the Extended Priority Chemicals and Products List to suppliers and merchants after its development, and establish a timeline for achieving compliance.
- Platforms should set out clear requirements for restricted and prohibited chemicals listed, including restriction thresholds, compliance procedures, and testing mechanisms, to guide suppliers and merchants in gradually meeting the list's control requirements.
- Regular sampling and testing based on the Extended Priority Chemicals and Products List should be conducted to ensure compliance by suppliers and merchants.
- The scope of priority chemicals and products should be reviewed and expanded on a regular basis. E-commerce platforms must stay aligned with authoritative high-concern chemical lists and the latest scientific research, engage with stakeholders and relevant civil society organizations, and establish an annual process for reviewing and updating the list and its product coverage.

IKEA's Chemical Management Approach

IKEA has established a comprehensive chemical management policy applicable to all products sold globally. This policy encompasses a general list of restricted substances applicable across all product categories, as well as specific restriction lists tailored to particular product types and manufacturing processes.

Through its supplier code of conduct, known as the IWAY Standard, IKEA ensures chemical safety throughout the production process. The IWAY Standard mandates that suppliers manage chemicals responsibly, including proper purchasing, storage, handling, and use, to protect worker health and the environment. Additionally, IKEA enforces specific chemical requirements for products, prohibiting or restricting the use of substances listed in its restricted substances lists. Compliance is monitored through regular and random testing of materials and finished products.

To date, IKEA has eliminated the use of polycarbonate (PC) plastics in all food contact materials and children's products, and has nearly phased out expanded polystyrene foam in packaging. The company also prohibits the use of recycled plastics containing brominated flame retardants in electronic products. In 2020, IKEA removed titanium dioxide from children's art materials, amounting to 0.8 tons. Furthermore, the company phased out propiconazole as a preservative in outdoor wooden furniture, eliminated benzophenone from surface coatings, expanded the ban on bisphenol A (BPA) in children's products to include bisphenol S (BPS) and bisphenol F (BPF), and began phasing out cobalt and two biocides—biphenyl-2-ol and sodium 2-biphenylate—from surface coatings.

3.2.3 Building a Chemical Inventory and Conducting Chemical Footprint Measurement

1) Exchange of Chemical Information in Products: B2B / B2C

A company's chemical inventory or chemical footprint represents a detailed account of the chemicals actually used in its operations. For e-commerce platforms, given the vast and complex network of supply chains and third-party merchants, it is undoubtedly a major challenge to obtain comprehensive data on the types and quantities of chemicals used. However, from the perspective of improving corporate risk management and enhancing supply chain compliance, this remains a valuable undertaking—and some e-commerce platforms have already succeeded in doing so.

Moreover, understanding the chemical composition of products is the foundation for transparency to consumers. In the future, more and more brands are expected to disclose chemical information on product packaging or product information pages, in response to growing regulatory requirements and rising consumer demand for information on product safety and health.

E-commerce platforms should require suppliers and third-party merchants to provide chemical information related to their products (B2B), or disclose such information directly to consumers via product packaging or online product listings (B2C). As chemical composition data may involve trade secrets, companies may opt to use third-party platforms for data collection and analysis. For example, Walmart uses WERCS as its service provider. These third-party services typically collect data from suppliers, manage and analyze it, and then deliver the information to retailers in a standardized format—while safeguarding the suppliers' confidential business information.

Requiring brands and merchants operating on e-commerce platforms to disclose chemical information on product pages can also help reduce platform-level risks while strengthening consumer trust and brand favorability. Greater transparency generally correlates with a lower likelihood of hazardous chemical content in products. E-commerce platforms can begin by enhancing the transparency of chemical information for their private-label products and those of affiliated brand partners.

Walmart's Toxic Chemical Reduction: A Journey Grounded in Chemical Footprint Baseline Data

In June 2022, Walmart announced significant progress in its sustainable chemistry initiatives. Over a three-year period, Walmart and its suppliers successfully removed 37 million pounds of hazardous chemicals from the products sold in its stores.

In 2017, Walmart became the first U.S. retailer to set a time bound goal for reducing its chemical footprint. The company committed to a 10% reduction in the use of priority chemicals in consumable products by 2022, using 2017 as the baseline year. The goal applies to both private-label and brand-name products sold by Walmart and Sam's Club in the U.S., comprising over 140,000 SKUs in key product categories such as cosmetics, personal care, household cleaners, and formulated baby care products.

By 2020, Walmart surpassed its original goal ahead of schedule, achieving a 17% reduction in priority chemicals across its formulated product assortment—a milestone made possible by establishing a robust chemical footprint baseline and tracking progress through transparent, measurable data.

Preferentially Stock and Promote Certified or Self-Declared Safer Products

According to data from New York University's Stern School of Business, between 2015 and 2019, products marketed with "green chemistry" attributes grew at a rate of 11.3%, compared to just 2.1% for their conventional counterparts[63]. These products often carry certification marks or self-declared claims on their packaging, such as the U.S. Environmental Protection Agency's Safer Choice label or indications of being free from phthalates. Certified products can serve as a powerful tool for e-commerce platforms to identify items that are free from toxic and hazardous chemicals. This, in turn, enables platforms to more efficiently meet reduction targets for priority controlled chemicals in specific product categories. At the same time, such certifications support consumers—especially those with higher expectations for health and sustainability—in choosing safer and more trustworthy products.

With proactive chemicals management strategies and effective actions, e-commerce platforms can also create their own product claims and dedicated sales sections. For instance, within categories such as formulated products, infant and toddler care, or offerings from conscientious brands, certain products may take the lead in ensuring chemical safety. Target Corporation, for example, has launched its own line of safer chemical products under the Target Clean label. This range covers over 4,000 products across cosmetics, cleaning supplies, baby care, feminine hygiene, and pet care. Products under this label are formulated without ingredients such as propylparaben, butylparaben, phthalates, formaldehyde, nonylphenol, benzophenone, retinyl palmitate, hydroquinone, triclosan, trichloroethane, as well as butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT).

An Environmental Product Declaration (EPD) is a third-party verified, scientific, comparable, and internationally recognized disclosure of the comprehensive environmental impacts of a product throughout its life cycle. EPDs do not evaluate product compliance or rank product performance; instead, they serve to inform government regulators, industry experts, procurement professionals, and consumers about a product's overall environmental impact and its sustainability attributes.

Different countries and regions have developed their own certification systems for EPDs, based on the ISO 14020 series of environmental labeling standards. For example, in China, EPDs correspond to Type III environmental declarations; in the European Union, they are aligned with the EU Ecolabel; and internationally, they are recognized under the global EPD system.

63.Golden, J., Handfield, R., Daystar, J., Kronthal–Sacco, R., & Tickner, J. (2021). Green Chemistry A Strong Driver of Innovation, Growth, and Business Opportunity. Industrial Biotechnology, 17(6), 311-315.

Figure 5. Examples of Third-Party Product Chemical Safety Certifications and Labels

Enterprises may select Environmental Product Declaration (EPD) certification based on their region and product type. This involves collecting data on material and energy consumption, waste generation, and other factors throughout the product's life cycle, and conducting a Life Cycle Assessment (LCA). The LCA calculates and discloses the environmental impacts of a product—ranging from raw material extraction, production, and transportation to consumption and final disposal—on non-renewable resources, ecosystems, and human health. EPDs provide consumers with scientific, verifiable, and comparable environmental information related to the product.

Encouraging Enterprises to Proactively Substitute Chemicals of High Concern

One of the key objectives of chemical information disclosure is to identify and replace substances of high concern. In recent years, growing public awareness of chemical hazards has prompted both the United States and the European Union to continuously update their lists of restricted and banned substances. Enterprises are encouraged to stay ahead of regulatory developments by assessing chemicals used throughout their supply chains, identifying substances of high concern, and proactively substituting them with safer alternatives.

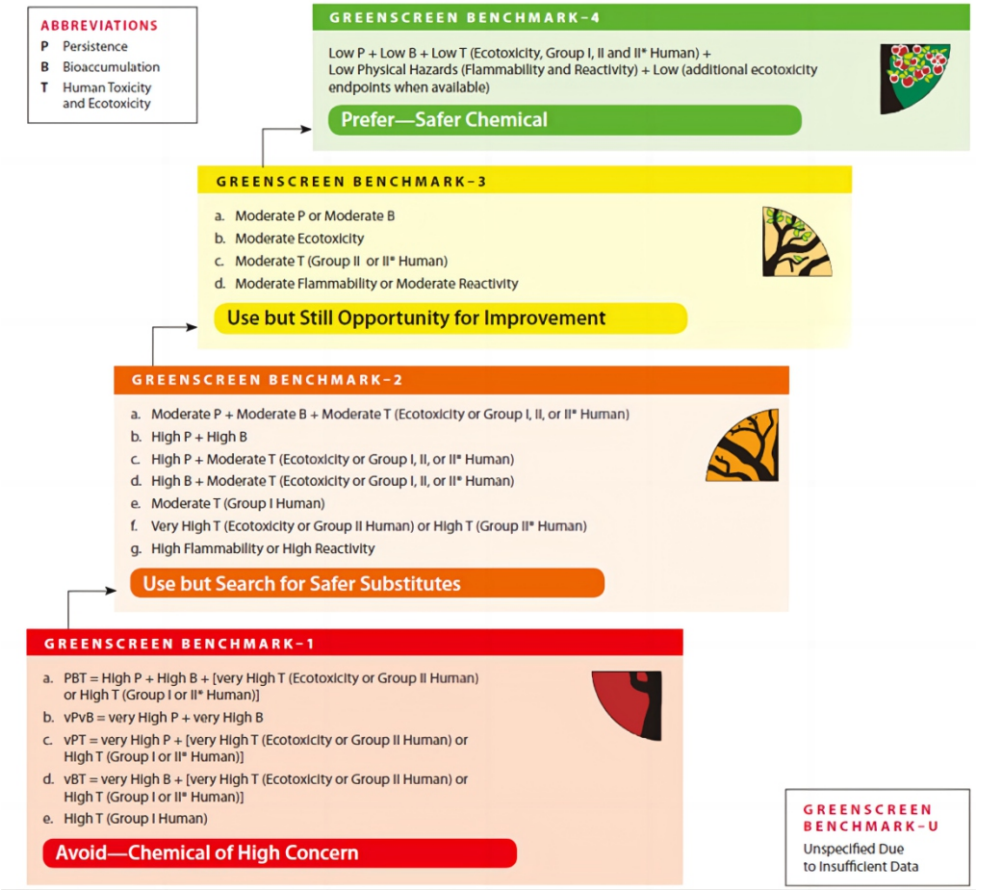
Chemical substitution requires evaluating and comparing hazardous and alternative chemicals on a consistent basis. This process should use intuitive indicators to reflect the degree of hazard, allowing enterprises to select less hazardous substances as suitable alternatives.

Tools such as the U.S. EPA's Design for the Environment (DfE) assessment criteria, the GreenScreen® for Safer Chemicals developed by Clean Production Action (CPA), and the Quick Chemical Assessment Tool (QCAT) can all be used to identify chemicals of high concern and evaluate potential alternatives.

Using GreenScreen® for Safer Chemicals as an example, this methodology evaluates a substance across 18 hazard endpoints covering human health and environmental impacts. Each endpoint is assessed individually, and the results are integrated to assign an overall Benchmark score, ranging from Benchmark 1 to Benchmark 4. Benchmark 1

indicates that the chemical is of high concern and should be avoided. Higher Benchmark levels correspond to safer chemical profiles, with Benchmark 4 representing the safest substances. This structured hazard assessment and benchmarking system enables the clear identification of chemicals of concern and supports informed decision-making in the selection of safer alternatives.

Figure 6. GreenScreen for Safer Chemicals Benchmark Scores

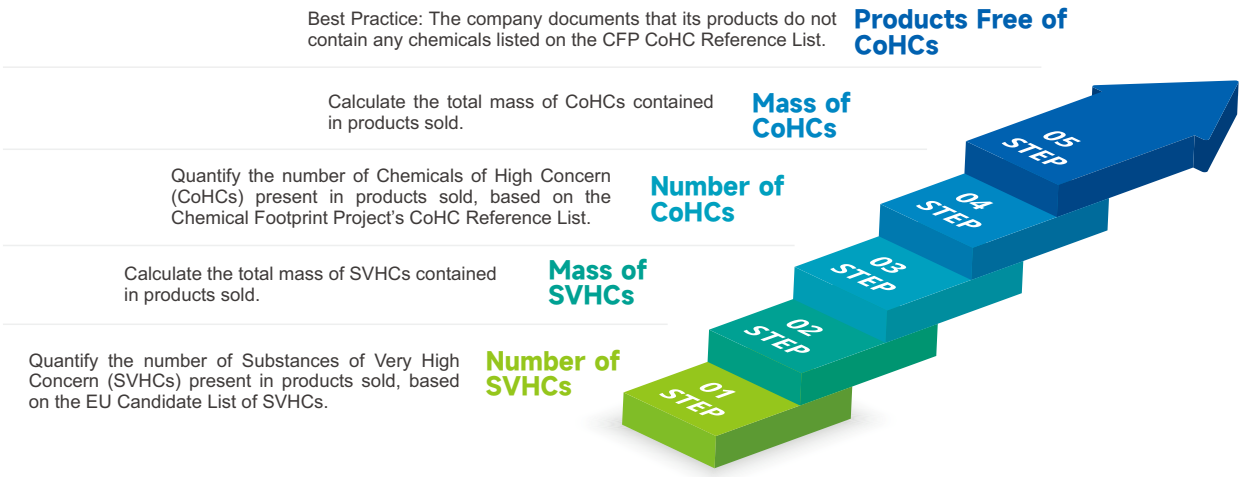


2) Select Priority Chemicals and Calculate the Chemical Footprint

The chemical footprint, akin to the carbon footprint, is a quantitative indicator used to assess a company's environmental impact in the domain of chemical management. Just as companies must first establish a baseline of their carbon emissions to set and achieve carbon reduction goals, efforts to reduce the use of priority controlled chemicals must be grounded in a clear understanding of the baseline chemical footprint. This forms the foundation for tracking progress and realizing reduction targets.

Calculating a chemical footprint can be a complex undertaking. Enterprises must begin by identifying all intentionally added chemicals and known impurities in their products, and then determine which of these substances appear on relevant lists of chemicals of concern. By calculating the quantity of such chemicals present in each product category and multiplying this by the total annual sales volume, a company can establish its baseline chemical footprint. For example, Walmart has adopted a mass-based approach to chemical footprinting, setting quantitative reduction targets and reporting the elimination of 37 million pounds of toxic chemicals over a three-year period.

For many companies, however, challenges in data availability may limit the feasibility of conducting a mass-based footprint calculation. In such cases, a count-based approach—tracking the number of chemicals of concern across product lines—can serve as a practical alternative. The Chemical Footprint Project (CFP) outlines five tiers of chemical footprint assessment methodologies, categorized by increasing levels of complexity and data requirements.



3) Setting Reduction Targets Based on the Chemical Footprint Baseline

Platform enterprises differ from traditional retailers in that they operate complex ecosystems involving numerous participants and intricate supply chains. The challenges they face in setting chemical footprint reduction targets are similar to those encountered when responding to national carbon targets and establishing corporate emission reduction targets.

Platform companies can leverage their existing experience in carbon footprint accounting, disclosure, and target setting to guide chemical footprint management. The scope of chemical footprint accounting can align with the widely used framework for carbon emissions, encompassing Scope 1, 2 and 3 emissions[iv].

While companies generally perform well in disclosing and setting targets for Scope 1 and Scope 2 emissions, Scope 3 emissions present greater challenges. There is currently no unified international standard for Scope 3 accounting by platform enterprises, and few have engaged comprehensively in this area. However, stakeholders increasingly expect platforms to take responsibility for the environmental impacts of their broader ecosystems, including the activities of merchants operating on their platforms.

Platform companies can begin by managing the environmental impacts of their own operations and supply chains, but should also recognize the need to extend their responsibility across their entire ecosystem. For instance, eBay began including logistics-related emissions from merchants on its platform in its Scope 3 carbon footprint calculations starting in 2020[64]. Similarly, Alibaba announced Scope 3 and Scope 3+ carbon reduction targets in 2021. These examples illustrate a growing trend among platform enterprises to embrace broader environmental responsibilities that encompass all participants in their ecosystems.

In chemical footprint management, platform enterprises can begin by focusing on their self-operated businesses, accounting for the number and mass of chemicals and setting reduction targets. Over time, platforms can extend their efforts beyond self-operated activities by first engaging large brands within their ecosystems to manage their chemical footprints.

64.eBay. (2021). eBay Impact 2020 report. https://www.ebayinc.com/impact/impact-report-2020/

From a product perspective, platforms can adopt a phased approach, starting with a few product categories and selecting specific chemicals for footprint accounting. As initial progress is made, the scope can gradually expand to include a wider range of chemicals and products.

1. Select product categories.
2. Based on the Priority Chemicals and Products List, calculate the number and/or mass of priority chemicals within the selected product category.
3. Set targets to reduce the chemical footprint in that category and collaborate with suppliers to achieve the targets through safer alternatives.
4. Expand chemical footprint accounting to additional product categories.

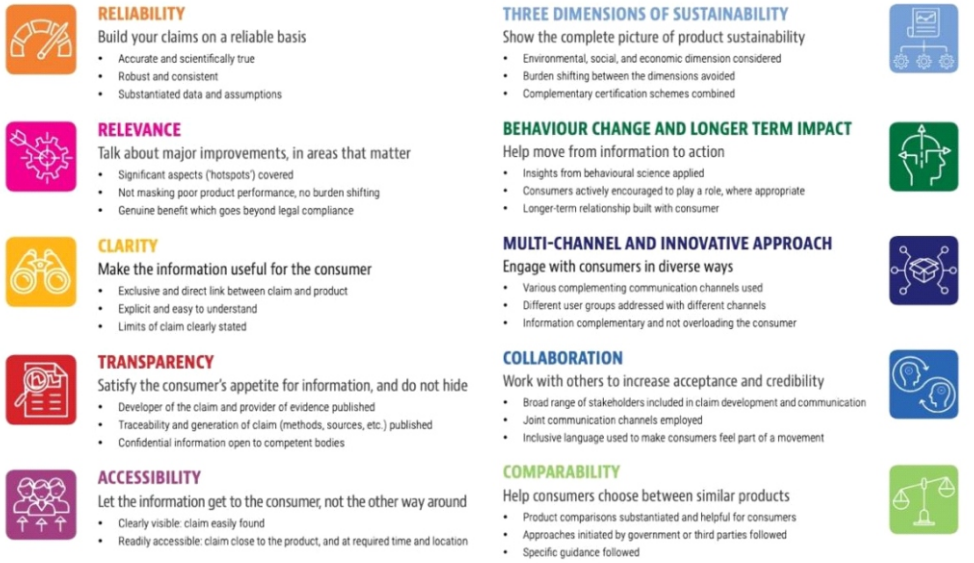
3.2.4 Consumer Communication

1) Promoting the Disclosure of Chemical Information in Products

Data show that 90% of consumers check ingredient and composition lists when purchasing products[65]. Consumers are increasingly willing to pay for products that are natural, healthy, safe, and effective, and place particular importance on information related to product ingredients, formulations, and performance.

In 2017, UNEP released the Guidelines for Providing Product Sustainability Information, which set out ten principles for companies to communicate sustainability information to consumers. Subsequently, in 2023, UNEP published Communicating Product Sustainability Information Related to Chemicals, which builds on the Guidelines' ten high-level principles and applies them specifically to chemicals in products. The 2023 document provides practical guidance to businesses on effectively disclosing chemical-related information, ensuring that communication is reliable, relevant, accessible, and easy to understand. It emphasizes the importance of transparency regarding chemical content, associated hazards and risks, and the use of safer alternatives.

Figure 7. UNEP Guidelines for Providing Product Sustainability Information



65.China Economic Net. (2021, December 11). Economic Daily and JD.com release data: Consumers increasingly value product ingredients. http://www.ce.cn/xwzx/gnsz/gdxw/202112/11/t20211211_37162618.shtml

Information on chemicals in products is a critical aspect of product sustainability. It not only influences a product's environmental impact throughout its life cycle but also directly affects consumer health, safety, and well-being. E-commerce platforms can leverage their data management capabilities to disclose chemical composition information for both platform-owned brand products and products offered by merchant brands, through product packaging and online listings.

Recommended Actions:

- Building on chemical inventory and footprint assessments, platforms can start by focusing on priority chemicals within selected product categories and require suppliers or brand owners to disclose chemical information on packaging and digital product pages.
- In line with UNEP's Communicating Product Sustainability Information Related to Chemicals, the chemical information provided must be accurate, trustworthy, and verified by the platform.
- Platforms should ensure that consumers can easily access information on chemicals in products, particularly by displaying it clearly and appropriately on product pages.
- Where applicable, platforms should provide educational explanations of chemical hazards in user-friendly language to raise awareness and promote informed purchasing decisions.

In January 2018, Walmart began requiring suppliers to list Walmart's Priority Chemicals on product packaging, accelerating suppliers' efforts to phase out these substances. In addition to complying with chemical ingredient disclosure guidelines under relevant regulations, Walmart asks suppliers to go further by providing:

- Ingredient CAS numbers[v]
- Full disclosure of all ingredients including those typically protected under trade secrets (e.g. fragrances)
- Known residuals, contaminants, and by-products
- Identification of ingredient function and uses
- Product formula number
- Hazard information (e.g. MSDS/SDS data)
- Priority chemicals that have been removed from the product or portfolio of products, in conformance with FTC's Green Guides

Source: Walmart Implementation Guide for Policy on Sustainable Chemistry in Consumables (last updated: February 21, 2014)[66]

On November 28, 2020, the Alibaba Foundation and Baidu Security jointly launched the "Green Web Initiative", shifting from merely blocking billions of irregular or harmful online searches to offering science-based education and awareness-raising content. This marked a further step toward proactive consumer engagement and guidance.

The initial Green Web Initiative focused on three core areas: protecting health and well-being, wildlife conservation, and child protection. It was later expanded into "Green Web Initiative 2.0," launched in partnership with Douyin and Alibaba, to cover additional topics such as online fraud prevention, public safety, personal data protection, anti-drug and anti-gambling efforts, and discouraging the consumption of wild animals.

By informing users about problematic search behavior, the legal consequences of trading prohibited goods, and promoting lawful alternatives, platforms not only help shift consumer behavior but also contribute to collaborative social governance and proactively mitigate platform risks at the source.

66.Walmart. (2014) Implementation Guide for Policy on Sustainable Chemistry in Consumables. http://productingredients.com/docs/walmart.pdf

2) Promoting the Use of Products with Safe and Sustainable Chemicals

China's National Development and Reform Commission (NDRC), in its Implementation Plan for Promoting Green Consumption, calls for e-commerce platforms and other distribution enterprises to create dedicated sections for green and low-carbon products, using incentive mechanisms to encourage sustainable consumer behavior.

Research has shown that proactive consumer communication and incentive strategies by e-commerce platforms can significantly influence and improve green purchasing choices[67]. With access to vast product and user data, platforms are well positioned to leverage their technological capabilities to raise awareness of chemical safety and support the shift toward safer, more sustainable consumption.

Recommended actions:

- Promote transparency in chemical composition to uphold consumers' right to know;
- Increase the share of products containing safe and sustainable chemicals, and create dedicated promotional zones;
- Promote certified products or those carrying environmental product declarations and ensure the accuracy and credibility of such claims through verification.

A notable example is Clean at Sephora, an initiative by global cosmetics retailer Sephora. This label helps consumers identify products formulated without over 50 ingredients that are potentially harmful to health or the environment. These include parabens, sulfates (SLS and SLES), phthalates, formaldehyde and formaldehyde releasers, mineral oils, oxybenzone, and plastic microbeads, among others. Sephora provides full transparency through an up-to-date "Formulated Without" list on product pages, empowering consumers to make more informed and responsible choices.

Figure 8. Sephora' s "Clean at Sephora" Program – Formulated Without List

67.Ecommerce Europe. (2021). Collaborative report on sustainability and e-commerce (2nd ed.).

JD.com launched the "Quality Certification" label to help consumers identify products that meet higher quality standards. Building on compliance with national standards, JD.com collaborates with third-party testing organizations and references leading industry benchmarks to select products that exceed baseline regulatory requirements.

To date, JD.com has developed and published over 150 product-specific quality standards that go beyond national regulations, covering categories such as electronics (3C), maternal and infant products, fresh produce, and packaged foods[68]. Products that meet the "Quality Certification" criteria receive enhanced marketing support and promotional exposure on JD's platform, helping to increase visibility and consumer recognition.

Figure 9. JD Quality Certification

3.2.5 Information Disclosure and Collaboration

1) Disclosure of Chemicals Management Information

As concerns over chemical risks gain traction among both domestic and international investors and regulators—and as consumers become increasingly aware of their rights to health and safety—enterprises are under growing pressure to enhance transparency in their chemicals management practices and related progress. For instance, the European Union's Corporate Sustainability Reporting Directive (CSRD) mandates that EU-listed companies, large enterprises, and non-EU companies with qualifying subsidiaries in the EU disclose environmental, social, and governance (ESG) information in accordance with the European Sustainability Reporting Standards (ESRS). Similarly, major stock exchanges in China—Shanghai, Shenzhen, and Beijing—have recently released guidelines on sustainability reporting, requiring listed companies to prepare ESG reports and disclose information on environmental, social, and governance performance.

68.Eastday. (2021, December 14). JD.com's 12.12 campaign launches "Quality Certification"; Top 100 Gold Awards dubbed the "Michelin List" of mass consumer goods. https://caijing.chinadaily.com.cn/a/202112/14/WS61b83880a3107be4979fcf92.html

Leading e-commerce platforms have publicly disclosed their chemical policies and Priority Chemicals and Products Lists through their websites, sustainability reports, and participation in third-party initiatives. These efforts aim to ensure that key stakeholders—including investors, civil society organizations, and consumers—are informed about their commitments and actions related to chemicals management. In contrast, Chinese e-commerce platforms have yet to include chemicals management in their ESG or sustainability reporting.

Recommended actions:

- Disclose the e-commerce platform's chemical policies and Priority Chemicals and Products List;
- Establish dedicated sections in corporate sustainability and ESG reports to communicate goals and progress on chemicals management;
- Share updates, performance, and knowledge on chemicals management with suppliers and third-party merchants to foster awareness and capacity building;
- Share best practices and lessons learned with relevant stakeholders;
- Participate in third-party disclosure and verification initiatives.

Voluntary Corporate Chemicals Management Initiatives and Action Networks

The Chemical Footprint Project (CFP)

Initiated by Clean Production Action, CFP is a voluntary initiative aimed at advancing safer chemical use in the marketplace by promoting the concept and practice of measuring a company's "chemical footprint." It focuses on reducing the use of Chemicals of High Concern (CoHCs) across industries.

The CFP engages a broad coalition of signatories, including investors, businesses, healthcare organizations, governments, and civil society groups. Each year, CFP invites companies—including major retailers—to participate in its annual survey. Participating companies confidentially submit data related to their chemicals management practices. Based on this information, CFP scores companies on their chemicals management performance, allowing them to measure progress and benchmark against peers.

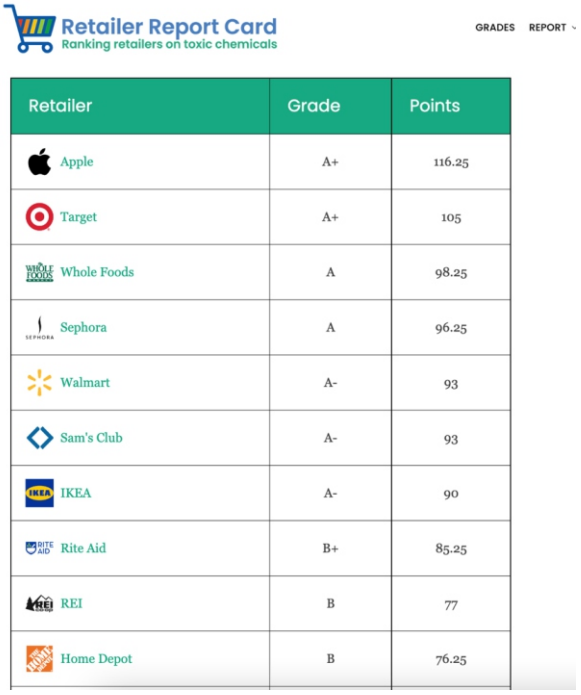
The CFP survey comprises 19 questions, grouped into four key pillars: Management Strategy, Chemical Inventory, Footprint Measurement, Disclosure and Verification.

Retailers such as Walmart and Target have taken part in the CFP survey alongside a range of brand owners and manufacturers. Notably, Walmart participated in the 2017 CFP survey and subsequently established its own chemical footprint reduction goals, which it now reports on regularly.

Ecovadis

Founded in 2007, EcoVadis is the world's largest provider of business sustainability ratings, having established a global network of more than 100,000 rated companies. Companies participate by completing the platform's Corporate Social Responsibility (CSR) questionnaire, which covers criteria such as environmental impact, labor and human rights, ethics, and sustainable procurement. Based on a thorough assessment, EcoVadis awards medals (Platinum, Gold, Silver, or Bronze) to recognize a company's sustainability performance. These medals can be used for external communications and stakeholder engagement.

To date, over 130,000 companies have disclosed information on the platform across a range of ESG dimensions—including environment, labor and human rights, ethics, and governance. Environmental disclosures include specific data on chemical management goals, policies, systems, actions, and performance outcomes.



Retailer Report Card
Ranking retailers on toxic chemicals

GRADES REPORT

Retailer	Grade	Points
Apple	A+	116.25
Target	A+	105
Whole Foods	A	98.25
Sephora	A	96.25
Walmart	A-	93
Sam's Club	A-	93
IKEA	A-	90
Rite Aid	B+	85.25
REI	B	77
Home Depot	B	76.25

Retailer Report Card (RRC)

The Retailer Report Card (RRC), launched by the Mind the Store Campaign, applies a transparent scoring methodology to rank the progress of approximately 50 of the largest retailers in North America in chemicals management. The RRC evaluates companies based on 13 weighted indicators, including the existence of a chemicals policy, management strategies and incentive mechanisms, supply chain compliance, information sharing on chemical ingredients in products, actions to reduce or eliminate chemicals of high concern, efforts to adopt safer alternatives, transparency and public disclosure, chemical footprint measurement, and the use of third-party certifications.

The RRC is updated annually, with its website offering detailed performance data for each evaluated retailer across all indicators. This transparency enables stakeholders to assess company performance in chemicals management and helps catalyze a competitive race to the top—driving retailers to eliminate toxic chemicals and plastics and replace them with safer alternatives.

2) Establishing Collaborative Mechanisms with a Broad Range of Stakeholders to Drive Continuous Improvement

Effective reduction of toxic and hazardous chemicals in e-commerce requires coordinated efforts, not isolated actions by individual companies. Collaboration with diverse stakeholders throughout planning, implementation, and evaluation brings critical expertise and added value. Moreover, open and equitable engagement across the sector promotes transparency and shared learning, helping to raise the overall standards of chemicals management and sustainability within the industry.

Effective reduction of toxic and hazardous chemicals in e-commerce requires coordinated efforts. Collaboration with diverse stakeholders throughout planning, implementation, and evaluation brings essential expertise and resources. Civil society organizations, industry associations, research institutions, third-party consultants, and investors all offer valuable perspectives and technical knowledge that can help shape more robust chemicals management strategies. Regular and transparent engagement with NGOs focused on chemical safety and environmental health can further strengthen accountability and drive innovation. Such cross-sector collaboration also promotes knowledge exchange and fair competition, contributing to improved chemicals management and sustainability performance across the entire industry.

Recommended actions:

- Engage in third-party disclosure initiatives by publicly sharing chemicals management policies, targets, and progress, and commit to continuous improvement.
- Establish regular communication mechanisms with stakeholders—such as NGOs focused on chemical safety and environmental issues—to facilitate information exchange.
- Share practices, challenges, and lessons learned related to chemicals management with peer companies and industry platforms to help raise the overall standard of chemicals management across the sector.

Appendix I – Toxics-Free Corps Priority Chemicals and Products List (2024)

No.	Chemical Substance	Product Categories
1	**Phthalates**	Children's toys (plastic dolls, plastic toys, swim rings, plush toys, electronic toys, rubber ducks, inflatable toys, strollers); school supplies (backpacks, erasers, pencil cases, pen boxes, gel pens, liquid glue); children's footwear (kids' slippers, sneakers, flip-flops)
2	**Formaldehyde**	School supplies (study desks, student desks, solid glue); children's furniture (beds, tables, cabinets); children's footwear; apparel, footwear and home textiles (knitted underwear, socks, buffalo leather mats, casual hats, senior shoes, casual shoes, summer sports shoes, women's shoes)
3	**Lead**	Stainless steel cups for children; electronic toys (bubble toys, radio-controlled cars, light-and-sound Ultraman toys, toys with projectors, remote-controlled toy mice, electric flying dolls, electric flying toys, electric whale toys, electric toy cars, toy pianos, electronic toy guns, video game consoles, balloon battle robots, toy irons, battery-operated toys, toy telephones, toy excavators, toy cameras, radio-controlled vehicles, smart flying balls, etc.)
4	**Cadmium**	Electronic toys (toy excavators, bubble toys, electronic toy guns, electric whale toys, toy telephones, electric toy cars, electric flying dolls, toy pianos); plastic dolls
5	**Hexavalent Chromium**	High-heeled shoes, belts
6	**Heavy Metals**	Children's footwear, children's slippers
7	**Carcinogenic Azo Dyes (reducible)**	Casual shoes, leather shoes
8	**Volatile Substances**	Infant pacifiers
9	**Volatile Compounds**	Infant soothing pacifiers
10	**Volatile Organic Compounds (VOCs)**	Prefabricated plastic track surfaces
11	**Nickel**	Children's earring sets
12	**Chlorinated Hydrocarbons**	Correction stationery
13	**Chromium**	Children's real cooking sets

Appendix II – Toxics-Free Corps Extended Priority Chemicals and Products List (2024)

No.	Chemical Substance	Product Categories
1	**Boron**	Slime toys, modeling clay
2	**Short-chain chlorinated paraffins (SCCPs)**	Electronic toys (electric flying dolls, children's headphones, children's cameras, toy cameras, radio-controlled cars, smart flying balls); children's smartwatches; plastic dolls
3	**Formaldehyde**	Children's toys (bubble toys, fingerprint ink pads, squishy toys); school supplies (pencil cases, pen boxes); children's bamboo tableware; red scarves; boys' sneakers; travel shoes; women's shoes; summer sports shoes; casual shoes; knitted underwear; casual hats; socks; buffalo leather mats
4	**Benzo[a]pyrene**	Whoopee cushions
5	**Bisphenol A (BPA)**	Plastic rubber duck toys
6	**Phthalates**	Costume clothing and masks; children's crawling mats; children's watches and smartwatches; children's rain boots; school supplies (plastic school bags, double-sharpening pencil boxes, subject dividers, backpacks, trolley bags, book bags); athletic shoes
7	**Menthol, Camphor**	Nasal inhaler sticks
8	**Benzisothiazolinone**	Finger paint
9	**Methylisothiazolinone (MI), Methylchloroisothiazolinone (MCI)**	Bubble toys, modeling clay, finger paints, fingerprint ink pads
10	**Nickel**	Toy handcuffs
11	**Alkylphenols (APs) and Alkylphenol Ethoxylates (APnEOs) (including nonylphenol [NP], octylphenol [OP], nonylphenol ethoxylates [NPnEO], octylphenol ethoxylates [OPnEO])**	Down jackets

No.	Chemical Substance	Product Categories
12	**Nitrosamines**	Remote-controlled balloon battle robots, balloons
13	**Organotin compounds**	Plastic mermaid toys
14	**Benzene**	Squishy toys
15	**Xylene**	Squishy toys
16	**Lead**	Temporary tattoos; children's dining chairs; electric bicycles; craft buttons; metal cartoon pins; leather shoes; headscarves; smartwatches; bamboo tableware; toys (teacher play bags, handbag toy sets, slime eggs, rubber ducks, modeling clay, toy fishing rods); plastic tongue-ball shoes; paints
17	**Cobalt**	Temporary tattoos
18	**Polycyclic aromatic hydrocarbons (PAHs)**	Temporary tattoos
19	**Cadmium**	Children's rings
20	**Chromium**	Children's necklaces
21	**Carcinogenic azo dyes (reducible aromatic amines)**	Red scarves; cotton and blended fabrics; boys' shoes
22	**Migratable elements**	Hexagonal pencils (Hb); plastic toys
23	**Hexavalent chromium**	Gloves
24	**Arsenic**	Glass bookends
25	**Heavy metals**	Pencil cases; children's leather shoes
26	**Dichloromethane (methylene chloride)**	Wool knitwear, shawls, and related garments

Endnotes

i.According to documents issued by the Ministry of Ecology and Environment, **"chemicals"** refer to substances that are either intentionally produced by humans or naturally occurring substances that have been processed and utilized by humans. "Chemical substances" refer to elements and compounds that are either extracted from nature or produced and processed for commercial purposes.

In terms of their natural attributes, chemicals—by virtue of their specific chemical composition or compound forms—are in essence chemical substances. Recent documents from the Ministry increasingly adopt the term "chemical substances." In practice, the legal definitions of "chemicals" and "chemical substances" have largely converged in both connotation and scope. Therefore, this report uses the two terms interchangeably without drawing a strict distinction.

ii.**The EU REACH Regulation**—short for Registration, Evaluation, Authorisation and Restriction of Chemicals—is a comprehensive chemical management framework that applies to all chemical substances manufactured or imported into the European Union market.

REACH takes a preventive and precautionary approach to chemical regulation. Its core objective is to protect human health and the environment by identifying the intrinsic hazards of chemical substances early and managing their risks appropriately. This may include restrictions or bans on the use of substances of very high concern (SVHCs).

As one of the most influential chemical regulatory systems globally, REACH sets a benchmark for chemical safety governance and is often referenced in international policy development and trade compliance.

iii.According to the U.S. Environmental Protection Agency (EPA), **Commercial Chemicals** are chemical substances manufactured or formulated for commercial or industrial use. This category includes commercially pure grades of chemicals, technical grades of any chemical produced or sold, and all formulations where the chemical is the sole active ingredient. Generally, these can be divided into industrial chemicals (including hazardous chemicals) and agricultural chemicals (including pesticides).

iv.The concepts of **Scope 1, Scope 2, and Scope 3 emissions** originate from the Greenhouse Gas Protocol (GHG Protocol), developed to categorize direct and indirect emission sources associated with an organization. This framework enables companies to better manage risks and opportunities related to their overall greenhouse gas (GHG) emissions.

Scope 1 covers direct emissions from sources that are owned or controlled by the company.

Scope 2 accounts for indirect emissions from the generation of purchased electricity, steam, heating, and cooling consumed by the company.

Scope 3 includes all other indirect emissions that occur in the company's value chain, such as those associated with the extraction and production of purchased materials, transportation of purchased fuels, and the use of sold products and services.

v.**CAS Registry Number** is a unique numerical identifier assigned to every chemical substance described in the open scientific literature. This includes compounds, polymers, biological sequences, mixtures, and alloys. The Chemical Abstracts Service (CAS), a division of the American Chemical Society, is responsible for assigning these numbers. The primary purpose of CAS Registry Number is to provide a consistent and unambiguous way to identify chemical substances, facilitating easier and more reliable searches across chemical databases.

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