Air & water pollution prevention 102-12, 102-15, 103-1

Protect human health and the natural environment by preventing pollution of water and air through the manufacture or use of our products.

Kao's creating value to address social issues

Social issues we are aware of

It goes without saying that air pollution, water pollution and soil pollution can have a significant negative impact on human health, on agricultural crops and other plants, and on ecosystems.

Atmospheric pollutants such as nitrogen oxides (NOx), sulfur oxides (SOx), particulate matter (PM) and volatile organic compounds (VOCs) are known to increase the prevalence of pulmonary diseases such as asthma. Most atmospheric pollutants derive from burning of fossil fuels or usage of organic solvents. Worldwide, around 8.8 million people die prematurely each year because of atmospheric pollution. In Europe alone, the figure is believed to be over 790,000 (according to a study by the University of Mainz in Germany). At the same time, in recent years there has been a trend for indoor spaces to be made as airtight as possible in an effort to make homes more energy-efficient. As a result, chemical substances in indoor spaces remain in those spaces for long periods, and their concentration levels rise. A report (by Yokohama National University in Japan) suggests that this can have a negative impact on human health.

The vast majority of living organisms, including human beings, cannot live without water. Humans also need access to sanitary water in order to maintain kirei lifestyles. The main cause of water pollution is various substances contained in wastewater from factories and household sewage.

Negative impacts on human health resulting from soil pollution include the effects of both direct contacts with polluted soil by touching it or eating it and indirect contacts by using groundwater that has been polluted with harmful substances that have leached out from polluted soil. Significant characteristics of soil pollution include the fact that, once soil pollution starts to occur, harmful substances can accumulate in the soil over a long period, and the fact that people are less likely to be aware of soil pollution than they are of air pollution and water pollution.

Kao's creating value

We are working to prevent air pollution and water pollution in the areas near Kao production plants by reducing emissions of atmospheric pollutants such as NOx, SOx and VOCs from our plants and reducing organic matter and other substances in wastewater discharged from our plants, by complying faithfully with the relevant laws and regulations in each country and region in which we operate, and by setting reference values that are even more rigorous than those required by law to strictly manage pollutants.

We also take great care to safeguard the health of the people working at our plants throughout the world. For example, we control VOCs in the spaces where our printing operations are performed through the use of *LUNAJET*, a water-based pigment inkjet ink which does not require the use of organic solvents. Through measures such as the development of Bio IOS, a revolutionary new type of surfactant that reduces the amount of surfactant used, we are contributing toward prevention of water pollution through our products.

Furthermore, we perform regular surveys of soil conditions at each of our production plants to confirm that groundwater used in the local community has not been polluted.

Contributions to the SDGs

Air & water pollution prevention 102-43, 103-2, 303-2 (Water and effluents 2018), 404-2

Policies

We utilize a wide range of chemical substances in our products, from home-use products to industrial products, and we continue to implement activities to minimize negative impacts of chemical substances at every stage from development to post-use disposal.

In our Basic Principle and Basic Policies on Environment and Safety, we undertake to "assess environment and safety aspects throughout the entire lifecycle of the products, from manufacture through disposal, when developing products and technologies" and to "offer products with a lower environmental burden."

Furthermore, the Kao Responsible Care Policy contains the following declarations: "We shall ... strive to develop technologies and bring to market products that reduce our impact on the environment, thereby contributing to the peace of mind of our business customers and consumers." and "We shall strive to continue to reduce the environmental impact of our business operations by ... disposing of wastewater and waste gas appropriately."

Our Environmental Statement embodies our commitment to ensuring that "Kao products ... utilize original Kao-developed technologies to minimize the impact they have on the environment, not just in the manufacturing process, but in the daily life of the customers who use them. From materials procurement and manufacturing, to distribution, sales, usage and final disposal, we want to engage in 'eco together' with stakeholders and consumers worldwide."

➡ Basic Principle and Basic Policies on Environment and Safety
www.kao.com/content/dam/sites/kao/www-kao-com/global/en/sustainability/pdf/environment-safety-principle-policies.pdf

➡ Kao Responsible Care Policy
www.kao.com/content/dam/sites/kao/www-kao-com/global/en/sustainability/pdf/responsible-care-policy.pdf

➡ Kao Environmental Statement
www.kao.com/content/dam/sites/kao/www-kao-com/global/en/sustainability/pdf/environmental-statement.pdf

Education and promotion

We recognize the importance of giving our employees who handle chemical substances a variety of opportunities to obtain knowledge about the relationship between our business activities and products and air and water pollution, and to actively engage in pollution prevention activities of their own accord. We have created many opportunities for employee education accordingly.

Specifically, we conduct environmental education including on air and water pollution prevention for all employees as part of our Responsible Care activities. We also provide education encompassing the importance of legal compliance pertaining to air and water pollution to all employees working at factories and research institutes that have obtained ISO 14001 or RC 14001 certification.

Collaboration and engagement with stakeholders

Emissions of substances linked to air pollution and water pollution, which are from business activities, are regulated by government agencies. We are working proactively to address this issue through collaboration and consultation with government agencies and industry associations.

Framework

Emissions of pollutants into the air or into bodies of water in relation to our business activities, and the current state of progress in addressing this issue, are managed under our Responsible Care promotion system.

➡ Responsible care activities/Framework
www.kao.com/content/dam/sites/kao/www-kao-com/global/en/sustainability/pdf/sus-db-2020-e-all.pdf#page=18

Air & water pollution prevention

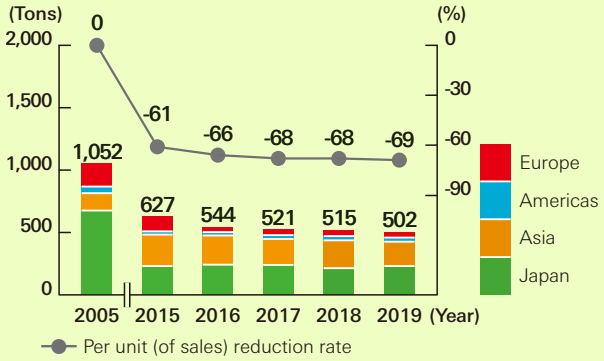
103-2, 103-3, 303-2 (Water and effluents 2018), 303-4 (Water and effluents 2018), 305-7

Mid- to long-term targets and performance

Performance in 2019

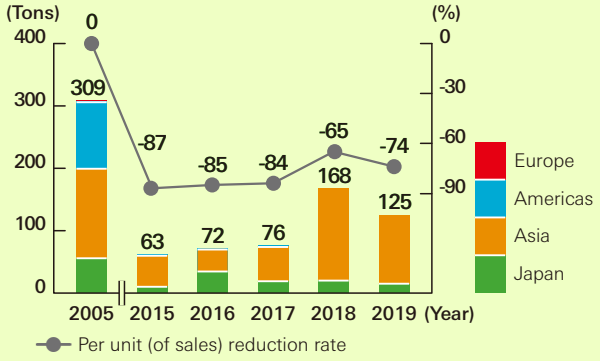
Performance*

NOx emissions☑ (all production sites)



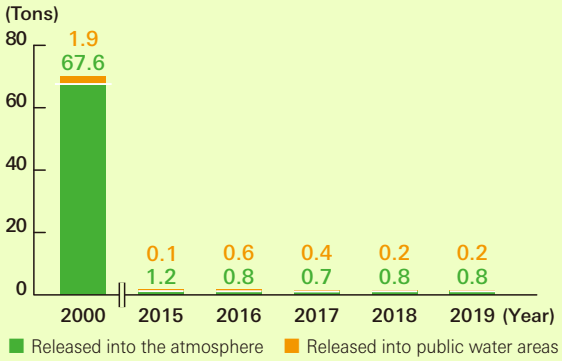
* Boundary: All Kao Group production sites.
* Assurance provided for NOx emission figures.

SOx emissions (all production sites)



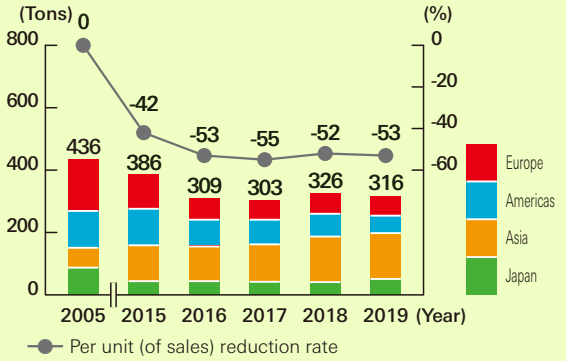
* Boundary: All Kao Group production sites.

Total emissions of chemical substances subject to the PRTR system



* Boundary: All Kao Group production sites in Japan.

COD pollution load☑ (all production sites)



* The amount of COD pollution load for wastewater entering sewer systems takes into account the removal rate from sewer systems.
* Assurance provided for COD pollution load.

Emissions of volatile organic compounds (VOCs)

Although we have no facilities subject to the VOC emission regulations provided in the Air Pollution Control Act, we work to voluntarily cut VOC emissions.

For the 100 VOC substances defined in the notice issued by the Director General of the Environmental Management Bureau, Ministry of the Environment, we set voluntary targets on the annual atmospheric emissions from each plant for each substance (5 tons or less in 2005, 3 tons or less in 2009, 1 ton or less in 2010), conducted emission reduction activities and accomplished our targets. We are managing VOC emissions with the current target of maintaining our activities.

The group in Japan handled 33 types of VOCs in quantities over 1 ton in 2019, with total emissions into the atmosphere of 8.4 tons☑.

Compliance with environmental legislation

In 2019, there were no violations of environmental legislation.

Compliance status with environmental laws and regulations

Category	Unit	2017	2018	2019
Number of violations*1	incidents	11	4	0
Of which, number of leaks	incidents	0	1	0
Total fines*2	1,000 yen	699	644	0
Of which, number of leaks	1,000 yen	0	0	0

*1 All incidents detected by authorities during the reporting period.
*2 Fines paid during the reporting period.

* Per unit of sales is calculated based on Japanese standards up to FY2015, and on International Financial Reporting Standards (IFRS) from FY2016.

Air & water pollution prevention 303-2

Our initiatives

Initiatives to prevent air pollution

Efforts at plants

Compliance with laws and regulations

The amounts and densities of pollutants emitted into the atmosphere are regulated by government agencies. We have established our own voluntary management criteria which are even more rigorous than the statutory requirements, and we comply with these to monitor pollutants.

Using cleaner fossil fuels

As burning of fossil fuels is accompanied by emission of NOx, SOx, PM, etc., we use natural gas—which is a clean fossil fuel—at all plants outfitted with the necessary infrastructure. Our plants do not use any coal.

Reducing emissions of chemical substances subject to the Japanese Pollutant Release and Transfer Register (PRTR) system

We began activities in this area by setting a voluntary target for annual emissions of one ton or less for each substance from each plant in FY2000. We achieved this target in FY2002. Since then, we have continued to achieve this voluntary target, excluding leaks of chlorofluorocarbon and similar emissions.

The number of chemical substances subject to the Japanese PRTR system of which we handled over 1.0 ton in 2019 was 75, and the total discharge of such substances into the atmosphere and public water areas was 1.0 ton. In addition, we are voluntarily monitoring and controlling releases and transfers (in the same way as would be done for chemical substances subject to PRTR) of chemical substances that the Japan Chemical Industry Association has specified as being subject to voluntary surveys.

Reducing emissions of VOCs (volatile organic compounds)

Our production plants outside Japan include some plants where they have not been possible to monitor VOC emissions, or where the emissions are relatively high. We are working to monitor and reduce VOC emissions at these plants.

Measures taken in relation to our products

Lunajet water-based pigment inkjet ink

Using the pigment nano-dispersion technology that we had previously developed, we successfully developed *LUNAJET*, the world's first water-based pigment inkjet ink, featuring a VOC-free design* which ensures that only very small quantities of VOCs are emitted during printing operations, thereby helping to prevent air pollution and also making a major contribution toward improving the working environment of printing workers. We also confirmed that this water-based pigment inkjet ink technology can be applied to water-based gravure-printing ink.

* VOC-free design
"VOC-free" is defined as emitting less than 700 ppmC (in carbon conversion terms) of volatile organic compounds (VOC) during the printing process.
VOC (volatile organic compound): VOC is a collective term for organic compounds that are volatile and are transformed into gaseous form in the atmosphere. In Japan, VOC emissions are regulated by the revised Air Pollution Control Act.

Measures to prevent water pollution

Measures taken in relation to product development

In product development, we incorporate considerations for impacts on the water environments of discharged water after product use. More specifically, we have investigated the biodegradability of raw materials that may be discharged into the environment and their impacts on common aquatic organisms using river water and activated sludge used at wastewater treatment plants. Through this investigation, we are actively promoting the development and use of raw materials with reduced environmental impact. We also plan to use AI and other technologies to investigate chemical substances with high environmental compatibility.

Efforts at plants

Compliance with wastewater related laws and regulations

The amounts and/or densities of pollutants discharged into rivers, the ocean and sewage systems are regulated by government agencies. We have installed and conduct high-level maintenance and management of wastewater treatment facilities at many plants. After properly treating plant wastewater, it is discharged outside the plant. We have established our own voluntary management criteria which are even more rigorous than the statutory requirements, and we comply with these to monitor pollutants.

Air & water pollution prevention 102-43, 303-2

AIR & WATER POLLUTION PREVENTION

Surveys of groundwater and soil contamination

In light of our past history of chemical substance use, every year we voluntarily measure the levels of substances regulated by environmental standards in the groundwater within plant premises.

Measures relating to wastewater after product use

We are focusing on understanding the actual situation in relation to wastewater discharge after product use and we are conducting our own field surveys on an ongoing basis, such as environmental monitoring of river water to get an idea of the ecological risks of chemical substances. To respond to globalization, we are conducting monitoring and working with experts to develop mathematical models that predict the concentration of chemical substances in rivers, aiming to conduct business with consideration for the local environment in countries outside Japan.

We are also participating in environmental monitoring undertaken by the Japan Soap and Detergent Association (JSDA). We have conducted environmental monitoring of four major surfactants in urban river systems (7 sites from 4 rivers, 4 measurements per year) for the past 20 years in order to assess environmental risk on aquatic ecosystems. In the surveys conducted so far, the results show that these surfactants have consistently low risks to aquatic organisms.

Measures taken in relation to our products

Visco Top high-performance specialty thickener

When undertaking civil engineering work near water (for example, on riverbanks or on the coast), it is vitally important that measures are taken to protect the water from being contaminated. In the case of bridge pier construction for long bridges or suspension bridges that cross ocean straits, because the piers are actually built in the riverwater or seawater, special underwater concrete that has high viscosity and is resistant to washout is used. Furthermore, when construction is undertaken near underground watercourses, care must be taken not to contaminate the groundwater. For work in this kind of water-related environment, the use of additives to increase the viscosity of inorganic materials such as grouting materials and concrete can enhance underwater anti-washout performance.

We have developed *Visco Top*, a high-performance specialty thickener that provides un-precedented viscosity for grouting materials and concrete, and makes it possible to undertake construction work without polluting the riverine or ocean environment. *Visco Top* has been also used in the removal of high concentration contaminated water from trenches at the Fukushima Daiichi Nuclear Power Plant.

Without the addition of *Visco Top*

With the addition of *Visco Top*

TRUpath™

Kao Group member company Washing Systems, LLC is now offering the TRUpath™ washing system that can wash most products without using alkali (sodium hydroxide), which is widely used in commercial cleaning but has large environmental impact. TRUpath™ enables washing to be completed within a short time while saving water, and the system's low-temperature washing feature also makes it possible to reduce fuel consumption. In addition, wastewater processing is easier than with alkali detergents.

Topic

Main awards received in 2019

Won the Minister of Economy, Trade and Industry Award in the Green & Sustainable Chemistry Awards for Kao's realization of printing technology that allows printing on soft plastic film using water-based inkjet ink

Kao received the Minister of Economy, Trade and Industry Award in the 18th Green & Sustainable Chemistry (GSC) Awards, which are organized by the Japan Association for Chemical Innovation (JACI), in recognition of our realization of printing technology that allows printing on soft plastic film using water-based inkjet ink. This award constituted recognition of the new value created, from an ESG perspective, by the *LUNAJET* VOC-free water-based inkjet ink that Kao has developed, which can be printed on film.

Award ceremony

TRUpath™ won the Green Chemistry Challenge Award (GCCA)

TRUpath™ received the 2019 Green Chemistry Challenge Award, which is awarded jointly by the U.S. Environmental Protection Agency (EPA) and the American Chemical Society (ACS), in recognition of its effectiveness in reducing environmental impact.

Award ceremony