

Chemical Pollution

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introduction

The environment has been taken care of in general, and the issue of pollution in particular, and at various levels, whether on the public formal education institutions or the non-formal education institutions. In spite of the great interest in environmental education programs, the reality of this situation is still that environmental care and importance are modest and insufficient to effect the desired effect in developing environmental awareness.

The world has known since the beginning of the twentieth century a set of developments in the relationship of man to the environment, as this century was marked by a set of transformations that caused severe impacts on the environment. The most notable of these transformations are the massive industrialization that the whole world and the developed countries in particular have known, in addition to the massive demographic explosion. These transformations have caused serious environmental problems, perhaps the most important of which is pollution that has affected all aspects of life. This is what imposed on those concerned with the environment, health, education and information in society, shedding light on the environment, providing environmental education that develops awareness of community members, alerting them to the dangers of environmental pollution, and most importantly, directing their behavior to caring for and preserving the environment. The topic of pollution and environmental studies has received the attention of specialists and international public opinion, so there are numerous seminars and conferences dealing with environmental issues and problems. Everyone has been warned that the fundamental solution to the current environmental crisis requires a major change in human attitudes towards their environment, and educational institutions must achieve this through environmental education curricula that provide an environmental culture that results in changes in behavior (Park, 1988). As the curriculum contains

environmental educational experiences helps to broaden learners' perceptions, and increases their knowledge of how to deal with the environment . The issue of pollution is one of the most important study topics included or that must include environmental educational concepts, which one must acquire and adhere to.

DEFINITION

Chemical pollution is defined as the presence or increase in our environment of chemical pollutants that are not naturally present there or are found in amounts higher than their natural background values. Most of the chemicals that pollute the environment are man-made, resulted from the various activities in which toxic chemicals are used for various purposes.



healthy Environment

The chemicals in their gaseous, liquid, and solid states that are characterized by their efficacy, toxicity, or explosive potential, or to corrosive events, or that have other characteristics that could result in a risk to the environment and public health, whether alone or when related to other materials. There is no doubt that the industry is one of the most important sources that produce chemical pollutants in our world today due to the multiplicity of industries and the tremendous progress in the industrial application of modern science, which is known as technology and is considered the most chemical pollutants resulting

from industry have the ability to accumulate in the body of living things
It reaches toxic degree.

Sources of pollution

pollution is divided into two types:
natural pollution and industrial pollution.

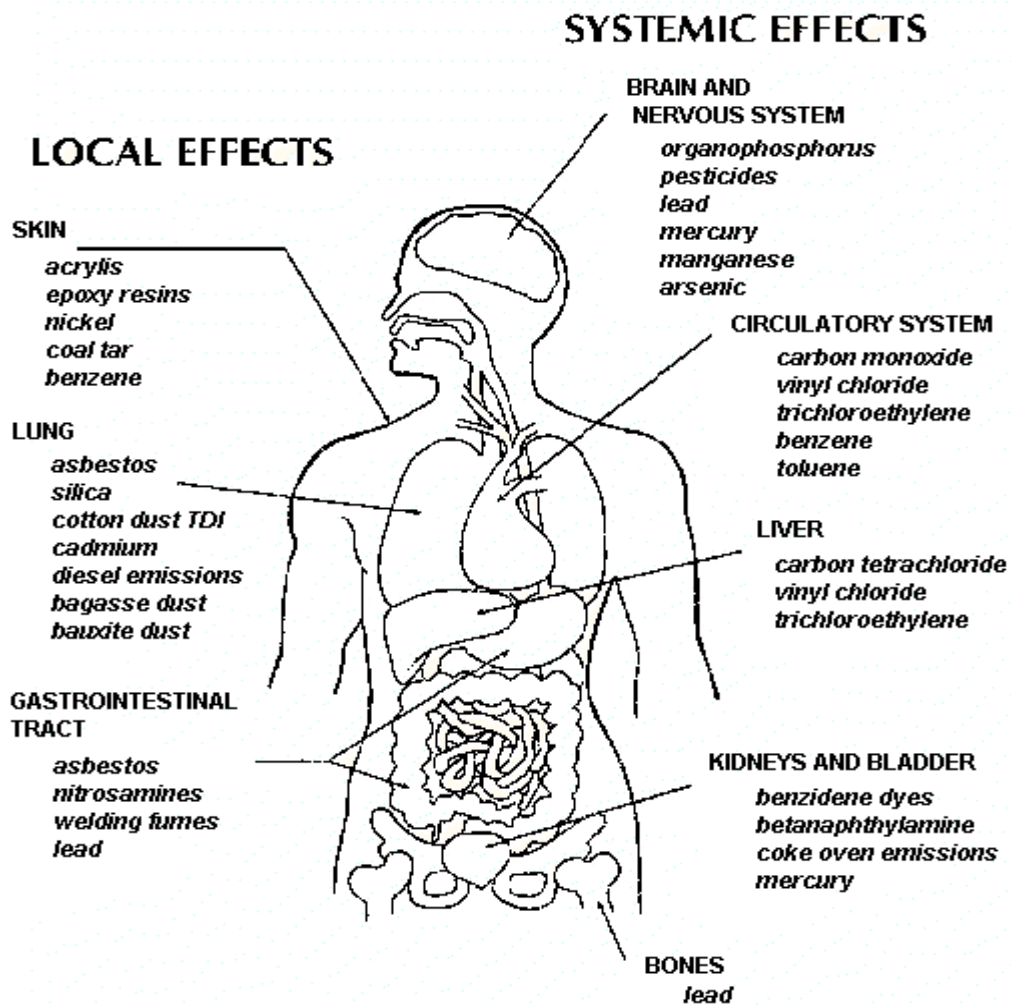
Natural pollution : pollution is the source whose source is due to natural phenomena that occur from time to time, such as volcanoes, thunderbolts, and storms that may carry huge amounts of sand and dust, and damage crops, so natural pollution is therefore sources of natural origin, and there is no income for man in it.

Industrial pollution: -Industrial pollution results from human action and activity, and finds its source in man's industrial, service, and entertainment activities, etc., and in his increasing uses of modern technology manifestations and its various innovations. It responsible for the emergence of the pollution problem in our time, and reaching this degree The serious threat to life and the survival of man on the surface of the earth, and among the most important sources of industrial pollution: industrial and commercial waste and what is emitted by car exhaust, and factory chimneys that leave toxic (chlorine, fluorine and carbon) compounds, and others.





Chemical substances effects of human healthy

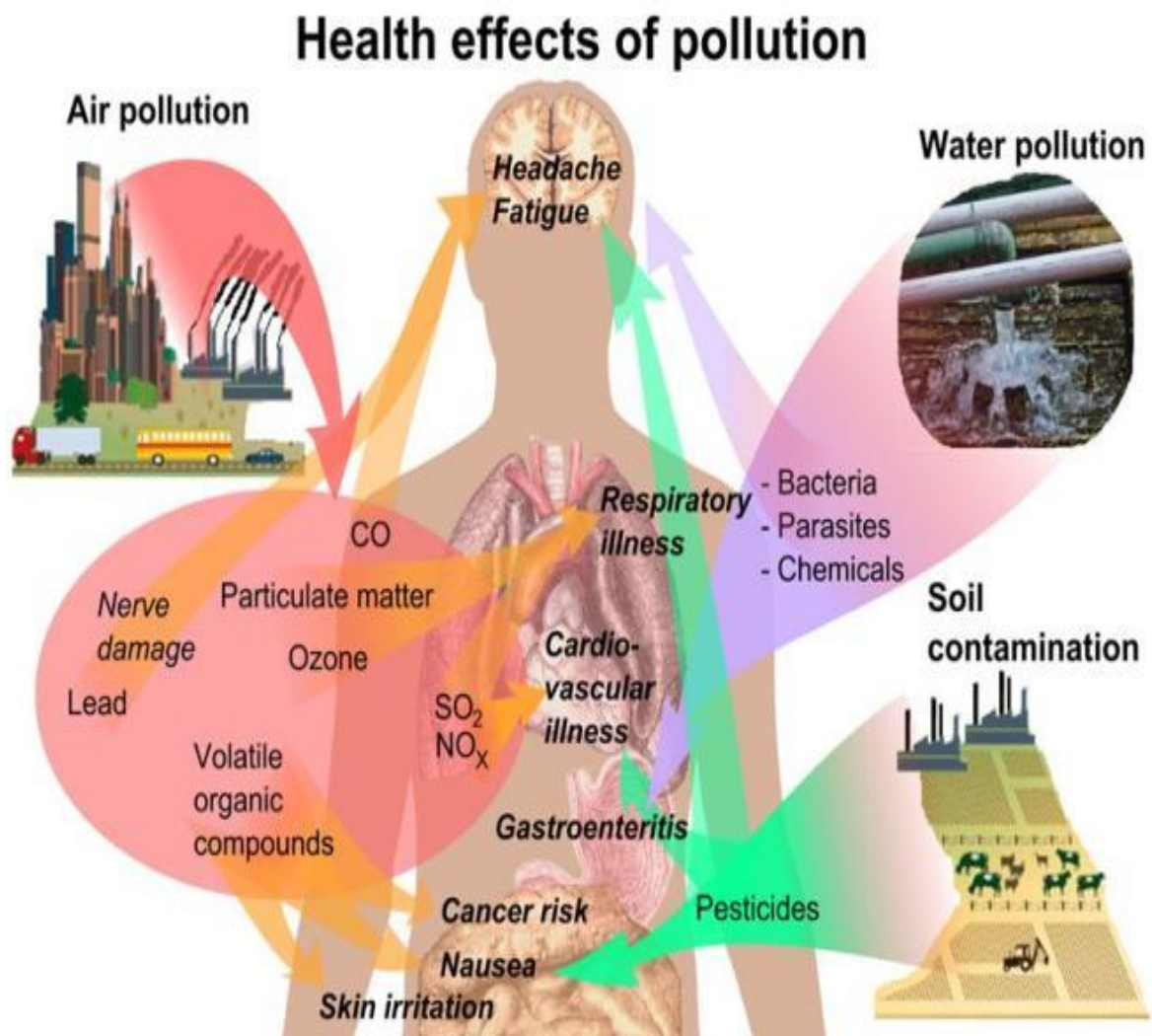


• The severity of industrial pollution depends on several factors, including:

1. The area from which industrial pollutants are emitted
2. Time period for pollution.
3. The degree of concentration of pollutants.
4. Physical, chemical and biological properties of pollutants.
5. The ability to decompose and assimilate in the environmental environment in which it is placed.
6. Toxicity relative to humans and other organisms.

•The general pollutants classified according to the property of harmful substances or products into environment to:

(Water pollution, Air pollution, Soil pollution, Nuclear pollution and Biological pollution)



MAIN TYPES OF CHEMICAL POLLUTION: These chemicals can react with tissues in the body and change the structure and function of the organ, cause abnormal growth and development of the individual, or bind with the genetic material of cells and cause cancer. One of the central tenets of the study of such effects (toxicology) is that the dose of a chemical determines its overall effects and that most chemicals can be dangerous at high exposure

1. **Inorganic pollutants:** Inorganic pollutants are released into the environment due to activities of mining, industry, transportation and urban activities. Environmental risks associated with inorganic pollutants vary widely due to several complex interactions at both intracellular and extracellular levels. Toxic heavy metals and metalloids interact quite strongly with soil constituents as compared to salts of alkali metals, rate of which however, depend on the element and their speciation.
2. **Organic pollutants:** More of organic compounds used in industry and medical field there are we exposure in daily life, They're used for drugs and cleaning applications and as solvents in a wide range of products such as fuels, paints, inks, preservatives and pesticides , therefore causes more pollutions, So can have serious impacts of human health. and many can be absorbed through intact skin and absorbed into the bloodstream; and may be have more major route of entry into the body.
3. **Nuclear (Radiation) pollutants:**

Radiation warning symbol
(nuclear power plants)



Radiation pollution means the leakage of radioactive materials into one of the components of the environment, such as water, air, and soil. It is considered one of the most dangerous types of environmental pollution in our time, as it is not seen, smelled, does not feel. Without any resistance, and without any indication of its presence, and without first having an effect, and when radioactive materials reach the cells of the body, they cause visible and hidden damage that often leads to human life, and

radioactive contamination may occur from natural sources such as radiation from outer space and gases Radioactive mounting from the cortex Z, or from industrial sources of nuclear power stations of atomic reactors and radioactive isotopes used in industry, agriculture, medicine or other.

Radioactivity is toxic because it forms ions when it reacts with biological molecules. These ions can form free radicals, which damage proteins, membranes, and nucleic acids. Radioactivity can damage DNA (deoxyribonucleic acid) by destroying individual bases (particularly thymine), by breaking single strands, by breaking double strands, by cross-linking different DNA strands, and by cross-linking DNA and proteins. Damage to DNA can lead to cancers, birth defects, and even death.

4. **Biological pollutants:** Biological or biological pollution is considered one of the oldest forms of pollution known to man, and this pollution arises as a result of the presence of visible or invisible living organisms such as bacteria, fungi and others in the environmental medium such as water, air or soil, so the mixing of disease-causing organisms with food that The person eats it, the water he drinks, or the air that he inhales causes biological pollution, which leads to disease.

- The effect of chemical pollutants on human health There is no doubt that the human body is poisoned by chemical pollutants if exposed to it, and poisoning is the occurrence of a demolition in the biological composition of some parts of the body and acute poisoning occurs as a result of exposure to toxic gases for twenty-four hours, while chronic poisoning occurs as a result of exposure to pollutants for a long period of time intermittent. Man can control solid or liquid chemical pollutants for easy identification, collection and disposal in remote places. As for gas chemical pollutants, they are rapidly spreading and some cannot be seen, which is difficult to collect if they are spread. There are three ways by which gas pollutants enter the human body and are:

- Through the respiratory system when breathing.
- Through the digestive system when eating foods and drinks.
- Through the skin, especially in the injured areas.

Industrial pollutants are divided into three types:

1. Solid pollutants, which are those pollutants resulting from many industries, such as dust resulting from the cement industry, for example.
2. Liquid pollutants such as the solutions of the chemical materials that the factories throw into the waterways.
3. Gas pollutants such as gases and harmful smoke from industrial chimneys and oil refineries.

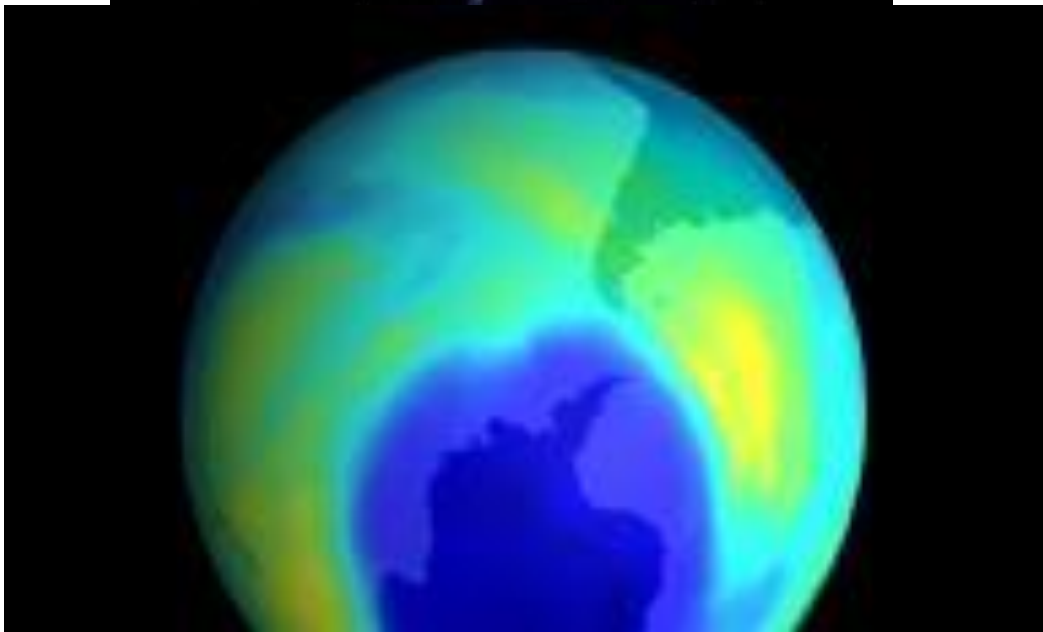
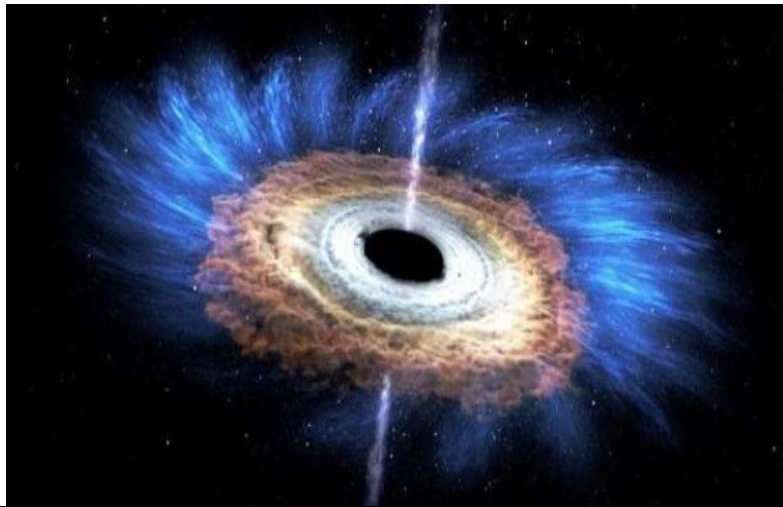
Most important organs of the body affected by toxic pollutants are the kidneys and liver, where pollutants accumulate, as the skin and eye sensitivity are a sign of the presence of substances with an unhealthy effect in the atmosphere, and the fear of the effect of chemical pollutants on human health is not limited to the surrounding pollutants but rather leads to fear of using Chemicals in the various products that a person uses daily and that are included in food and drink items such as preservatives and flavors added to food. The World Health Organization issues lists of these materials to stop use in the food industry in the countries of the world.

hazards of environment Pollution

1. Poisoned marine organisms, which may cause their death, thus affecting the food chain in the ecosystem.
2. Damage to living organisms that live on Earth, whether they are microorganisms, plants or animals, as it loses soil fertility, and may lead to desertification.
3. Global warming occurs, which may cause environmental disasters, such as: global warming, as well as melting ice in the Arctic and which causes the percentage of water on the earth to rise, and thus drown.

4. It leads to a hole in the ozone layer, which leads to an increase in the harmful UV rays reaching the earth, which affects human life.

Gases pollutants such oxides of salver, carbon, and nitrogen as well as the chlorofluorocarbon compounds are broken by UV radiation releasing chlorine and fluorine free radical those react woth ozone of stratosphere cause decomposed it:



5. Acid rain causes corrosion various impacts and buildings due to the rise in the proportions of some gases.



The Effects of Chemical Pollution

Chemical pollution can be caused by a variety of chemicals from a variety of sources and can involve a variety of health effects from simple digestive problems to chemical intoxication and sudden death by poisoning. The effects are usually related to the exposure to high amounts and accumulate of chemicals in body. Chemical pollution leads to various serious diseases, generally by consuming poisonous food, drinking highly contaminated water, or breathing contaminated air.

Chemical intoxication can have severe health effects that may trigger immediate symptoms and diseases or delayed effects which may appear after weeks or months since the exposure occurred. This is based on the type of pollutants and on the amounts to which you are exposed. **CAUTION, never assume that all is OK if no health effects appear immediately!**

Chemical compounds intoxication are organic or inorganic chemicals that are the main [causes of chemical pollution](#). The most common chemical pollutants are those compounds used across large areas and which are persistent, meaning they do not easily degrade in nature. Examples are most pesticides, herbicides, insecticides used in agriculture and gardening, as well as chlorinated solvents used in many industrial processes and dry-cleaning activities.

The chemical industry is another example in this sense, mainly because it is usually linked to polluted waste streams. In fact, the waste streams from chemical industry are now strictly controlled and treated before being released into the environment. But this was not always the case in the past and many rivers and surface water bodies were contaminated by the numerous waste streams coming from various chemical plants, as well as other industrial sources. Even though measures were taken to reduce this type of pollution, its effects are still visible.

Chemical intoxication is caused by exposure to chemical pollutants and can have immediate effects or delayed effects, which may appear after weeks or even months after the exposure occurred. Severe chemical intoxication may cause the death of the person that inhales an increased quantity of such substances.

HOUSEHOLD CHEMICALS involve a variety of chemical products and mixtures that can easily become chemical pollutants when released into the environment. Even the everyday detergents are chemical compounds that may pollute our environment! Read the labels of detergent products to confirm that they contain a variety of potentially hazardous chemicals. Such : (Pesticides, Fertilizers, Preservatives, Colorants and Flavor of Food and Cleaning substance and Drugs).



Containers labelled with chemical hazard warning signs

Pesticide risk of the health and environmental

pesticides have been commonly used to control pests causing release the pesticides component into the environment.

The intensive use of pesticide leads to an increased risk of contamination of the environment and harmful effects on variety biological, food security, and water sources.

The released pesticides into the environment and their impacts of the ecosystem and human health, such DDT, dieldrin, and other toxic have more affected of the healthy, because transfer to the humans by the foods of animals and plants.



Methods of prevention of environmental pollution

Take preventive precautions.

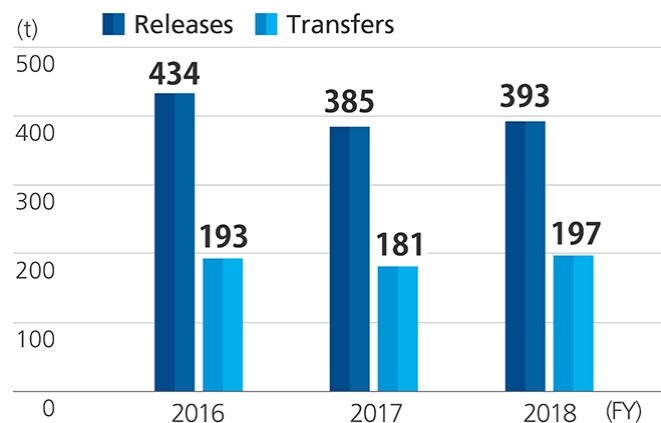
1. Maintaining hygiene in its various forms, including: personal hygiene, clean working environment, water, and soil.
2. Ensure the correct use of pesticides.
3. Waste disposal and disposal in the right way.
4. Getting rid of rodents and insects and eliminating them permanently.
5. Noise reduction.
6. Continuation in afforestation and erection of retaining walls in order to reduce the capacity of air pollutants.

Control of pollutant release and transfer register (PRTR) Substances

PRTR system: This system is for the control of chemical substances that are harmful to human health or the ecosystem. Under this system, businesses ascertain the amounts of harmful chemical substances they have released into the atmosphere, water, or soil, or transferred to locations outside of their business facilities, and report this data to the national government. The national government then uses this data and estimates to summarize and disclose volumes of chemical substances released or transferred.

Report of Amounts of PRTR Substances Released or Transferred

(Contain manganese, chromium, nickel, and lead as alloy substances)



Symbols of Handling, Releases, and Transfers of PRTR Substances

| No. | Substance | Amount Used (kg) | Amount Released (kg) | Amount Transferred (kg) |
|-----|---|------------------|----------------------|-------------------------|
| 412 | Manganese and its inorganic compounds | 2,535,608 | 0 | 21,200 |
| 300 | Toluene | 771,721 | 190,919 | 47,785 |
| 80 | Xylene | 203,756 | 18,742 | 1,899 |
| 87 | Chromium and chromium(III) compounds | 178,801 | 0 | 28,294 |
| 273 | 1-dodecanol | 165,089 | 84,320 | 52,808 |
| 296 | 1,2,4-trimethyl benzene | 159,894 | 66,436 | 23,955 |
| 53 | Ethyl benzene | 67,158 | 2,541 | 191 |
| 374 | Hydrogen fluoride and its water-soluble salts | 61,335 | 1,557 | 14,029 |
| 71 | Ferric chlorides | 49,985 | 0 | 0 |
| 297 | 1,3,5-trimethylbenzene | 30,531 | 19,596 | 1,331 |

| No. | Substance | Amount Used (kg) | Amount Released (kg) | Amount Transferred (kg) |
|-----|---|------------------|----------------------|-------------------------|
| 88 | Hexavalent chromium and its compounds | 29,814 | 0 | 124 |
| 308 | Nickel | 29,168 | 0 | 0 |
| 302 | Naphthalin | 7,948 | 195 | 52 |
| 407 | Polyoxyethylene alkylether = | 5,882 | 5,746 | 80 |
| 392 | n-hexane | 4,676 | 1,859 | 661 |
| 438 | Methylnaphthalene | 4,604 | 23 | 0 |
| 321 | Vanadium compounds | 3,618 | 0 | 0 |
| 304 | Lead | 3,297 | 0 | 0 |
| 133 | Ethylene glycol monoethyl ether acetate | 3,245 | 26 | 0 |
| 207 | 2,6-Di-tert-butyl-4-cresol | 2,598 | 833 | 1,765 |

| No. | Substance | Amount Used (kg) | Amount Released (kg) | Amount Transferred (kg) |
|-----|---------------|------------------|----------------------|-------------------------|
| 245 | Thiourea | 2,125 | 0 | 2,125 |
| 411 | Formaldehyde | 1,118 | 26 | 5 |
| 277 | Triethylamine | 1,101 | 62 | 16 |
| | Total | 4,323,070 | 392,882 | 196,320 |

Common Substances

- [Formaldehyde](#)
- [Mercury](#)
- [Lead](#)
- [Asbestos](#)
- [Hazardous/Toxic Air Pollutants](#)
- [Per- and Polyfluoroalkyl Substances \(PFAS\)](#)
- [Pesticide Chemicals](#)
- [Polychlorinated Biphenyls \(PCBs\)](#)

References:

- *Environmental chemistry*
- *Emerging pollutants*
- *Chemical pollutants*
- *Environmental health*