



Nickel

General Information

Key Points

Fire

- Elemental nickel dust and nickel carbonyl are flammable
- Nickel is incompatible with acids, oxidizing agents and sulphur
- Nickel and nickel carbonyl react violently with oxidants
- Nickel and nickel compounds emit toxic fumes and vapours of nickel carbonyl when heated to decomposition
- In the event of a fire involving nickel carbonyl, use fine water spray and gas tight kit with breathing apparatus
- In the event of a fire involving nickel or nickel compounds, use fine water spray and normal fire kit with breathing apparatus

Health

- Toxic by inhalation, ingestion and skin contact
- Short-term inhalation causes sore throat and hoarseness
- Ingestion may lead to nausea, vomiting, diarrhoea and abdominal pain
- Skin exposure can cause irritation and allergic contact dermatitis
- Long-term inhalation may cause asthma, runny nose and inflammation of the sinuses
- Nickel carbonyl and soluble nickel salts are toxic to the unborn child
- Nickel compounds can cause cancer in humans
- Elemental nickel is a possible human carcinogen

Environment

- Avoid release into the environment
- Inform the Environment Agency of substantial incidents

Background

Nickel is a silvery white metal. It is a natural element that is found in the earth's crust (soil and rocks), air and water. Nickel can also be combined with other elements to form nickel compounds. Examples of nickel compounds include nickel chloride, nickel sulphide, nickel carbonyl and nickel oxide.

Nickel is mainly used to produce stainless steel and other alloys used to produce a number of consumer products including electrical equipment, jewellery and household appliances. Nickel alloys are also used to make coins. Nickel compounds are used in electroplating, pigments, ceramics and are used to produce nickel-cadmium batteries.



Human activities including nickel refining and oil and coal combustion release nickel into the environment.

Food and cigarette smoke are the biggest sources of nickel exposure for the general population. Skin contact with products that contain nickel (e.g. jewellery and coins) can lead to nickel exposure.



Occupational exposure to nickel or nickel compounds may occur especially in industries that produce, process or use nickel.

Short term inhalation of nickel may cause sore throat and hoarseness. Ingestion of nickel compounds may cause nausea, vomiting, abdominal pain and diarrhoea.

Skin exposure to nickel or nickel compounds may cause skin irritation. In the past, skin contact with nickel containing products (e.g. jewellery) was a common cause of development of allergic contact dermatitis. Following the EU nickel directive, which implemented a maximum level of nickel that could be released from such items, exposures have been reduced or prevented.

Long term inhalation of nickel or nickel compounds may cause asthma and inflammation of the sinuses.



Animal experiments have indicated that exposure to nickel carbonyl by inhalation and soluble nickel compounds (e.g. nickel sulphate) by ingestion may produce adverse effects on pregnancy outcome. However, exposure to such compounds by the general public is unlikely to occur.

Elemental nickel is classified as a possible human carcinogen. Nickel compounds are classified as carcinogenic to humans.

Frequently Asked Questions

What is nickel?

Nickel is a metal that is widely distributed in the earth's crust (soil and rocks), air and water. Nickel can combine with other elements including sulphur, chlorine and oxygen to form water soluble and insoluble nickel compounds. Nickel compounds are mostly crystals or powders at room temperature.

Nickel is used to produce stainless steel and other alloys. Nickel alloys are used in coins, jewellery, household appliances and electrical equipment. Nickel compounds are also used in the production of nickel-cadmium batteries.

How does nickel get into the environment?

Human activities including combustion of coal and oil, municipal incineration, steel and other nickel alloy production and electroplating all release nickel into the environment.

Volcanoes and forest fires also release nickel into the environment.

How will I be exposed to?

People may be exposed to nickel by ingesting food that is contaminated with nickel or by cigarette smoking. People may also be exposed to low levels of nickel by inhaling air contaminated with nickel or by ingesting nickel contaminated water. Skin contact with products that contain nickel (e.g. jewellery, stainless steel and coins) can lead to trace amounts released from such products. Nickel contact dermatitis was often seen in individuals who wore nickel containing jewellery in the past, but stringent controls are now in place to ensure that this no longer a significant route of exposure.

Workers employed in industries that produce, process or use nickel may be exposed to higher levels of nickel than the general population.

If there is nickel in the environment will I have any adverse health effects?

The presence of nickel in the environment does not always lead to exposure. Clearly, in order for it to cause any adverse health effects you must come into contact with it. You may be exposed by breathing, eating, or drinking the substance or by skin contact. Following exposure to any chemical, the adverse health effects you may encounter depend on several factors, including the amount to which you are exposed (dose), the way you are exposed, the duration of exposure, the form of the chemical and if you were exposed to any other chemicals.

Inhalation of nickel or nickel compounds for a short period of time may cause sore throat and hoarseness. Ingestion of nickel compounds may cause nausea, vomiting, abdominal pain and diarrhoea.

Skin exposure to nickel or its compounds can lead to skin irritation and allergic contact dermatitis (an immunological reaction leading to skin sensitisation expressed as a reddening/rash on the skin). Nickel contact dermatitis was often seen in individuals who wore nickel containing jewellery in the past, but stringent controls are now in place to ensure that this is no longer a significant route of exposure.

Long term inhalation exposure to nickel or nickel compounds may cause asthma, runny nose and inflammation of the sinuses.

Can nickel cause cancer?

The International Agency for Research on Cancer (IARC) has classified nickel compounds as carcinogenic to humans (Group 1). Breathing air containing nickel compounds for long periods of time may cause cancer of the lung or nasal passages e.g. in workers involved in nickel refining.

IARC classified elemental nickel as possibly carcinogenic to humans (Group 2B)

Does nickel affect children or damage the unborn child?

Children will be affected by nickel in the same way as adults.

Exposure to nickel carbonyl or soluble nickel salts in sufficient amounts during pregnancy may cause harm to the unborn child. This is based on evidence of these effects from studies in animals, which showed an increased number of babies born with birth defects when the mother was exposed to nickel carbonyl. However, exposure to nickel carbonyl or soluble nickel salts is only likely to occur in the workplace.

What should I do if I am exposed to nickel?

It is very unlikely that the general population will be exposed to a level of nickel high enough to cause adverse health effects following inhalation or ingestion. However, if contact dermatitis (red skin rash) occurs following skin exposure to items containing nickel, contact should be ceased immediately.