

Temperature Reactive Super Absorbent Hydrogel for Heavy Metal Removal from Aqueous Solutions

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Abstract

Heavy metals are a group of elements that are characterized by their high atomic weight and density. They include elements such as lead, mercury, cadmium, arsenic, and chromium, among others. Heavy metals have been used for various industrial and commercial purposes, such as in batteries, paints, and pesticides. However, their widespread use has led to significant environmental and health concerns. Heavy metals are toxic to humans and other living organisms because they can accumulate in the body over time, causing a variety of health problems. They can enter the body through ingestion, inhalation, or absorption through the skin. Once inside the body, heavy metals can interfere with the normal functioning of cells and tissues, leading to serious health consequences.

Keywords: Atomic • Health • Toxic • Body

Introduction

Lead is one of the most well-known heavy metals and has been widely used in industrial applications. It is also commonly found in old paint, plumbing pipes, and some types of pottery. Exposure to lead can cause a range of health problems, including developmental delays in children, high blood pressure, and kidney damage. Mercury is another commonly used heavy metal that can have serious health effects. It is used in thermometers, dental fillings, and some types of light bulbs. Exposure to mercury can cause neurological damage, including tremors and memory loss. Cadmium is a heavy metal that is commonly found in batteries, pigments, and plastics [1]. It can also be found in some types of food, such as shellfish and leafy greens. Exposure to cadmium can cause kidney damage, lung damage, and cancer. Arsenic is a naturally occurring heavy metal that is commonly found in drinking water, especially in areas with high levels of arsenic in the soil. Exposure to arsenic can cause skin lesions, lung cancer, and other health problems.

Chromium is a heavy metal that is commonly used in stainless steel and other alloys. Exposure to chromium can cause lung cancer and other respiratory problems, as well as skin irritation and rashes. In addition to their direct health effects, heavy metals can also have significant environmental impacts. They can leach into soil and water, contaminating crops and water sources. This can have serious consequences for ecosystems and the organisms that depend on them. Heavy metals can also bio accumulate in the food chain; with predators at the top of the chain accumulating the highest concentrations. There are a variety of ways to reduce exposure to heavy metals. For example, individuals can avoid using products that contain heavy metals, such as lead-based paint and mercury-containing thermometers. They can also eat a healthy diet that includes foods that are low in heavy metals, such as fruits, vegetables, and grains [2].

In addition to individual actions, there are also policy measures that can help to reduce exposure to heavy metals. For example, governments can regulate the use of heavy metals in products and require companies to safely dispose of products that contain heavy metals. Governments can also monitor water and soil quality to ensure that levels of heavy metals are within safe limits. Overall,

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heavy metals are a significant environmental and health concern. They can have serious impacts on human health and the environment, and it is important to take steps to reduce exposure to them. By being aware of the risks associated with heavy metals and taking steps to reduce exposure, individuals can help to protect themselves and the environment from the negative effects of these toxic substances [3].

Literature Review

One of the most well-known heavy metals is lead. Lead has been used for thousands of years in many different applications, including piping, paint, and ammunition. However, lead is also a potent neurotoxin that can cause damage to the nervous system, brain, and other organs. Children are particularly vulnerable to lead exposure, which can lead to developmental delays and cognitive impairments. Mercury is another heavy metal that is of significant concern. It is used in a variety of applications, including thermometers, dental fillings, and fluorescent light bulbs. However, mercury can also cause damage to the nervous system, brain, and other organs, particularly in fetuses and young children. It can enter the environment through the burning of fossil fuels and the release of mercury-containing waste from industrial processes [4].

Cadmium is a heavy metal that is commonly found in industrial processes and fertilizers. It can cause lung damage and is linked to an increased risk of lung cancer. Cadmium exposure is also associated with kidney damage and bone loss. Arsenic is a naturally occurring heavy metal that is found in groundwater in many parts of the world. Chronic exposure to arsenic can cause skin lesions, cardiovascular disease, and an increased risk of cancer. Chromium is also a naturally occurring heavy metal that can cause lung damage and an increased risk of cancer [5].

Discussion

Nickel is another heavy metal that is commonly found in industrial processes, particularly in the production of stainless steel. Nickel exposure can cause lung damage and an increased risk of cancer. It is also associated with skin allergies and other skin problems. Heavy metals can enter the environment in a variety of ways. They can be released into the air through industrial processes, such as mining and smelting. They can also be released into water bodies through the discharge of industrial waste and sewage. Heavy metals can also enter the soil through the use of fertilizers and pesticides that contain these elements [6].

Once heavy metals enter the environment, they can accumulate in the food chain. For example, fish can accumulate mercury in their tissues, and people who consume these fish can be exposed to high levels of mercury. Similarly, plants can accumulate heavy metals in their tissues, and livestock that graze on these plants can be exposed to these toxins. The effects of heavy metal exposure can

vary depending on the specific metal, the dose, and the duration of exposure. Short-term exposure to high levels of heavy metals can cause acute health effects, such as nausea, vomiting, and diarrhea. Long-term exposure to lower levels of heavy metals can cause chronic health effects, such as damage to the nervous system, kidneys, and liver, as well as an increased risk of cancer [7].

Conclusion

Children are particularly vulnerable to the effects of heavy metal exposure because their bodies are still developing, and they may be more likely to ingest contaminated soil or water. Pregnant women are also at risk because heavy metals can cross the placenta and harm the developing fetus. To protect human health and the environment, it is essential to monitor and regulate the release of heavy metals into the environment. Governments and regulatory agencies can set standards for acceptable levels of heavy metals in the air, water, and soil, and enforce these standards through monitoring and enforcement activities.

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Conflict of Interest

There is no conflict of interest by author.

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