

Interesting Properties of Mercury Metal in Chemistry Lessons Educational Issues

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Abstract

The article deals with the dependence of the reason why chemistry is loved by students on the teacher's skill and pedagogical mastery. It is noted that during the teaching of the topic of metals, it is important to give ample space to information about the interesting properties of mercury metal. Therefore, the article covers the symptoms of mercury poisoning and what measures to take. It is noted that from ancient times until now, the number of people who know how dangerous mercury metal is a minority.

Information about the serious problems caused by mercury waste in Azerbaijan, mainly in Sumgait city, is brought to the attention of students. It is noted that from 2000 to 2004, based on the World Bank Project, a landfill was built near Sumgait for the isolation of mercury waste from the environment. Transportation of about 60,000 tons of mercury-containing waste to this landfill and future treatment of mercury-containing waste at the landfill are explained to the students. In the "this is interesting" learning part of the topic, some information about red mercury is conveyed to the students as interesting information. These interesting facts make students think. In general, the article gives ample space to the issues of conducting educational work among students and the population. Also, the attitude towards the issues of which foods to prefer in case of mercury poisoning is also reported.

There is a great need to inform and educate the population in this area. For this, it is necessary to conduct constant monitoring in the polluted areas and to assess the ecological risks of the results of the conducted monitoring. In order to prevent the use of contaminated areas, certain measures should be taken, propaganda should be carried out continuously, and people should be informed.

Keywords: liquid metal, toxic metal, mercury vapor, red mercury, environmental risk

Цікаві властивості металевої ртуті на навчальних уроках з хімії

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Анотація

У статті розглядається залежність того, чому хімія полюбається учнями, від майстерності та педагогічної майстерності вчителя. Відзначається, що під час викладання теми про метали важливо приділити достатньо місця інформації про цікаві властивості металевої ртуті. Тому в статті розповідається про симптоми отруєння ртуттю та про те, які заходи вжити. Відзначається, що з давніх часів і дотепер число людей, які знають, наскільки небезпечна металева ртуть, становить меншість.

До відома студентів доводиться інформація про серйозні проблеми, спричинені ртутними відходами в Азербайджані, головним чином у місті Сумгаїт. Зазначається, що з 2000 по 2004 рік за проектом Світового банку поблизу Сумгаїта був побудований полігон для ізоляції ртутних відходів від навколишнього середовища. Учні пояснюється транспортування близько 60 000 тонн ртутьвмісних відходів на це звалище та подальше поводження з ртутьвмісними відходами на полігоні. У навчальній частині теми «Це цікаво» деяка інформація про червону ртуть доноситься до учнів як цікава інформація. Ці цікаві факти змушують учнів задуматися. Загалом у статті достатньо місця приділено питанням проведення виховної роботи серед студентів та населення. Також повідомляється ставлення до питань, яким продуктам харчування віддати перевагу при отруєнні ртуттю.

Існує велика потреба в інформуванні та освіті населення цієї сфери. Для цього необхідно проводити постійний моніторинг на забруднених територіях та оцінювати екологічні ризики за результатами проведеного моніторингу. Щоб не допустити використання забруднених територій, необхідно вживати певних заходів, постійно вести пропаганду, інформувати людей.

Ключові слова: рідкий метал, токсичний метал, пари ртуті, червона ртуть, екологічна небезпека

Introduction.

Chemistry occupies a key place among natural sciences. During the teaching of chemistry, various phenomena occurring in the environment are given ample space. In order to understand the secrets of the environment, it is necessary to know this subject perfectly. It is impossible to imagine any area of our life without chemicals. Every person should know chemistry regardless of his specialty. A specialist who does not know chemistry releases a large amount of industrial waste into the air or discharges it into water or soil. However, a specialist who knows chemistry well will use that waste as a valuable raw material in another production area and take care of protecting the environment.

In recent years, in order for students to master the secrets of chemistry more deeply, educational events are given a wide place in educational institutions. Teachers who use new teaching methods to shape the scientific outlook of students and take care of environmental protection achieve certain results through additional measures.

Chemistry is an interesting subject. In order for students to love and learn this subject in depth, the teacher should be a professional as well as a master of his profession. A professional teacher should teach chemistry in such a way that students can understand the processes occurring in the environment. Sometimes serious consequences occur if you do not know the properties of simple chemicals in household and home conditions. Therefore, every chemistry teacher should understand his responsibility, try to teach students about the physical and chemical properties of chemicals and how to deal with them during the teaching process. For example, during the teaching of the topic of metals, a wide space should be given to the teaching of the interesting properties of some metals. It is important for students to have a thorough knowledge of mercury metal, which has many properties that differ sharply from other metals. Therefore, all chemistry teachers, whether in secondary school or in higher education institutions, should teach the students many properties of mercury metal.

Results.

First of all, students should know the physical properties of mercury metal. If the following information is conveyed to the students in a simple way, they will have an idea about metal. When the teacher gives information about mercury metal in a sealed container in chemical laboratories, it should be conveyed to the students that it is very heavy. For this, it is important to instruct them to lift the container very carefully. Also, in front of the students, he should place that container in the last

row in the closed part of the chemical cabinet and instruct them not to touch it at all. Students should know during the lesson that this metal will not be used during any experiment.

Thus, those who are already educated have some idea about mercury metal. Later, it is intended to engage students in active activities to explain the physical properties of mercury metal in a comprehensive manner. This is considered to be the motivational stage.

The class is addressed with a general question: - What did you learn about mercury metal? After listening to the students, other properties of mercury metal are explained. In the "explanations" part of the training material, some explanations are given regarding the facts identified during the activity. Thus, the main topic of the lesson is reflected here.

Mercury metal is a heavy, poisonous and liquid substance with a silver color. It is heavier than all known liquids. At 200 C, the mass of one liter is 13.6 kg. An ordinary glass jar can withstand the weight of mercury and crack. Therefore, they store large amounts of mercury in special thick-walled glass containers or iron containers. The boiling point of mercury is 3570 C. Since mercury atoms keep their valence electrons firmly, they give them to "common use" with great difficulty. Thus, the crystal lattice of mercury becomes unstable and also conducts heat and electricity poorly. Since liquid mercury expands evenly when heated, thermometers are filled with mercury metal. Mercury metal is pronounced in Latin as *hydrargyrum*. "Hydrargyrum" is a Greek word meaning "liquid silver". Alchemists also called mercury "Mercurius" in reference to its affinity with gold, the king of metals.

Mercury metal is rarely found free in nature. Most of the world's mercury is produced in China and Kyrgyzstan. Mercury metal is located in the additional subgroup of group II in Mendeleev's periodic table. is an element d. Serial number 80, relative atomic mass 200, 59 - dur. The electron formula is $.....4f14\ 5d10\ 6s2$.

As the mercury forms an amalgam with the aluminum metal, the protective oxide layer breaks down. Therefore, it is forbidden to carry mercury metal on airplanes. Mercury has a shiny property because it reflects light from itself. Although mercury metal has a beautiful shine, it is considered a very dangerous metal. This metal was known to science 1500 years before our era. Alchemists considered it the mother of metals, the basis of the philosopher's stone. Arab alchemists and physicians observed that snakes and scorpions moved away from the place where free mercury was poured. In the past, mercury was also used by magicians for

some purposes. Red mercury was used as a tool to drive away spirits.

After students have mastered the physical properties of mercury metal, important facts related to the subject, which are not provided for in the standards, but for those who want to study the subject in depth, are mastered in the "knowledge box". At this time, it is necessary to provide extensive information about the fact that mercury metal is a very toxic metal. The consequences of mercury poisoning for human health should be widely discussed.

Let's count the many features of mercury poisoning. People who are poisoned by mercury metal feel constantly sleepy during the day. The eyes are swollen. Discoloration of hair color is observed. It is also possible to find cases such as loss of hair on the body. Vapors of metallic mercury are considered more dangerous. As you breathe, mercury enters the blood. In the body, mercury circulates through the blood, combines with proteins and partially accumulates in the liver, kidneys, spleen, and brain tissues. The main symptoms of poisoning are general weakness, sharp pains in the abdomen, increased body temperature, loss of appetite, and lethargy in the body. During these mentioned symptoms, severe headaches, rapid pulse, and muscle spasms also occur. At this time, if timely medical assistance is not provided, it can result in death after a few days (Rzayeva, 2017).

The toxic dose of mercury for humans is 0.4 mg, the lethal dose is more than 150 mg. Mercury is easily removed from the body through the kidneys, intestines, and sweat glands. Mercury is the only metal that is liquid at room temperature. This tiny amount of mercury at the end of a glass thermometer is very dangerous. Many people do not know how dangerous it is to spill the mercury inside the house as a result of breaking the thermometers that are used all the time in all the houses. Mercury is among the ten most dangerous poisons. After explaining to the students what this danger is in the educational process, it is necessary to master the first measures to be taken. (Ma0svi, 2017).

If mercury has spilled into the house as a result of a broken thermometer, it is absolutely impossible to collect it and throw it in the trash. Because mercury metal evaporates and poisons the contents. It is explained to the students that the mercury inside the tested thermometer can make a person suffer from serious diseases.

Since no smell or irritation is observed when mercury metal is dispersed in the house, at first any person can stay in the room without feeling any adverse effects. Its negative consequences appear

after a while. If a medical thermometer is broken and mercury is spilled on the ground, it is recommended to do the following – to change the air, you need to open the windows and the door. Do not use a broom to collect mercury metal. It is recommended to clean the mercury with scotch tape or wet paper. The place cleaned of mercury should be washed with hot soapy water or potassium permanganate solution. After the room is completely cleaned of mercury metal, hands should be washed with hot water and soap. It is necessary to place the accumulated mercury in a hermetically sealed jar, remove it from the house and notify the organization for decontamination of the areas. (Ma0svi, 2017).

All students should know that when symptoms of mercury poisoning are observed, it is necessary to wash the stomach by adding 20-30 g of activated charcoal to a glass of water. When mercury salts enter the body, the best remedy is to drink milk or a broken raw egg with water. The "this is interesting" part of the training materials on the topic provides examples and interesting information to expand the knowledge of the topic.

Two grams of mercury in a thermometer can pollute the air up to six thousand meters. A layer of mercury spilled from a broken thermometer is in liquid form. That substance can easily spread between the carpet and the floor and slowly evaporate, poisoning the air. The mercury inside a broken thermometer is scattered around in the form of small globules. Since mercury evaporates very quickly, it can enter the body through the respiratory tract during breathing. As a result, a person is poisoned. The main symptoms of acute poisoning with mercury and its vapors are observed after a few hours.

Mercury and its vapors damage not only the human internal organs, but also the skin. It causes hair loss and changes in skin sensation. It also causes skin rashes typical of measles and scarlet fever. In most cases, inflammation of the lungs, chest pains, cough and shortness of breath, and in many cases severe bruising of the skin is also observed. Children's bodies are more sensitive to the effects of mercury and its vapors. Children should be strictly protected from this poisoning. If a small child accidentally swallows mercury metal while biting the thermometer, it is necessary to immediately make him vomit by drinking warm water, and then consult a doctor.

Experts believe that if a person breathes this air, mercury accumulates in his body in the kidneys, liver and brain, causing poisoning. Sometimes mercury poisoning does not manifest itself for a long time and may not be felt for a long time. After a

while, a person experiences weight loss and nausea. Even a person is nervous. Complications occur in a person's nervous system and kidneys as a result of the doctor's wrong diagnosis and ignorance of the reason why the poisoned person fell into this condition.

When students are informed about how dangerous mercury is, it should be explained that mercury metal can enter the body both through the respiratory tract and the digestive system. (Maosvi, 2017). Mercury metal can enter the body through the following main sources – when the environment is polluted with chemical waste, mercury metal can enter the body through plant and animal products. Plant-based products include rice, cabbage, and animal-based products such as seafood, sea fish, meat, etc. an example can be given.

In the "this is interesting" training part of the topic, you can give some interesting information about "red mercury" to the students as interesting information. These interesting facts will make students think. For example, the information given about the metal "red mercury", which is considered one of the most mysterious substances and became a source of discussion in the last half century, will be interesting for students. Students are told that this substance, whose existence and non-existence are still not officially announced in the world, has caused many conflicts.

In 1980, it was claimed that the red mercury, which became a legend, was used to guide the nuclear weapons of the USSR. Pravda, one of the famous newspapers of its time in Russia, claimed that red mercury was extracted from the Ural Mountains and Russian lands. In the following years, it was claimed that Russians engaged in the sale of red mercury were persecuted in different countries of Europe. According to the information provided by some sources, there were even those who were arrested among those engaged in the sale of mercury. In 1997, two Georgians were caught in Turkey with containers of red mercury, and in 1998, information was obtained about the arrest of an Armenian. In that year, US scientists raised serious claims about the existence of red mercury, but until this date, they have not revealed any evidence of the substance's existence. The amount of mercury released into the atmosphere from industrial enterprises in Russia is about 10 tons per year. Now all countries are trying to limit the use of mercury and its availability is decreasing.

In Azerbaijan, mercury waste has caused serious problems mainly in the city of Sumgait. Mercury

waste is related to the activity of 2 chlor-alkaline plants. One of these plants was closed in 1981. In some cases, as a result of the lack of technology and improper application, mercury has spread into the environment along with various wastes. There was a possibility of mercury waste entering the Caspian Sea and underground water. However, the level of mercury pollution at the bottom of the Caspian Sea has not been studied.

There is a serious risk of mercury contamination of the Absheron Peninsula. In 2000 and 2004, based on the World Bank Project, a landfill was built near Sumgait for the isolation of mercury waste from the environment. About 60,000 tons of mercury-containing waste was transported to this landfill. Currently, the work of expanding and improving the landfill in accordance with European standards is being continued. In the future, it is planned to create technical potential for cleaning and neutralization of mercury-containing waste at the landfill.

Thus, the harmful effects of mercury from heavy metals have been worrying experts more recently. In order to prevent such poisoning, certain measures are taken using various methods. According to experts, the number of harmful substances can be reduced to a certain extent if various fruits and vegetables are used during nutrition. (Mammadov, & Khalilov, 2003)

Conclusions.

There are some foods that can help remove mercury toxins from the human body. It is beneficial to eat broccoli, cabbage, and cauliflower along with various vegetables every day. Two to three cloves of garlic every day can help flush out poisoning. It is important to drink natural green tea instead of coffee in the morning. It is important to use foods such as celery, coriander, parsley, and ginger during feeding.

There is a great need to inform and educate the population in this area. For this, it is necessary to conduct constant monitoring in the polluted areas and to assess the ecological risks of the results of the conducted monitoring. In order to prevent the use of contaminated areas, certain measures should be taken, propaganda should be carried out continuously, and people should be informed.

At the end of the lesson, students are asked to prepare a project. It is recommended to use different sources to prepare this project. Students preparing the project mercury metal as well as having more extensive information about them, they also have information that will never be erased from their memory.

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