



WAEC CHEMISTRY

Questions and Answers



Samples of Chemistry Practical Questions and Answers

What are the physical properties of metals?

Metals possess several distinct physical properties. Firstly, metals are generally solid at room temperature, with exceptions like mercury which is liquid. They have a characteristic lustrous or shiny appearance, often referred to as metallic luster. Metals are malleable, meaning they can be easily hammered or pressed into different shapes without breaking. They are also ductile, allowing them to be drawn into thin wires. Metals have high thermal and electrical conductivity, meaning they can efficiently transfer heat and electricity. They exhibit high density, typically heavier than non-metals. Metals are good conductors of both heat and electricity due to the presence of free electrons within their atomic structure. They also have high melting and boiling points, allowing them to exist in solid states at higher temperatures. These physical properties make metals suitable for various industrial applications, such as construction, electrical wiring, and manufacturing.

Can you state the roles of sand bed, chlorine, and alum in the treatment of water?

In the treatment of water, sand bed, chlorine, and alum play crucial roles. Sand bed is commonly used in water filtration systems. It acts as a physical barrier, trapping larger particles and sediments, thus removing them from the water. This process, known as filtration, helps improve the water's clarity and reduces turbidity.

Chlorine is widely used as a disinfectant in water treatment. It kills or inactivates harmful microorganisms, including bacteria, viruses, and parasites, making the water safe for consumption. Chlorine

effectively destroys disease-causing pathogens, preventing waterborne illnesses and outbreaks.

Alum, also known as aluminum sulfate, is used in the water treatment process as a coagulant. It aids in the removal of suspended particles, organic matter, and dissolved substances. When added to water, alum forms gelatinous flocs, which attract and bind with impurities, causing them to settle at the bottom. This process is called coagulation and helps in clarifying the water, reducing turbidity, and removing contaminants.

By employing these three components in water treatment, sand bed for filtration, chlorine for disinfection, and alum for coagulation, the quality of water can be significantly improved, ensuring its safety and suitability for various purposes.

What are the chemical properties of acids?

Acids exhibit several characteristic chemical properties. Firstly, acids have a sour taste, although it is important to note that tasting acids is highly discouraged due to their corrosive nature. Acids can react with certain metals, such as zinc or magnesium, to produce hydrogen gas. This reaction is known as the metal-acid reaction. Acids can also react with bases to form salts and water, a process referred to as neutralization. Acid-base reactions are essential in various chemical processes, such as in the production of fertilizers and the balancing of pH levels.

Another notable chemical property of acids is their ability to conduct electricity when dissolved in water. This is due to the presence of ions in the acidic solution. Acids are proton donors, meaning they release hydrogen ions (H^+) when dissolved in water. The concentration of hydrogen ions determines the acidity of a solution, as measured by the pH scale. Acids have a pH value below 7, with lower values indicating stronger acidity.

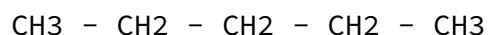
Furthermore, acids can react with carbonates and bicarbonates to release carbon dioxide gas. This effervescence or fizzing is commonly observed when acids are mixed with substances like baking soda.

Overall, the chemical properties of acids involve their ability to react with metals, bases, carbonates, and bicarbonates, as well as their capacity to conduct electricity and influence pH levels in solutions.

Could you draw the structure of pentane?

Unfortunately, as a text-based AI, I am unable to provide visual representations or drawings. However, I can describe the structure of pentane to you. Pentane is an organic compound belonging to the alkane family, specifically the straight-chain alkanes. It is composed of five carbon atoms bonded together in a continuous chain, with each carbon atom bonded to four hydrogen atoms. The molecular formula of pentane is C₅H₁₂.

To visualize the structure, imagine a straight line representing the carbon chain, with each carbon atom connected to the next by a single bond. At each carbon atom, there are also hydrogen atoms attached, totaling four hydrogen atoms per carbon. The structure can be represented as:



Each "CH₃" represents a methyl group (a carbon atom bonded to three hydrogen atoms), and each "CH₂" represents a methylene group (a carbon atom bonded to two hydrogen atoms).

It's important to note that the structure of pentane is a linear or straight chain, but in reality, the molecule can adopt different conformations due to the rotation around the carbon-carbon bonds.

Can you state the laws of chemical combination?

The laws of chemical combination are fundamental principles that govern the way elements and compounds react with each other to form new substances. There are three main laws of chemical combination:

1. Law of Conservation of Mass: This law states that in a chemical reaction, the total mass of the reactants is equal to the total mass of the products. In other words, mass is conserved during a chemical reaction.
2. Law of Definite Proportions (or Law of Constant Composition): According to this law, a chemical compound always contains the same elements in the same proportion by mass, regardless of the source or method of preparation. This means that the ratio of the masses of the elements in a compound is constant.
3. Law of Multiple Proportions: The law of multiple proportions states that when two elements combine to form different compounds, the mass of one element that combines with a fixed mass of the other element is in a ratio of small whole numbers. This law is based on the observation that elements can combine in more than one ratio to form distinct compounds.

These laws provide a foundation for understanding and predicting the behavior of chemical reactions and help scientists in the formulation and interpretation of chemical equations.

Which ions are present during the electrolysis of sodium chloride?

During the electrolysis of sodium chloride (NaCl), the following ions are present:

1. Cations (positive ions):
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- Sodium ions (Na^+): These ions migrate towards the cathode (negative electrode) during electrolysis.
2. Anions (negative ions):
- Chloride ions (Cl^-): These ions migrate towards the anode (positive electrode) during electrolysis.

At the cathode, sodium ions are reduced (gain electrons) to form sodium metal (Na), while at the anode, chloride ions are oxidized (lose electrons) to form chlorine gas (Cl_2). This process is an important industrial method for the production of sodium hydroxide (NaOH) and chlorine gas.

What are the methods of preventing the rusting of iron?

Rusting of iron occurs when iron reacts with oxygen and moisture in the presence of an electrolyte, such as water or salt. To prevent rusting, several methods can be employed:

1. Coating: Applying a protective coating on the iron surface acts as a barrier, preventing oxygen and moisture from coming into direct contact with the iron. Common coating methods include painting, electroplating, and galvanizing.
 2. Sacrificial Protection: By attaching a more reactive metal to the iron surface, such as zinc or magnesium, the reactive metal corrodes instead of the iron. This method is known as sacrificial protection or galvanic corrosion.
 3. Alloying: Mixing iron with other elements, such as chromium or nickel, to form alloys like stainless steel, improves the corrosion resistance of the iron.
 4. Cathodic Protection: This method involves connecting the iron structure to a more active metal, such as magnesium or aluminum, and providing a direct current. The more active metal acts as a sacrificial anode, protecting the iron structure from corrosion.
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5. Dehumidification: Reducing the moisture content in the environment, especially in enclosed spaces, can minimize the chances of rust formation.

Can you state the components of water gas and name types of coal?

Water gas, also known as synthesis gas or syngas, is a mixture of carbon monoxide (CO) and hydrogen (H₂) gases. It is produced by the reaction of steam with carbonaceous materials, such as coal or natural gas, in a process called gasification. The composition of water gas typically varies, but it commonly contains around 50% carbon monoxide and 50% hydrogen, with traces of other gases.

Regarding types of coal, there are four main types:

1. Anthracite: This is the highest rank of coal and has a high carbon content and a low moisture and volatile matter content. It has a high energy density and burns with a clean blue flame. Anthracite is commonly used as a fuel in industries and for residential heating.
 2. Bituminous: Bituminous coal is the most commonly used type of coal. It has a moderate to high carbon content and a relatively higher moisture and volatile matter content compared to anthracite. It is widely used in electricity generation, industrial processes, and as a fuel for heating and cooking.
 3. Sub-bituminous: Sub-bituminous coal has a lower carbon content and higher moisture and volatile matter content compared to bituminous coal. It is commonly used in electricity generation due to its relatively low sulfur content, making it a cleaner-burning fuel.
 4. Lignite: Lignite is the lowest rank of coal and has the lowest carbon content and the highest moisture and volatile matter content. It is a soft and brownish coal. Lignite is primarily
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used in electricity generation and is often found near the surface in large deposits.

What is the difference between evaporation and boiling?

Evaporation and boiling are both processes by which a liquid changes into a gaseous state, but there are differences between them:

Evaporation:

- Evaporation occurs at the surface of a liquid.
- It takes place at any temperature, even below the boiling point of the liquid.
- The process is slow and occurs gradually over time.
- Only the molecules with enough energy to overcome the intermolecular forces escape into the gas phase.
- Evaporation leads to cooling of the remaining liquid.
- Examples of evaporation include the drying of clothes on a clothesline or the evaporation of water from a puddle.

Boiling:

- Boiling occurs throughout the entire volume of the liquid.
 - It happens when the temperature of the liquid reaches its boiling point.
 - The process is rapid and occurs at a constant temperature.
 - The intermolecular forces within the liquid are completely overcome, and bubbles of vapor form throughout the liquid.
 - Boiling does not lead to cooling of the liquid; instead, heat is absorbed and used to convert the liquid to vapor.
 - Examples of boiling include the boiling of water in a kettle or the boiling of a liquid in a pot on a stove.
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In summary, evaporation is a surface phenomenon that occurs at any temperature, while boiling is a bulk phenomenon that occurs at the boiling point of the liquid.

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