NEET Chemistry Practice Test (Sample)

Study Guide

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Questions

1. What is one primary function of histamine in the human body?

A. Increases blood pressure

B. Contracts the smooth muscles

C. Stimulates digestion

D. Increases heart rate

2. Which substance is used as a stabilizer in the froth flotation process?

A. Aniline

B. Wheat starch

C. Sodium carbonate

D. Calcium sulfate

3. What happens to the alcohol during the reaction with HBr?

A. It is oxidized

B. It is reduced

C. It undergoes substitution

D. It is dehydrated

4. Which of the following are examples of monosaccharides?

A. Starch and glycogen

B. Glucose, fructose, ribose

C. Lactose and sucrose

D. Oligosaccharides

5. What is Avogadro's number?

A. 3.022×10^{23}

B. 6.022×10^{22}

C. 6.022×10^{23}

D. 9.022×10^{23}

6. What process is used to achieve 99.9% pure aluminium?

A. Electrolysis

B. Hoope's process

C. Zone refining

D. Reduction with carbon

7. Which of the following is a common example of an analgesic?

A. Diazepam

B. Ibuprofen

C. Fluoxetine

D. Phenobarbital

8. What are drugs that bind to receptor sites and inhibit their natural functions called?

A. Agonists

B. Antagonists

C. Histamines

D. Vasodilators

9. Which isotope of hydrogen is represented as "Deuterium"?

A. Hydrogen-1 (^{1}H)

B. Hydrogen-2 (^{2}H)

C. Hydrogen-3 (^{3}H)

D. Hydrogen-4 (^{4}H)

10. What is the name of the process used for the purification of aluminum by electrolytic refining?

A. Bayer's process

B. Hoop's process

C. Hall-Héroult process

D. Spark discharge method

Answers

1. B
2. A
3. C
4. B
5. C
6. B
7. B
8. B
9. B
10. B

Explanations

1. What is one primary function of histamine in the human body?

A. Increases blood pressure

B. Contracts the smooth muscles

C. Stimulates digestion

D. Increases heart rate

Histamine plays several roles in the body, particularly in the immune response and physiological functions. One primary function of histamine is to contract smooth muscles, especially in the bronchi of the lungs. When histamine is released during an allergic reaction or inflammation, it can lead to the contraction of smooth muscle tissues, causing bronchoconstriction. This contraction can result in symptoms such as difficulty in breathing, which is commonly associated with asthma or allergic responses. In addition, histamine is involved in regulating stomach acid as part of the digestive process, but its primary role in smooth muscle contraction is more evident in the context of allergic reactions and various physiological responses. While it may have some impact on other functions such as the cardiovascular system, the most direct and significant action related to histamine's role is the contraction of smooth muscle, making it the primary function among the choices provided.

2. Which substance is used as a stabilizer in the froth flotation process?

A. Aniline

B. Wheat starch

C. Sodium carbonate

D. Calcium sulfate

In the froth flotation process, a stabilizer is needed to enhance the separation of mineral particles from the ore, and wheat starch is commonly used for this purpose. Wheat starch acts as a depressant for certain minerals, which means it helps to selectively prevent unwanted minerals from floating while allowing the desired minerals to rise to the surface as froth. This is essential in ensuring that the separation is efficient and that the desired minerals can be collected effectively. The other substances listed have different roles. Aniline, for instance, is not typically used as a stabilizer in froth flotation; it is more commonly associated with other chemical processes. Sodium carbonate serves as a pH regulator and helps in modifying the properties of the slurry but does not act as a stabilizer in the flotation process. Calcium sulfate, meanwhile, is used in various applications but is not effective for stabilization in froth flotation. Thus, wheat starch is the correct choice as a stabilizer due to its ability to selectively inhibit the flotation of specific minerals, making the mineral separation process more efficient.

3. What happens to the alcohol during the reaction with HBr?

A. It is oxidized

B. It is reduced

C. It undergoes substitution

D. It is dehydrated

During the reaction between alcohol and HBr, the alcohol undergoes a substitution reaction. In this process, the hydroxyl group (-OH) of the alcohol is replaced by a bromine atom from HBr. The alcohol, for instance, is converted into an alkyl bromide, which is a compound where the bromine is now attached to the carbon atom that previously held the hydroxy group. This reaction typically involves the protonation of the alcohol oxygen, leading to the formation of a good leaving group (water), which is then displaced by the bromide ion. This substitution reaction aligns with the characteristics of nucleophilic substitution, where the nucleophile (in this case, the bromide ion) attacks the positively charged carbon that is bonded to the outgoing -OH group, allowing for the formation of the alkyl bromide.

4. Which of the following are examples of monosaccharides?

A. Starch and glycogen

B. Glucose, fructose, ribose

C. Lactose and sucrose

D. Oligosaccharides

Monosaccharides are the simplest form of carbohydrates and consist of single sugar molecules. They cannot be hydrolyzed into smaller carbohydrate units. Glucose, fructose, and ribose exemplify this because they each contain a single sugar unit and are vital in biological processes. Glucose, for instance, is vital for energy production in cells, fructose is found in fruits and can be converted to glucose, and ribose is essential for the synthesis of RNA. Their structure, which includes a carbon backbone and functional groups like hydroxyl (-OH), facilitates their roles in metabolism and cellular functions. In contrast, starch and glycogen are polysaccharides made up of long chains of glucose units, making them more complex and not monosaccharides. Lactose and sucrose are disaccharides, meaning they are composed of two monosaccharides linked together. Oligosaccharides contain a small number (3 to 10) of monosaccharides, thus too complex to be classified as monosaccharides. Therefore, the presence of glucose, fructose, and ribose in the correct answer establishes it as a list of true monosaccharides.

5. What is Avogadro's number?

A. 3.022×10^{23}

B. 6.022×10^{22}

C. 6.022×10^{23}

D. 9.022×10^{23}

Avogadro's number is defined as the number of atoms, molecules, or particles in one mole of a substance. It is a fundamental constant in chemistry that allows for the conversion between the number of entities at the atomic or molecular level and the amount of substance measured in moles. The accepted value of Avogadro's number is 6.022×10^{23} per mole. This number establishes a link between the microscopic scale of individual atoms and the macroscopic scale of everyday measurements, ultimately facilitating the calculation of the amounts of substances required in chemical reactions. The identity and significance of Avogadro's number make it a pivotal concept in stoichiometry and molecular chemistry. Other options provided do not represent Avogadro's number accurately, as they present either different numerical values or improper scientific notation.

6. What process is used to achieve 99.9% pure aluminium?

A. Electrolysis

B. Hoope's process

C. Zone refining

D. Reduction with carbon

Achieving 99.9% pure aluminum is primarily accomplished through a purification method known as electrolysis, specifically by utilizing the Hall-Héroult process. This method involves the electrolysis of aluminum oxide (Al_2O_3) dissolved in molten cryolite. The process efficiently separates aluminum metal from impurities by applying a direct current, which helps to reduce aluminum ions to pure aluminum at the cathode while oxidizing at the anode. Although the other methods mentioned have their significance in purification and extraction processes, they do not achieve the same level of purity for aluminum. For example, zone refining is excellent for purifying certain elements, particularly semiconductors, but it is not typically applied to aluminum. The reduction with carbon method is used for extracting aluminum from its ores, but this does not yield the high purity required for applications in aerospace or electrical industries. Hoope's process is not widely recognized in terms of aluminum purification. Therefore, electrolysis remains the standard and most effective method to produce aluminum of such high purity.

7. Which of the following is a common example of an analgesic?

A. Diazepam

B. Ibuprofen

C. Fluoxetine

D. Phenobarbital

Ibuprofen is a commonly used analgesic that belongs to the nonsteroidal anti-inflammatory drug (NSAID) class. It works by inhibiting enzymes involved in the production of prostaglandins, which are compounds responsible for causing pain, inflammation, and fever. By reducing the levels of these inflammatory mediators, ibuprofen effectively alleviates pain associated with various conditions such as headaches, muscle aches, arthritis, and menstrual cramps. This pain-relief mechanism is characteristic of analgesics, which are specifically designed to reduce pain without necessarily affecting consciousness or impairing cognitive functions. In contrast, the other options do not serve the primary function of pain relief. Diazepam, for example, is a benzodiazepine used primarily for its anxiolytic and sedative effects. Fluoxetine is primarily an antidepressant, and while it can have some effects on pain, it is not classified as an analgesic. Phenobarbital is a barbiturate used mainly as an anticonvulsant or sedative rather than for pain relief. Thus, ibuprofen stands out as the clear choice among these options for its ability to alleviate pain effectively.

8. What are drugs that bind to receptor sites and inhibit their natural functions called?

A. Agonists

B. Antagonists

C. Histamines

D. Vasodilators

Drugs that bind to receptor sites and inhibit their natural functions are referred to as antagonists. These molecules attach to the receptor but do not activate it, effectively blocking or dampening the biological response that would normally occur if the natural ligand, such as a neurotransmitter or hormone, were to bind. This can be critically important in various therapeutic contexts where inhibition of a receptor's activity is desired, such as reducing excessive stimulation in conditions like hypertension or pain. In contrast, agonists are substances that bind to a receptor and activate it, thereby mimicking the action of the natural ligand. Histamines are specific compounds involved in immune responses and allergic reactions rather than a class of drugs that act on receptors broadly. Vasodilators refer to drugs that relax and widen blood vessels, which is a different mechanism of action compared to how antagonists function.

9. Which isotope of hydrogen is represented as "Deuterium"?

A. Hydrogen-1 (^1H)

B. Hydrogen-2 (^2H)

C. Hydrogen-3 (^3H)

D. Hydrogen-4 (^4H)

Deuterium is an isotope of hydrogen that has one proton and one neutron in its nucleus, which distinguishes it from its most common isotope, protium (Hydrogen-1), that contains only one proton and no neutrons. The designation "Hydrogen-2" refers to the presence of the additional neutron, which effectively doubles the mass of the hydrogen atom compared to protium. In nuclear notation, deuterium is represented as ^2H, indicating that the atomic mass is 2 due to the presence of these two particles (one proton and one neutron). This isotope is important in various scientific fields, including chemistry and nuclear physics, and is commonly used in studies involving nuclear reactions and in tracing chemical pathways due to its distinct properties. Hydrogen-3, or tritium, is another isotope of hydrogen that contains one proton and two neutrons, making it heavier than deuterium. Hydrogen-4 is not a commonly recognized or stable isotope of hydrogen, as it is highly unstable and quickly decays. Thus, the recognition of deuterium as Hydrogen-2 aligns it with the correct choice based on its nuclear composition.

10. What is the name of the process used for the purification of aluminum by electrolytic refining?

A. Bayer's process

B. Hoop's process

C. Hall-Héroult process

D. Spark discharge method

The purification of aluminum by electrolytic refining is accurately described by the Hall-Héroult process. This process involves dissolving aluminum oxide (obtained from bauxite and refined through Bayer's process) in molten cryolite, followed by electrolysis. An electric current is passed through the solution, causing aluminum metal to be deposited at the cathode while oxygen is released at the anode. This method is efficient and crucial for producing high-purity aluminum. The Bayer's process is essential for extracting aluminum oxide from bauxite, but it is not directly responsible for the electrolytic refining of aluminum. The Hoop's process is not a recognized method related to aluminum purification, and the spark discharge method does not pertain to the extraction or refining of aluminum. Thus, the Hall-Héroult process is the correct answer as it specifically describes the electrolytic refining technique used to achieve pure aluminum.