MHT CET 2023 Question Paper Shift 2

Question 1. What is the SI unit of rate of diffusion?

Answer. Square meters per second (m^2/s).
Solution. The SI unit of the rate of diffusion is square meters per second (m^2/s). It is commonly represented by the symbol "m^2/s". This unit is used to measure the rate at which a substance diffuses or spreads through a medium over a given period of time.

Question 2. What is the diameter of malpighian body in a micrometer?

Answer. 150-250 micrometers (μm)

Solution. The diameter of a Malpighian body, also known as a renal corpuscle or renal glomerulus, can vary depending on the species and individual. In humans, the average diameter of a renal corpuscle is approximately 150-250 micrometers (μm). However, it's important to note that this measurement can vary slightly based on factors such as age and health conditions.

Question 3. What is the location of anticodon?

Answer. RNA (tRNA)

Solution. The anticodon is a sequence of three nucleotides found on a transfer RNA (tRNA) molecule. It is located at one end of the tRNA molecule opposite to the attachment site for the amino acid. The anticodon region of the tRNA is responsible for recognizing and binding

to the complementary codon on messenger RNA (mRNA) during protein synthesis.

To be more specific, the anticodon is situated on the loop of the tRNA molecule known as the anticodon loop or anticodon arm. This region contains the three nucleotides that are complementary to the codon on the mRNA strand. The pairing between the anticodon and the codon ensures the correct amino acid is brought to the growing polypeptide chain during translation.

The location of the anticodon on the tRNA molecule allows it to interact with the mRNA codon through complementary base pairing, ensuring the accurate translation of the genetic code into protein.

Question 4. What are the principles of green chemistry?

Answer. The principles of green chemistry are a set of guidelines that promote the design and development of chemical processes and products that are environmentally friendly and sustainable. The aim of green chemistry is to minimize or eliminate the generation and release of hazardous substances throughout the life cycle of a chemical product, from its production to its disposal.

The 12 principles of green chemistry, originally defined by chemists Paul Anastas and John Warner, are as follows:

- Prevention: It is better to prevent waste generation rather than trying to clean it up after it has been created.
- Atom Economy: The synthesis of chemicals should maximize the incorporation of all starting materials into the final product, minimizing waste generation.

- Less Hazardous Chemical Syntheses: Chemical reactions should be designed to use the least hazardous materials possible, minimizing the use and generation of toxic substances.
- Designing Safer Chemicals: Chemical products should be designed to minimize toxicity while still maintaining their intended function.
- Safer Solvents and Auxiliaries: The use of auxiliary substances, such as solvents and separation agents, should be minimized, and when used, they should be non-toxic or easily separable from the final product.
- Design for Energy Efficiency: Chemical processes should be designed to be energy-efficient, reducing the consumption of energy and minimizing the environmental impact associated with energy use.
- Use of Renewable Feedstocks: Whenever possible, the use of renewable raw materials and feedstocks should be favored over non-renewable resources.
- Reduce Derivatives: Unnecessary derivatization (modifying a molecule to create a derivative) should be avoided to minimize waste generation.
- Catalysis: The use of catalytic reactions is preferred to stoichiometric reactions (reactions that use equal amounts of reactants), as catalysts can be more efficient and can reduce waste generation.
- Design for Degradation: Chemical products should be designed to degrade into non-toxic substances after they have fulfilled their intended function, reducing their persistence in the environment.
- Real-Time Analysis for Pollution Prevention: Analytical methodologies should be developed to allow for real-time monitoring and control of chemical processes, enabling prompt detection and prevention of pollution.
- Inherently Safer Chemistry for Accident Prevention: Chemical processes and products should be designed to be inherently safe,

minimizing the risk of accidents and hazards to human health and the environment.

These principles serve as a framework for chemists and researchers to develop innovative and sustainable solutions that have a reduced impact on the environment and human health.

Question 5. What causes poisoning of Carbon Monoxide?

Answer. Carbon monoxide (CO) poisoning occurs when an individual inhales or is exposed to high levels of carbon monoxide gas. Carbon monoxide is produced by the incomplete combustion of carbon-containing fuels such as gasoline, natural gas, wood, coal, and propane. It is a colorless, odorless, and tasteless gas, making it difficult to detect without specialized equipment.

The main cause of carbon monoxide poisoning is the inhalation of carbon monoxide gas. This gas binds to hemoglobin in red blood cells, forming carboxyhemoglobin. Carboxyhemoglobin has a much stronger affinity for oxygen than regular hemoglobin, which prevents the transport of oxygen to body tissues. As a result, oxygen deprivation occurs, leading to cellular damage and potentially life-threatening conditions.

Common sources of carbon monoxide include:

- Faulty or poorly maintained fuel-burning appliances: This includes malfunctioning furnaces, gas stoves, water heaters, fireplaces, and space heaters.

- Vehicle exhaust: Carbon monoxide can accumulate in enclosed spaces such as garages, tunnels, or poorly ventilated areas near running vehicles.
- Generators and power tools: Operating gasoline-powered generators or tools in enclosed spaces without proper ventilation can lead to carbon monoxide buildup.
- Tobacco smoke: Smoking or inhaling secondhand smoke exposes individuals to carbon monoxide, which can contribute to overall carbon monoxide levels in the body.
- Blocked chimneys or vents: Blockages in chimneys, flues, or vents can cause carbon monoxide to back up into living spaces instead of being properly vented outdoors.

The symptoms of carbon monoxide poisoning can vary depending on the level and duration of exposure. Early symptoms often resemble flu-like symptoms, including headaches, dizziness, nausea, fatigue, and confusion. Prolonged exposure to high levels of carbon monoxide can lead to loss of consciousness, seizures, organ damage, and even death.

To prevent carbon monoxide poisoning, it is crucial to have fuel-burning appliances and heating systems inspected and maintained regularly. Install carbon monoxide detectors in your home, especially near sleeping areas. Ensure proper ventilation and avoid running vehicles or gas-powered equipment in enclosed or poorly ventilated spaces. It is important to take immediate action and seek fresh air if you suspect carbon monoxide poisoning and to seek medical attention promptly.

Question 6. What are the characteristics of capillaries?

Answer. Capillaries are the smallest and most numerous blood vessels in the human body. They have several distinct characteristics that make them unique and vital for various physiological processes. Here are the main characteristics of capillaries:

- Size and Structure: Capillaries are tiny vessels with an average diameter of about 5 to 10 micrometers (μm). They are composed ofa single layer of endothelial cells, which form a thin, porous wall. This thin structure allows for efficient exchange of substances between the blood and surrounding tissues.
- Microcirculation: Capillaries form an extensive network within tissues, connecting arterioles (small arteries) to venules (small veins). This microcirculation allows for the delivery of oxygen and nutrients to tissues and the removal of waste products.
- Permeability: Capillary walls are highly permeable due to their thinness and presence of small gaps or pores between endothelial cells. This allows for the exchange of gases (such as oxygen and carbon dioxide), nutrients, waste products, and other substances between the blood and surrounding tissues.

- Surface Area: Capillaries have a large total surface area due to their immense number and extensive branching. This increased surface area enhances the exchange of substances between the blood and tissues.
- Slow Blood Flow: Blood flow through capillaries is relatively slow compared to larger blood vessels. This reduced flow velocity facilitates efficient exchange and allows sufficient time for substances to diffuse across the capillary wall.