

12. BIOCHEMICAL CHANGES

TEACHING TASK (Page 88 – 90)

NEET LEVEL QUESTIONS

Multiple Choice Questions

1) Which of the following statements best explains why the biosphere is considered a dynamic yet stable system?

Answer: C) It involves constant interactions among its components.

Explanation: The biosphere is dynamic because its living and non-living components (e.g., organisms, atmosphere, soil) continuously interact through processes like nutrient cycling, energy flow, and ecological relationships. It is stable because these interactions maintain equilibrium over time, allowing ecosystems to adapt to changes while sustaining life.

2) What percentage of Earth's water is readily available as freshwater?

Answer: D) 1%

Explanation: Approximately 97% of Earth's water is saline (in oceans), and of the remaining 3% freshwater, about 2% is locked in glaciers and ice caps. Only ~1% is readily available as surface water (rivers, lakes) or groundwater.

3) What process begins the water cycle?

Answer: B) Evaporation

Explanation: The water cycle starts with evaporation, where water from oceans, rivers, and other surfaces turns into water vapor due to solar energy, initiating the cycle.

4) What environmental challenge is caused by the dissolution of harmful substances in rainwater?

Answer: A) Acid rain

Explanation: Acid rain occurs when pollutants like sulfur dioxide and nitrogen oxides dissolve in rainwater, forming acidic compounds (e.g., sulfuric acid) that harm ecosystems.

5) What is the main process by which water is recycled on Earth?

Answer: C) Water cycle

Explanation: The water cycle (evaporation, condensation, precipitation, etc.) is the primary mechanism for recycling water through Earth's systems, ensuring its continuous movement and availability.

6) What is the primary role of the nitrogen cycle?

Answer: B) To facilitate the conversion of inert atmospheric nitrogen into usable forms

Explanation: The nitrogen cycle converts inert atmospheric nitrogen (N_2) into usable compounds like ammonia and nitrates through processes like nitrogen fixation, making it available for plants and other organisms.

7) Which bacteria are known for converting atmospheric nitrogen into organic forms?

Answer: A) Rhizobium and Cyanobacteria

Explanation: Rhizobium (found in legume root nodules) and Cyanobacteria (blue-green algae) are key nitrogen-fixing bacteria that convert atmospheric nitrogen into organic compounds like ammonia, which plants can use.

8) What is the result of nitrification in the nitrogen cycle?

Answer: A) Conversion of ammonia into nitrates

Explanation: Nitrification is the process where ammonia is oxidized by bacteria (e.g., Nitrosomonas and Nitrobacter) into nitrites and then nitrates, which are absorbable by plants.

9) What is the final step of the nitrogen cycle that releases nitrogen back into the atmosphere?

Answer: D) Denitrification

Explanation: Denitrification, performed by bacteria like Pseudomonas, converts nitrates back into nitrogen gas (N_2), releasing it into the atmosphere, completing the nitrogen cycle.

10) Why is understanding the nitrogen cycle important for agriculture?

Answer: B) It is essential for managing nitrogen levels in the soil for plant growth.

Explanation: Nitrogen is a critical nutrient for plant growth. Understanding the nitrogen cycle helps farmers manage soil fertility through practices like crop rotation and fertilizer use to ensure adequate nitrogen availability.

11) In what conditions does denitrification primarily occur?

Answer: B) In oxygen-deprived, wet soils

Explanation: Denitrification occurs in anaerobic (low-oxygen) conditions, such as waterlogged soils, where denitrifying bacteria convert nitrates into nitrogen gas.

12) What is one major way human activities have disrupted the natural nitrogen cycle?

Answer: B) By using synthetic nitrates excessively in agriculture

Explanation: Excessive use of nitrogen-based fertilizers in agriculture leads to nutrient runoff, causing issues like eutrophication and disrupting the natural nitrogen cycle.

13) Why is it important to adopt sustainable practices regarding nitrogen use?

Answer: B) To preserve water quality and ecosystem health

Explanation: Sustainable nitrogen use prevents excess nitrates from polluting water bodies, which can cause algal blooms and oxygen depletion, thus protecting water quality and ecosystems.

Advanced Level Questions

Multi Correct Answer Type

1) Which of the following organisms are primarily responsible for nitrogen fixation?

Answer: A) Rhizobium, C) Cyanobacteria

Explanation: Rhizobium (in legume roots) and Cyanobacteria (blue-green algae) are key nitrogen-fixing organisms that convert atmospheric nitrogen into usable compounds. Nitrosomonas and Nitrobacter are involved in nitrification, not fixation.

2) What are the consequences of ammonification?

Answer: A) Production of ammonia from nitrogenous compounds, C) Breakdown of organic matter from dead plants and animals

Explanation: Ammonification involves the decomposition of organic matter (e.g., dead plants/animals) by microorganisms, producing ammonia. Options B and D refer to nitrification and denitrification, respectively.

3) Which statements are true about the distribution of water on Earth?

Answer: A) Nearly 97% of Earth's water is found in the oceans, B) Approximately 2% of Earth's freshwater is locked in glaciers and polar ice caps, C) About 1% of Earth's water is readily available as freshwater

Explanation:

A: Correct, ~97% of Earth's water is saline, found in oceans.

B: Correct, ~2% of Earth's water (most of the freshwater) is in glaciers/ice caps.

C: Correct, ~1% of Earth's water is readily available as freshwater (rivers, lakes, groundwater).

D: Incorrect, groundwater is significant but does not constitute a quarter of Earth's total water.

4) Which roles does water play in living organisms?

Answer: A) It comprises about 70% of the human body, B) It plays a role in photosynthesis, C) It facilitates the cycling of nutrients essential for life

Explanation:

A: Correct, water makes up ~70% of the human body.

B: Correct, water is a reactant in photosynthesis ($6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$).

C: Correct, water transports nutrients in organisms and ecosystems.

D: Incorrect, water is not a primary component of Earth's atmosphere (water vapor is minor).

Assertion and Reason Type

5) Assertion: Nearly 97% of Earth's water is found in the oceans.

Reason: Oceans contain a vast majority of the Earth's freshwater supply.

Answer: C) Assertion is true, but Reason is false.

Explanation: The assertion is true; ~97% of Earth's water is in oceans. However, the reason is false because oceans contain saline water, not freshwater.

6) Assertion: The water cycle maintains a simple loop where water immediately returns to the sea after falling on land.

Reason: Water percolates through the soil to recharge groundwater and supports terrestrial life.

Answer: D) Assertion is false, but Reason is true.

Explanation: The assertion is false; the water cycle is complex, and water does not immediately return to the sea after falling on land (it may percolate, evaporate, or be used by organisms). The reason is true, as percolation recharges groundwater and supports terrestrial ecosystems.

Matrix Matching Type

7) Match the following:

Answer:

Water Cycle Step → B) Evaporation, Condensation, Precipitation

Percentage of Earth's Freshwater → A) 3%

Role of Water in Living Organisms → E) Photosynthesis, Digestion, Cellular Respiration

Component of Nitrogen Cycle → C) Nitrogen Fixation, Nitrification, Assimilation

Process in the Nitrogen Cycle → D) Ammonification, Denitrification

Explanation:

1-B: The water cycle involves evaporation, condensation, and precipitation.

2-A: Freshwater is ~3% of Earth's total water.

3-E: Water is essential for photosynthesis, digestion, and cellular respiration in organisms.

4-C: Nitrogen fixation, nitrification, and assimilation are key components of the nitrogen cycle.

5-D: Ammonification and denitrification are specific processes within the nitrogen cycle.

Comprehension Type

8) What is the primary role of nitrogen fixation in the nitrogen cycle?

Answer: B) To convert atmospheric nitrogen into compounds that plants can absorb

Explanation: Nitrogen fixation converts inert atmospheric nitrogen (N_2) into ammonia or other compounds that plants can absorb, as described in the passage.

9) Which organisms are primarily responsible for nitrogen fixation?

Answer: B) Rhizobium and Cyanobacteria

Explanation: The passage explicitly mentions Rhizobium and Cyanobacteria as key nitrogen-fixing organisms.

10) What type of plants have a symbiotic relationship with nitrogen-fixing bacteria?

Answer: C) Leguminous plants like peas and beans

Explanation: The passage states that leguminous plants like peas and beans have a symbiotic relationship with nitrogen-fixing bacteria, enriching the soil with nitrogen compounds.

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NEET LEVEL QUESTIONS

Multiple Choice Questions

1) Why is water considered fundamental in the biosphere, despite not always being classified as a biogeochemical cycle by ecologists?

Answer: B) It acts as a universal solvent and facilitates essential reactions within living cells.

Explanation: Water is vital as a universal solvent, enabling biochemical reactions in cells (e.g., photosynthesis, digestion). While it's part of the water cycle, some ecologists don't classify it strictly as a biogeochemical cycle because it's not a nutrient like carbon or nitrogen.

2) What percentage of Earth's water is found in the oceans?

Answer: A) 97%

Explanation: Approximately 97% of Earth's water is saline and found in oceans.

3) Which of the following constitutes a quarter of the readily available freshwater on Earth?

Answer: C) Groundwater

Explanation: Of the ~1% of Earth's water that is readily available freshwater, groundwater constitutes a significant portion (roughly a quarter of this freshwater), compared to rivers, lakes, or atmospheric humidity.

4) What percentage of the human body is composed of water?

Answer: B) 70%

Explanation: The human body is approximately 70% water, critical for physiological functions.

5) What is the approximate percentage of Earth's total water that exists in rivers and lakes?

Answer: C) 0.009%

Explanation: Rivers and lakes hold a very small fraction (~0.009%) of Earth's total water, as most water is in oceans (97%) or locked in glaciers/groundwater.

6) Which of the following is NOT mentioned as a role of water in living organisms?

Answer: D) Protein synthesis

Explanation: Water is involved in photosynthesis, digestion, and cellular respiration, but protein synthesis is not typically listed as a direct role of water in organisms.

7) What happens to water vapor after it condenses in the water cycle?

Answer: B) It leads to precipitation

Explanation: After condensation, water vapor forms clouds, which lead to precipitation (rain, snow, etc.) in the water cycle.

8) Which of the following statements is true about the water cycle?

Answer: C) Some water percolates through soil to recharge groundwater.

Explanation: In the water cycle, some precipitation percolates through soil to recharge groundwater aquifers, supporting terrestrial ecosystems. Other options are incorrect as water does not always return immediately to the sea or infiltrate entirely.

9) Which organisms are primarily responsible for nitrogen fixation?

Answer: B) Certain bacteria and blue-green algae

Explanation: Nitrogen fixation is primarily carried out by bacteria like Rhizobium and blue-green algae (Cyanobacteria), not fungi, earthworms, or fish.

10) What process describes the uptake of nitrogen compounds by plants?

Answer: C) Assimilation

Explanation: Assimilation is the process by which plants absorb nitrogen compounds (e.g., nitrates, ammonium) from the soil to synthesize proteins and other molecules.

11) During ammonification, what happens to organic matter?

Answer: B) It is broken down into ammonia

Explanation: Ammonification involves the decomposition of organic matter by microorganisms, producing ammonia as a byproduct.

12) What happens to nitrates from fertilizers when they are washed into water bodies?

Answer: B) They remain in the water, preventing conversion back into atmospheric nitrogen.

Explanation: Nitrates from fertilizers can accumulate in water bodies, leading to issues like eutrophication, and are not immediately converted back to atmospheric nitrogen.

13) What is a significant consequence of excessive nitrogen compounds entering rivers and lakes?

Answer: B) Algal overgrowth and oxygen depletion

Explanation: Excess nitrogen causes eutrophication, leading to algal blooms that deplete oxygen in water bodies, harming aquatic life.

Advanced Level Questions

Multi Correct Answer Type

1) What processes are involved in the conversion of ammonia into nitrates?

Answer: B) Nitrification

Explanation: Nitrification is the process where ammonia is oxidized into nitrites and then nitrates by bacteria like Nitrosomonas and Nitrobacter. Nitrogen fixation, denitrification, and ammonification are distinct processes.

2) What roles do plants play in the nitrogen cycle?

Answer: B) They absorb nitrates and ammonium ions from the soil, C) They synthesize proteins and nucleic acids using absorbed nitrogen compounds

Explanation:

B: Plants absorb nitrates and ammonium for growth.

C: They use these compounds to synthesize proteins and nucleic acids.

A and D are incorrect, as plants do not directly fix nitrogen or convert nitrates to nitrogen gas.

3) What are the steps involved in the water cycle?

Answer: A) Evaporation of water from surface bodies like oceans, B) Condensation of water vapor into precipitation, C) Percolation of water through soil to recharge groundwater

Explanation:

A, B, C: These are key steps in the water cycle.

D: Incorrect, as not all water immediately returns to the sea; some is used by organisms or recharges groundwater.

4) What environmental impacts does water have?

Answer: A) Acts as a solvent during precipitation, transporting water-soluble pollutants, B) Dilutes pollutants in bodies of water, C) Transports dissolved minerals from rocks to rivers

Explanation:

A: Water transports pollutants during precipitation.

B: It dilutes pollutants in water bodies.

C: It carries minerals to rivers, enriching ecosystems.

D: Incorrect, as acid rain is a specific consequence, not a general role of water.

Assertion and Reason Type

5) Assertion: Water plays a crucial role in biochemical processes in living organisms.

Reason: Water comprises about 70% of the human body and is involved in photosynthesis.

Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

Explanation: The assertion is true, as water is essential for biochemical processes (e.g., photosynthesis, digestion). The reason is true and explains the assertion, as water's presence in the body and its role in photosynthesis highlight its importance.

6) Assertion: Water acts as a solvent and cleanses the environment during precipitation.

Reason: Precipitation transports water-soluble pollutants and dissolved minerals to bodies of water like lakes and oceans.

Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

Explanation: The assertion is true, as water acts as a solvent during precipitation. The reason correctly explains how precipitation transports pollutants and minerals to water bodies.

Matrix Matching Type

7) Match the following:

Answer:

Water Cycle → B) Process where water evaporates, condenses, and precipitates

Freshwater → C) Represents about 3% of Earth's total water

Groundwater → D) Water infiltrates the soil to replenish underground reservoirs

Leguminous plants → A) Plants like peas and beans have symbiotic relationships with nitrogen-fixing bacteria

Explanation:

1-B: The water cycle involves evaporation, condensation, and precipitation.

2-C: Freshwater is ~3% of Earth's water.

3-D: Groundwater is recharged by water infiltrating the soil.

4-A: Leguminous plants have symbiotic relationships with nitrogen-fixing bacteria like Rhizobium.

Comprehension Type

8) What role does water play during precipitation in the environment?

Answer: B) It transports water-soluble pollutants to bodies of water

Explanation: The passage states that water acts as a solvent during precipitation, transporting pollutants to lakes and oceans.

9) What is one positive effect of water transporting dissolved minerals from rocks to rivers?

Answer: C) It enriches marine ecosystems

Explanation: The passage highlights that transporting minerals to rivers enriches marine ecosystems.

10) What is a negative consequence of water acting as a solvent during precipitation?

Answer: C) It leads to acid rain

Explanation: The passage mentions acid rain as a negative consequence of water dissolving harmful substances during precipitation.

TEACHING TASK (Page 97 – 99)

NEET Level Questions

1) What type of organisms in oceans perform photosynthesis?

Answer: B) Phytoplankton

Explanation: Phytoplankton are microscopic organisms in oceans that perform photosynthesis, producing oxygen and organic compounds.

2) What is the primary molecule produced during photosynthesis that serves as an energy source?

Answer: B) Glucose

Explanation: Photosynthesis produces glucose ($C_6H_{12}O_6$) as the primary energy source for plants and other organisms.

3) What releases CO₂ into the atmosphere through combustion?

Answer: C) Fossil fuels

Explanation: Combustion of fossil fuels (e.g., coal, oil) releases stored carbon as CO₂ into the atmosphere.

4) What do microorganisms release when decomposing plant organic matter?

Answer: C) Carbon dioxide

Explanation: Decomposition by microorganisms breaks down organic matter, releasing CO₂ as a byproduct.

5) Where is carbon stored long-term besides tree trunks and animal bodies?

Answer: B) Soil

Explanation: Soil stores carbon long-term in the form of organic matter and humus, in addition to tree trunks and animal bodies.

6) What natural process emits significant amounts of CO₂ and other gases from deep within the planet?

Answer: C) Volcanism

Explanation: Volcanism releases CO₂ and other gases from Earth's interior into the atmosphere.

7) What has substantially increased atmospheric CO₂ levels since the Industrial Revolution?

Answer: C) Fossil fuel use

Explanation: The burning of fossil fuels for energy since the Industrial Revolution has significantly increased atmospheric CO₂ levels.

8) What effect has been intensified by the increase in atmospheric CO₂ levels due to human activities?

Answer: B) Greenhouse effect

Explanation: Increased CO₂ levels enhance the greenhouse effect, trapping heat and warming the Earth.

9) What percentage of the Earth's atmosphere is oxygen?

Answer: B) 21%

Explanation: Oxygen constitutes approximately 21% of Earth's atmosphere, with nitrogen being the most abundant (~78%).

10) In which layer of the atmosphere is the ozone layer located?

Answer: B) Stratosphere

Explanation: The ozone layer, which absorbs UV radiation, is located in the stratosphere.

11) What harmful radiation does the ozone layer absorb?

Answer: C) Ultraviolet

Explanation: The ozone layer absorbs harmful ultraviolet (UV) radiation from the sun, protecting life on Earth.

12) What substances contribute to the depletion of the ozone layer?

Answer: C) CFCs

Explanation: Chlorofluorocarbons (CFCs) release chlorine in the stratosphere, which breaks down ozone molecules, causing depletion.

13) What term refers to regions where ozone concentrations are significantly depleted?

Answer: B) Ozone hole

Explanation: Areas with significantly reduced ozone concentrations, such as over Antarctica, are called ozone holes.

Advanced Level Questions

Multi Correct Answer Type

1) Which of the following are major reservoirs of carbon?

Answer: A) Fossil fuels, B) Carbonate rocks, C) Green plants, D) Dissolved carbon dioxide in oceans

Explanation: All options are major carbon reservoirs: fossil fuels (coal, oil), carbonate rocks (limestone), green plants (biomass), and dissolved CO₂ in oceans store significant amounts of carbon.

2) What processes contribute to the consumption of oxygen in the atmosphere?

Answer: A) Combustion, B) Respiration, D) Formation of oxides

Explanation:

A: Combustion uses oxygen to burn fuels.

B: Respiration in organisms consumes oxygen to produce energy.

D: Formation of oxides (e.g., rust) uses oxygen.

C: Photosynthesis produces oxygen, not consumes it.

3) Which activities contribute to ozone depletion in the atmosphere?

Answer: A) Refrigeration, B) Air conditioning, D) Release of chlorofluorocarbons (CFCs)

Explanation:

A, B: Refrigeration and air conditioning use CFCs, which deplete ozone.

D: CFCs directly cause ozone depletion.

C: Fossil fuel use contributes to CO₂ emissions, not ozone depletion.

Assertion and Reason Type

4) Assertion: Ozone depletion primarily occurs due to the release of ozone-depleting substances like CFCs.

Reason: These substances react chemically in the stratosphere, leading to the breakdown of ozone molecules.

Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

Explanation: The assertion is true, as CFCs are major contributors to ozone depletion. The reason explains this, as CFCs release chlorine in the stratosphere, which breaks down ozone.

5) Assertion: Photosynthesis is the main process responsible for replenishing oxygen in the atmosphere.

Reason: During photosynthesis, plants and other photosynthetic organisms release oxygen as a byproduct.

Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

Explanation: Photosynthesis is the primary process for oxygen replenishment, and the reason correctly explains that oxygen is a byproduct of this process.

6) Assertion: Carbon dioxide is released into the atmosphere through both natural and human-induced processes.

Reason: Respiratory processes in organisms and combustion of fossil fuels are significant contributors to atmospheric CO₂ levels.

Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

Explanation: CO₂ is released naturally (e.g., respiration, volcanism) and through human activities (e.g., fossil fuel combustion). The reason accurately lists key contributors.

7) Assertion: Soil serves as a significant reservoir for storing carbon compounds. Reason: Organic matter in soil, including fossil fuels, retains carbon for long periods, influencing the carbon balance in ecosystems.

Answer: C) Assertion is true, but Reason is false.

Explanation: The assertion is true; soil stores carbon in organic matter. However, the reason is false because fossil fuels are not stored in soil as organic matter but in geological formations like coal and oil deposits.

Matrix Matching Type

8) Match the following:

Answer:

Oxygen in the atmosphere → A) Replenishes atmospheric oxygen

Photosynthesis → B) Second most abundant element

Ozone layer → D) Absorbs harmful UV radiation

Biological Oxygen Demand → E) Measures oxygen needed for organic waste

Anaerobic conditions → C) Produces hydrogen sulfide

Explanation:

1-A: Photosynthesis replenishes atmospheric oxygen.

2-B: Oxygen is the second most abundant element (~21%) after nitrogen (~78%).

3-D: The ozone layer absorbs UV radiation.

4-E: BOD measures oxygen required to break down organic waste.

5-C: Anaerobic conditions lead to the production of hydrogen sulfide by bacteria.

Comprehension Type

8) What is the primary role of photosynthesis in the biological carbon cycle?

Answer: C) To convert carbon dioxide into biological forms using sunlight energy

Explanation: The passage states that photosynthesis converts atmospheric CO₂ into biological forms (e.g., glucose) using sunlight.

9) Besides plants, which organisms in aquatic environments perform photosynthesis?

Answer: D) Phytoplankton

Explanation: The passage specifies that phytoplankton perform photosynthesis in oceans.

10) What is the chemical formula for glucose produced during photosynthesis?

Answer: C) C₆H₁₂O₆

Explanation: The passage identifies glucose (C₆H₁₂O₆) as the product of photosynthesis.

11) How do plants utilize glucose produced during photosynthesis?

Answer: B) They store it as starch for long-term energy needs

Explanation: The passage notes that plants store glucose as starch for long-term energy needs.

LEARNERS TASK (Page 99 – 101)

NEET Level Questions

1) What elemental form of carbon is used in jewelry?

Answer: B) Diamond

Explanation: Diamond, a crystalline form of carbon, is used in jewelry due to its hardness and brilliance.

2) What process converts atmospheric carbon dioxide into biological forms using sunlight energy?

Answer: C) Photosynthesis

Explanation: Photosynthesis uses sunlight to convert CO₂ into glucose and other biological compounds.

3) What process do green plants use to absorb carbon dioxide from the atmosphere?

Answer: C) Photosynthesis

Explanation: Green plants absorb CO₂ during photosynthesis to produce glucose and oxygen.

4) What is a major reservoir of carbon that is not directly accessible to plants?

Answer: B) Fossil fuels

Explanation: Fossil fuels (coal, oil) store carbon but are not directly accessible to plants, unlike atmospheric CO₂ or biomass.

5) What process involves breaking down food molecules to release CO₂ gas in organisms?

Answer: C) Respiration

Explanation: Respiration breaks down food molecules (e.g., glucose) in organisms, releasing CO₂ as a byproduct.

6) What human activity directly releases stored carbon into the air through burning?

Answer: B) Deforestation

Explanation: Deforestation, particularly through burning trees, releases stored carbon as CO₂. (Note: Combustion of fossil fuels could also apply, but deforestation is specified in the options.)

7) What is the primary greenhouse gas responsible for trapping heat in Earth's atmosphere?

Answer: D) Carbon dioxide

Explanation: CO₂ is the primary greenhouse gas responsible for trapping heat, contributing to the greenhouse effect.

8) What human activity impacts the biological carbon cycle by clearing land and releasing CO₂?

Answer: B) Deforestation

Explanation: Deforestation removes trees that absorb CO₂ and releases stored carbon through burning or decomposition.

9) What is the second most abundant element in the Earth's atmosphere?

Answer: B) Oxygen

Explanation: Oxygen (~21%) is the second most abundant element in the atmosphere, after nitrogen (~78%).

10) What biological process involves organisms utilizing oxygen and releasing carbon dioxide?

Answer: B) Respiration

Explanation: Respiration uses oxygen to break down food molecules, releasing CO₂.

11) What is crucial for supporting aquatic life in water?

Answer: B) Dissolved oxygen

Explanation: Dissolved oxygen in water is essential for aquatic organisms to perform respiration.

12) What does BOD stand for in environmental science?

Answer: A) Biological Oxygen Demand

Explanation: BOD stands for Biological Oxygen Demand, measuring the oxygen required to decompose organic matter in water.

13) What is the main process that replenishes oxygen in the atmosphere?

Answer: C) Photosynthesis

Explanation: Photosynthesis by plants and phytoplankton is the primary process for replenishing atmospheric oxygen.

Advanced Level Questions

Multi Correct Answer Type

1) Through which processes does carbon dioxide return to the atmosphere?

Answer: A) Combustion of fossil fuels, C) Respiration in organisms, D) Volcanic emissions

Explanation:

A: Combustion releases CO₂ from fossil fuels.

C: Respiration in organisms produces CO₂.

D: Volcanic emissions release CO₂ from Earth's interior.

B: Photosynthesis consumes CO₂, not releases it.

2) Which of the following are roles of oxygen in biological processes?

Answer: A) Utilized during respiration, B) Released during photosynthesis, C) Crucial for supporting aquatic life, D) Essential for decomposition by aerobic bacteria

Explanation:

A: Oxygen is used in respiration to produce energy.

B: Photosynthesis releases oxygen as a byproduct.

C: Dissolved oxygen supports aquatic life.

D: Aerobic bacteria require oxygen for decomposition.

3) What are major forms of oxygen found in the Earth's crust?

Answer: B) Carbonates, C) Sulfates, D) Water vapor

Explanation:

B: Carbonates (e.g., limestone) contain oxygen.

C: Sulfates (e.g., gypsum) contain oxygen.

D: Water vapor (H₂O) contains oxygen.

A: Carbon dioxide is primarily atmospheric, not a major form in the crust.

Assertion and Reason Type

4) Assertion: Oxygen is crucial for supporting aquatic life.

Reason: Dissolved oxygen in water is necessary for aquatic organisms to undergo respiration.

Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

Explanation: The assertion is true, as oxygen is vital for aquatic life. The reason explains that dissolved oxygen is needed for respiration in aquatic organisms.

5) Assertion: Oxygen is a major component of biological molecules such as carbohydrates and proteins.

Reason: These molecules contain oxygen atoms essential for their structure and function.

Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

Explanation: Oxygen is a key component of carbohydrates (e.g., glucose) and proteins (e.g., amino acids), and the reason explains its structural and functional role.

6) Assertion: Fossil fuels and carbonate rocks contribute to the carbon cycle primarily through combustion and dissolution processes.

Reason: These reservoirs are not directly accessible to plants for fixation, limiting their immediate contribution to biological carbon fixation.

Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

Explanation: Fossil fuels release carbon via combustion, and carbonate rocks via dissolution. The reason explains why these reservoirs are not directly used by plants for carbon fixation.

7) Assertion: Decomposition of organic matter results in the release of carbon dioxide into the atmosphere.

Reason: This process involves aerobic microorganisms breaking down organic materials, releasing carbon dioxide as a byproduct.

Answer: A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

Explanation: Decomposition by aerobic microorganisms releases CO₂, as explained by the reason.

Matrix Matching Type

8) Match the following:

Answer:

Role of oxygen in respiration → A) Releases carbon dioxide

Decomposition of organic waste → B) Requires aerobic bacteria

Environmental impact of CFCs → C) Contributes to ozone depletion

Importance of the ozone layer → D) Shields Earth from UV radiation

Eco-friendly practices → E) Reduce ecological footprint

Explanation:

1-A: Respiration uses oxygen and releases CO₂.

2-B: Decomposition of organic waste requires aerobic bacteria.

3-C: CFCs cause ozone depletion.

4-D: The ozone layer shields Earth from UV radiation.

5-E: Eco-friendly practices reduce environmental impact.

Comprehension Type

9) What analogy is used to explain the greenhouse effect in the passage?

Answer: A) A blanket

Explanation: The greenhouse effect is commonly described as a blanket trapping heat, though the passage does not explicitly provide this analogy. Based on standard scientific explanations, this is the correct choice.

10) Which gases are mentioned in the passage as contributing to the greenhouse effect?

Answer: B) Carbon dioxide, carbon monoxide, methane, and water vapor

Explanation: These gases are known contributors to the greenhouse effect, trapping heat in the atmosphere.

11) How does the greenhouse effect affect Earth's temperature?

Answer: C) It warms up the Earth by trapping heat from the sun

Explanation: The greenhouse effect traps solar heat, warming the Earth.

12) Why is the greenhouse effect important for life on Earth?

Answer: C) It maintains Earth's temperature suitable for life

Explanation: The greenhouse effect keeps Earth's temperature within a range suitable for life, preventing extreme cold.