

Build your Own Notes:

Use these topics as guidelines to create your own notes for 4.1 from pages 83 – 84

Study Notes/Questions

Cycling of Organic and Inorganic Matter

Matter is classified as... either organic or inorganic.

Organic matter always contains... carbon and hydrogen, although other elements may be present.

Inorganic matter is not from... a living source, usually of mineral origin

- may or may not contain carbon

Photosynthesis is the process in plants that uses the Sun's energy to convert carbon dioxide and water into carbohydrates (glucose) and oxygen

Cellular respiration is the process that combines carbohydrates and oxygen to produce carbon dioxide and water and release energy.

Warmup:

Study Notes/Questions

The Carbon Cycle

Carbon is the key element in all living things

- 1) Carbohydrates – source of energy
- 2) Proteins – structural parts of bodies
- 3) Lipids (fats) – insulation, long term energy storage

Sources of Carbon – atmosphere, oceans, all living things, fossil fuels, forest

Carbon reservoirs – store carbon and release it slowly

Carbon sink – reservoirs that absorb more carbon than they release (forests, oceans)

The Carbon Cycle describes process where carbon is recycled through ecosystems

- mostly through photosynthesis & cellular respiration
- products of one are reactants for other
- keeps balance of O₂ and CO₂ in biosphere

Photosynthesis:



Carbohydrates formed are passed through food chains & food webs

Decomposition releases carbon into the soil

Carbon can be stored as fossil fuels and marine sediments (carbonates)

4.2 The Carbon Cycle

Notes/Questions

Cellular Respiration:



Carbon is released back into the atmosphere

Carbon is also released from combustion of fossil fuels

Oxygen is also cycled through photosynthesis and cellular respiration

Summary: (two to three sentences summarizing this section)

Self-Reflection
Questions:

1. Describe one thing that you knew about this topic before today.

2. Describe one thing you learned about this topic today.

4.2 Activity

1. Identify the appropriate organic molecule that matches the following descriptions:

(a) forms structural components of organisms

(b) provides immediate energy

(c) controls body functions

(d) provides insulation against heat loss

(e) long-term storage of energy

Warm up:

Study Notes/Questions

The Nitrogen Cycle

All living things need nitrogen to form nucleic acid (for DNA) and amino acids (for proteins)

Nitrogen gas makes up 78% of atmosphere, but most organisms can't break strong bonds in N_2 molecules so Nitrogen Cycle is needed

First Step -

A process carried out by certain bacteria found in nodules on the roots of legumes such as peas, peanuts, soybeans and others

Also in cyanobacteria (in water) and in lichens

Plants and bacteria have symbiotic relationship (both benefit)

Nitrogen (N_2) is fixed (combined with H_2) to give ammonia (NH_3)

Excess ammonia is dissolved in water as ammonium (NH_4^+) ions

Second Step -

A process where nitrate ions are produced from ammonium ions by bacteria in soils

Plants need both ammonium ions (NH_4) and nitrate ions (NO_3^-) to grow

Plants use nitrates to make amino acids (building blocks of protein) and DNA

Animals get amino acids by digesting plants proteins and nucleic acids, remake their own proteins and DNA

4.3 The Nitrogen Cycle

Study Notes/Questions	<p>Third Step -</p> <p>When organisms produce waste or die and decompose, the materials are broken down to release <u>ammonium and nitrates</u></p> <p><u>Anerobic bacteria</u> convert ammonium and nitrate back to nitrogen gas (<i>anerobic = without oxygen</i>)</p> <p>This process speeds up in <u>low oxygen, acidic environments</u> such as peat bogs</p>
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Summary: (two to three sentences summarizing this section)

Self-Reflection Questions:	1. Describe one thing that you knew about this topic before today.	2. Describe one thing you learned about this topic today.
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Activity 4.3

1. Name three compounds that contain nitrogen.
2. Nitrogen gas is the most abundant gas in the atmosphere. Explain why it is not useful to most organisms in its atmospheric state.
3. What are nitrogen-fixing bacteria? Where are they found?

Warmup:

Study Notes/Questions

The Phosphorus Cycle

Phosphates are important molecules in living things. DNA and RNA have sugar phosphate backbones

Animals have phosphates in shells, bones, teeth

Cell membranes are made of phospholipids (fat molecules with phosphate attached)

Energy in all organisms stored in ATP (adenosine triphosphate)

Sources of Phosphate

All phosphate originates from weathering of sedimentary and metamorphic rocks. (There is no phosphate in the atmosphere)

Phosphate ions dissolve in water, get absorbed by producers, then eaten by consumers

The Short and Long Cycle

Short Cycle

When organisms die and decompose the phosphates are released and dissolve in water and are available to producers again

Long Cycle

When organisms die and decompose in the ocean, the phosphates and other elements sink to the bottom and are covered in sediments

These sediments eventually become sedimentary rocks and the phosphates remain trapped until a geological event exposes them to weathering.

4.5 The Phosphorous Cycle

Study Notes/Questions

Mycorrhizae - symbiotic fungus on roots of most plants

- increases solubility of phosphate so more available

Human activities add phosphate to ecosystems in several ways

- commercial fertilizers
- animal manure used to enrich soil
- out from sewage treatment plants and industrial waste

Summary: (two to three sentences summarizing this section)

Self-Reflection
Questions:

1. Describe one thing that you knew about this topic before today.

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4.5 Activity

1. Name three places where phosphorus is found in living things.
2. What is the original source of all phosphorus?
3. Explain the role of weathering and the rock cycle in making phosphorus available for living organisms.