

Exam 2 Review Sheet

Chapter 25 - Cycling Carbon

- 1. What did the measurements taken by Keeling tell us about the yearly carbon cycle?**
~He began a program to monitor carbon dioxide levels in the atmosphere in 1958. Two patterns emerged: 1.) Carbon dioxide levels oscillate on a yearly basis. Oscillation- is seasonal fluctuations in CO₂ concentration.
What trend did he see in the concentration of atmospheric CO₂ in the last 50 years?
~2.) Carbon dioxide levels have increased steadily to the present day since measurements began. There has been a 25% increase in CO₂ levels over the past 50 years.
- 2. What is the difference between correlation and causation?**
~Correlation-Indicates that two events or processes occur together. Increased CO₂ levels in the atmosphere and the industrial revolution (happen at the same time).
~Causation-A relationship in which one event leads to another (causes the other).
- 3. How long have atmospheric CO₂ levels been increasing and what do scientists know is causing this increase?**
~CO₂ levels have been increasing for the past 400,000 years. Only fossil fuels having the correct ratio of all three carbon isotopes to account for the pattern of isotopic change in atmospheric CO₂. Considers the interplay between physical and biological processes.
How do they know this?
~They know this because the curve representing the changing atmospheric levels of CO₂ over the past 400,000 years shows an oscillation pattern that seems to reflect the interglacial and glacial periods.
- 4. What is responsible for the seasonal fluctuations in atmospheric CO₂ levels?**
~Seasonal fluctuations can be explained by the imbalance between photosynthesis and respiration in the summer and winter months. Atmospheric CO₂ levels fluctuate regularly up and down with the seasons. Seasonal photosynthesis, higher in the summer. Rates of respiration remain constant throughout the year.
- 5. What physical processes are involved in the carbon cycle?**
~The physical processes that are involved in the carbon cycle are volcanism; chemical weathering; and oxidation of coal, oil, and ancient organic matter.
- 6. What processes remove carbon from the atmosphere and what processes return carbon to the atmosphere?**
~The processes that remove carbon from the atmosphere include the weathering of rocks, and photosynthesis. Those that add CO₂ to the atmosphere include volcanoes, the oxidation of ancient organic matter in sedimentary rock, and respiration.
- 7. What is the difference between the short-term and long-term carbon cycles?**

~In the short-term carbon cycle, the CO₂ pattern is steadily oscillating and increasing over the last 200 years since the start of the industrial revolution. (Correlation). In the long-term carbon cycle, there has been a ups and downs in the levels the CO₂. (Short-term and long-term carbon cycles are linked by the slow leakage of organic matter from biological communities to sediments accumulating on the sea floor)

Is there a difference in the types of processes involved?

~Yes there is a difference. The processes involved in the short-term are photosynthesis and respiration and for sure human activities and the burning of fossil fuels. In the long-term carbon cycle, it is the weathering of rocks (removes CO₂), Volcanoes and Oxidation of ancient organic matter in sedimentary rock (adds CO₂ to the atmosphere).

Chapter 26 - Bacteria and Archaea

1. What are the features a prokaryotic cell?

~Most bacterial cells are small spheres, rods, spirals, or filament. Shapes are very small, are 200nm to 2 micrometers. Rely on diffusion and size is limited because of cell wall doesn't allow aid of the wall. Prokaryotic cells are cells that lack a nucleus and no membrane surrounds the prokaryotic DNA; they include Bacteria and Archaea.

2. What type of genome do bacterial and archaeal organisms have?

~Bacterial genome- is circular, some bacteria can also carry smaller circles of DNA called plasmids. Structural support is provided by a cell wall made of peptidoglycan. Archaeal Organisms- they are extremophiles, living in extreme environments characterized by low pH, high salt, or high temperatures, but others live in less extreme environments like the upper oceans or soil.

3. Know the different types of horizontal gene transfer and be able to define them.

~The different types of horizontal gene transfer are; **Conjunction**-DNA from a donor cell is transferred through a pilus into the recipient cell, **Transformation**- DNA released into the environment by dead cells is taken up by a recipient cell, and **Transduction**- DNA is transferred from a donor to a recipient cell by a virus.

4. Know the different types of metabolism that bacteria and archaea can use and be able to identify if an organism is an autotroph, chemotroph, chemoautotroph, photoheterotroph, photoautotroph from a description.

~The different types of metabolism that bacteria and archaea can use are; **Autotrophic metabolism**; Oxygenic photosynthesis-(oxygen producing) Plant photosynthesis, Anoxygenic photosynthesis-Carbon dioxide gets reduced to carbohydrates (does not use oxygen), **Chemoautotroph metabolism (Chemoautotrophy)**- microorganism , which use chemoautotrophy are called chemoautotrophs. In which chemical energy is used to convert CO₂ to organic molecules, is unique to Bacteria and Archaea. An organism that oxidizes H₂S to gain energy and utilizes CO₂ as a carbon source would be classified as

chemoautotroph. **Heterotrophic metabolism**- aerobic respiration, oxygen utilizing, it breaks down carbohydrates using oxygen to generate ATP (energy). Fermentation- yields only a modest amount of energy. Photoheterotroph- obtaining energy from sunlight and using performed organic compounds as a source of compounds as source of carbon instead of CO₂. Photoautotroph- ?????????????????????????????????
Chemotroph-????????????????????

5. What is the difference between oxygenic and anoxygenic photosynthesis?

~Oxygenic photosynthesis- is (oxygen producing) Plant photosynthesis
Anoxygenic photosynthesis-Carbon dioxide gets reduced to carbohydrates (does not use oxygen)

6. What are oxidation/reduction reactions?

~Reactions in which electrons are removed from (oxidation) or added to (reduction) a molecule. Reactions happen in pairs. In photosynthesis the CO₂ is reduced to carbohydrates. In respiration the Carbohydrates are oxidized to CO₂. O₂ serves as electron acceptor. In all known photosynthetic eukaryotes photosynthesis is oxygenic (O₂ producing). Respiration in most eukaryotic cells are aerobic (uses O₂).

7. What are the geochemical cycles that bacteria and archaea are involved in?

~Sulfur Cycle-Plants and algae can take up sulfur and incorporate it into proteins, but bacteria and archaeon dominate the sulfur cycle by means of oxidation and reduction reactions that are linked to the carbon cycle. Nitrogen Cycle-Bacteria and archaeon can to reduce nitrogen gas to ammonia in a process called nitrogen fixation. The Nitrogen cycle also involves oxidation and reduction reactions that are linked to the carbon cycle. Carbon Cycle-intricately linked network of biological and physical processes that shuttles carbon among rock, soil, oceans, air and organisms.

8. What are the major groups of bacteria?

~The major groups of bacteria morphology, physiology, and the ability to take up specific stains in culture.

Why are archaea often called extremophiles?

~Because they can live in all types of environments.

What kind of environments can they live in?

~ Living in extreme environments characterized by low pH, high salt, or high temperatures, but others live in less extreme environments like the upper ocean or soil.

9. What is the human biome?

~It is all the bacteria and archaea that are in and on the human body. The totality of microbes that reside in/or humans, their genomes, and environmental interactions between the microbes and their human host is human biome.