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**Carbon Cycle Reading**

**Background:**

**Nutrient cycles** move and transfer important chemical elements like **carbon**, **hydrogen**, **nitrogen**, and **oxygen** throughout an ecosystem. These elements are a part of many important nutrients needed for living things. The cycling of these elements throughout an ecosystem is called **biogeochemical cycles** (**bio**: living, **geo**:earth, **chemical**: matter).

In biogeochemical cycles, **matter** is **conserved** (maintained) through many transformations and passes through the four spheres: **atmosphere**, **hydrosphere**, **biosphere**, and **geosphere**. We will be looking at the movement of **carbon**.



**Air (***Atmosphere***)**:

Today, the **amount of carbon** in our **atmosphere** (air) increasing because more carbon is spending time stored as a **gas**. Carbon enters the atmosphere when carbon is released as a gas (CO2) through **respiration** from the **biosphere** (living things), or when volcanoes erupt or gasses burn from the **geosphere**.

Carbon leaves the atmosphere and enters the **biosphere** through the process of **photosynthesis** when carbon is taken out of the air by plants to make food (glucose). It also enters the **hydrosphere** (water) through dissolution.

**Water (***Hydrosphere***):**

After rocks in the **geosphere**, water and more specifically the ocean (**hydrosphere**) is the next biggest storage site of carbon (with 38,000 billion tons of dissolved CO2).

**Plants** (biosphere) and the **ocean** (hydrosphere) store half of the carbon we release into the atmosphere every year because they absorb slightly more CO2 than they release.

Because CO2 is soluble, it’s constantly dissolving into the ocean surface (dissolution) and being released from the ocean surface back to the atmosphere. This keeps the CO2 levels in both the sea and the sky in reasonable balance.

**Aquatic Plants** **(***Biosphere***):**

After some carbon is dissolved from the **atmosphere** (air) into the water as CO2, some plants can use the carbon to make food (glucose). The carbon leaves the **hydrosphere** (water) and enters the **biosphere** (living things) through the process of **photosynthesis**. When is a plant is eaten by animals, the carbon in the plant moves into the animal as glucose. The carbon moves up the **food chain** as animals eat other animals.

When plants and animals **die** and **decompose** the carbon can get stored in the **geosphere** (ground). Some carbon can become **fossil fuel** over millions of years and eventually released into the atmosphere through human influence.

**Aquatic Animals** **(***Biosphere***):**

When is a plant is eaten by animals, the carbon in the plant moves into the animal as glucose. The carbon moves up the **food chain** as animals eat other animals. Aquatic animals can release carbon back into the ocean (hydrosphere) through **respiration**.

When plants and animals **die** and **decompose** the carbon can get stored in the **geosphere** (ground). Some carbon can become **fossil fuel** over millions of years and eventually released into the atmosphere through human influence.

**Land Plants (***Biosphere***):**

Carbon leaves the **atmosphere** (air) and enters the **biosphere** (living things) through the process of **photosynthesis** when carbon is taken out of the air by plants to make food (glucose). When is a plant is eaten by animals, the carbon in plants moves into the animal as glucose. The carbon moves up the **food chain** as animals eat other animals.

When plants and animals **die** and **decompose** the carbon can get stored in the **geosphere** (ground). Some carbon can become **fossil fuel** over millions of years and eventually released into the atmosphere through human influence.

**Land Animals** **(***Biosphere***):**

When is a plant is eaten by animals, the carbon in the plant moves into the animal. The carbon moves up the **food chain** as animals eat other animals. Land animals can release carbon back into the air (atmosphere) through **respiration**.

When plants and animals **die** and **decompose** the carbon can get stored in the **geosphere** (ground). Some carbon can become **fossil fuel** over millions of years and eventually released into the atmosphere through human influence.

**Sediment and Rock (***Geosphere***):**

Carbon can moves through our planet over **long time scales**. For example, over millions of years **weathering** and **erosion** of rocks on land (geosphere) can add carbon to surface water which eventually runs off to the ocean (hydrosphere).

The **geosphere** always has the **largest amount** of carbon storage. 99.9% of carbon is stored in **rock**, mostly as limestone. **Soil** itself stores three times as much carbon as all the world’s plants. Parts of plant and animal remains (biosphere) can stay in the soil for hundred of year, making it another large carbon storage site. Soil holds about 1550 billion tons of carbon this way—about three times as much as the total carbon stored in all the plants (550 billion tons) and animals (2 billion tons) alive today.

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**Carbon Cycle and Spheres Interactions**

**List what makes up each system below:**

1. Biosphere: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Geosphere: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Atmosphere: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Hydrosphere:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Describe how each of the systems interact with one another in the Carbon Cycle.**

1. How do the Biosphere and Geosphere interact? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. How do the Geosphere and Hydrosphere interact? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. How do the Hydrosphere and Atmosphere interact? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. How do the Biosphere and Atmosphere interact? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. How do the Biosphere and Hydrosphere interact? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. How do the Atmosphere and Geosphere interact? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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