Name _____

Date _____

Episode 10: SLOW CARBON CYCLE

I. Find the atomic number and mass of each of these elements. If possible, visit https://svs.gsfc.nasa.gov/13873 to find its origin.

	atomic number	atomic mass	origin
Carbon			
Oxygen			
Hydrogen			
Calcium			

II. Define these vocabulary words

- Calcium carbonate
- Chemical weathering
- Biogenic calcium carbonate
- Plankton
- Tectonic Plate

III. Summarize each video section.

1. What role does CO_2 play in calcium carbonate formation?

2. What are 3 steps of lithification:

   1.

   2.

   3.

3. How does limestone move?

4. How is CO_2 released from limestone?

Name _____

How does carbon move into and out of our air?

Before you start drawing, brainstorm how carbon moves, for example, burning fossil fuels, fires, volcanoes, photosynthesis, food webs, etc. (https://thenounproject.com/s has icons.)

Carbon sources: Draw icons that show how carbon or CO_2 moves into our air.	**Carbon sinks:** Draw icons that show how carbon or CO_2 move out of our air.

Circle all of the icons that move carbon quickly, within decades or fewer years.

Box icons that move carbon over millions of years (the slow carbon cycle).

Write N by natural processes, H next to human activities, or N/H if natural and human.

Question: Why is it a problem when human activities push carbon from the slow carbon cycle into the quick carbon cycle?

Teacher Resource

Name _____

Date _____

Episode 10: SLOW CARBON CYCLE

I. Find the atomic number and mass of each of these elements. If possible, visit https://svs.gsfc.nasa.gov/13873 to find its origin.

	atomic number	atomic mass	origin
Carbon	6	12	Dying low-mass stars
Oxygen	8	16	Dying high-mass stars
Hydrogen	1	1	The big bang
Calcium	20	40	Dying high / low mass stars

II. Define these vocabulary words

- Calcium carbonate A compound made of calcium and carbonate, $CaCO_3$, can be found in the form of chalk or limestone. It is the major component in shells of snails, clams, conchs, foraminifera and coccolithophore, as well as stony corals formations, sea urchin exoskeleton and sea star endoskeleton.
- Chemical weathering Process that causes erosion or disintegration of rocks, for example, when rain water breaks down limestone and releases carbon dioxide.
- Biogenic calcium carbonate Formation of calcium carbonate by animals that extract calcium ions and carbonate ions, then shape them into shells, skeletons, eggshells, etc.
- Plankton Tiny plant and animal organisms that live at and beneath the surface of lakes, rivers, ponds, and oceans across the planet.
- Tectonic Plate Giant pieces of the earth's crust that float on top of a constantly moving solid to semi-solid rock mantle.

III. Summarize each video section.

1. What role does CO_2 play in calcium carbonate formation? CO_2 absorbed in water forms carbonate ions.

2. What are 3 steps of lithification:
1. Deposition
2. Compaction
3. Cementation

3. How does limestone move?
Mostly on tectonic plates. A very small amount is scraped from coral, travels through fish guts, and becomes sand.

4. How is CO_2 released from limestone?
- Heat from volcanoes
- Heat to make cement
- Chemical weathering (water)

Name _____

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Carbon sources: Draw icons that show how carbon or CO_2 moves into our air.	**Carbon sinks:** Draw icons that show how carbon or CO_2 move out of our air or store it.
Answers will vary • Breathing – N/H • Wood fires N/H • Burning gas in cars H • Burning jet fuel H • Volcano eruption N • Chemical Weathering N • Burning Coal to make electricity H • Burning fossil fuels for electricity H • Making Cement H • Decomposition N And more	Answers will vary • Photosynthesis in plants N • Photosynthesis in plankton N • Absorption in ocean water N • Calcium Carbonate formation N • Absorption in soil N • Fossil Fuel formation N • Limestone formation N

Circle all of the icons that move carbon quickly, within decades or fewer years.

Box icons that move carbon over millions of years (the slow carbon cycle).

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Question: Why is it a problem when human activities push carbon from the slow carbon cycle into the quick carbon cycle?

Teacher Resources:

NGSS Standards:

NGSS PS1.A Substances are made of atoms that combine in various ways.

NGSS PS1.B Substances react chemically in characteristic ways.

NGSS ESS3.A Human activities are major factors in current rise of Earth's temp.

NGSS SS2.A Planet systems interact.

Experiment resources:

Find the calcium carbonate precipitate experiment at:

https://www.acs.org/middleschoolchemistry/lessonplans/chapter6/lesson3.html

Final Sketchnote