Mechanical and Chemical Weathering

Name: _____ Period: _____ Date: _____
Essential Question: How is weathering affected by climate, surface area, rock composition, and pollution?

Weathering - the disintegration and decomposition of rock at or near the surface of the earth or simply the breaking of rocks. *It affects the rocks in place and* ***no transport*** *is involved*. This distinguishes weathering from erosion.

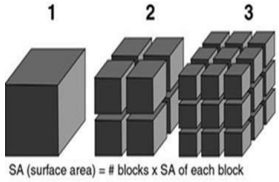
Two Types of Weathering

1. **Mechanical/physical weathering** - physical disintegration of a rock into smaller fragments, each with the same properties as the original. Occurs mainly by **temperature and pressure changes**.
2. **Chemical weathering** - process by which the internal structure of a mineral is altered by the addition or removal of elements. Change in phase (mineral type) and composition are due to the action of chemical agents. Chemical weathering is dependent on available surface for reaction temperature and presence of chemically active fluids.

Erosion - the incorporation and transportation of weathering products by a mobile agent such as wind, water, ice.

Factors that affect the rate of weathering

1. **CLIMATE:** The amount of water in the air and the temperature of an area are both part of an area's climate. *Moisture* speeds up chemical weathering. **Weathering occurs fastest in hot, wet climates**. It occurs very slowly in hot and dry climates. Without temperature changes, ice wedging cannot occur. In very cold, dry areas, there is little weathering.
2. **SURFACE AREA**-
   Most weathering occurs on exposed surfaces of rocks and minerals. The more surface area a rock has, the more quickly it will weather. When a block is cut into smaller pieces, it has more surface area. So, therefore, the smaller pieces of a rock will weather faster than a large block of rock



3. **ROCK COMPOSITION**-
   Some minerals resist weathering. Quartz is a mineral that weathers slowly. Rocks made up of minerals such as feldspar, calcite, and iron, weather more quickly.
4. **Pollution** speeds up weathering. Factories and cars release carbon dioxide and other gases into the air. These gases dissolve in the rainwater, causing **acid rain** to form. Acid rain contains nitric and sulfuric acid, causing rocks and minerals to dissolve faster.

CHEMICAL REACTIONS

When Carbon Dioxide dissolves in rainwater, carbonic acid is produced. As the rainwater moves through soil, the carbonic acid dissolves calcite (a mineral found in marble and limestone). Limestone caves, underground caves, cavern, or **Karst topography** are a result of this kind of weathering. Karst topography usually forms sinkholes.

http://www.ux1.eiu.edu/~cfjps/1300/weathering.html http://education-portal.com/academy/lesson/factors-that-affect-the-rate-of-weathering.html
http://bhsd228.schoolwires.net/cms/lib6/IL01001099/Centricity/Domain/511/7.3%20notes.pdf

Clarifying Questions:

1. What is **weathering**?
   _____
   _____
2. How is **weathering different from erosion**? Think!

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3. What are the **two types of weathering**?

_____

_____

4. What is **mechanical weathering**?

_____

5. What is **chemical weathering**?

_____

_____

For items 6-10: Mechanical or Chemical weathering. Write the letter of your answer on the blank.

A. Mechanical weathering **B. Chemical weathering**

____6. Occurs mainly by **temperature and pressure changes**. Like frost wedging.
_____7. Rocks break with their **minerals altered** by the addition or removal of elements
____ 8. Rocks break into smaller fragments, each with the **same properties** as the original.
_____9. Type of weathering dependent on surface for reaction and presence of **chemically fluids like acids.**
____10. Also known as **physical weathering**.

11. What is **erosion**?

_____

_____

12. How can increasing the **surface area of rock hasten or speed up the process of weathering** Think! 10 pts.?

_____

_____

Factors that affect the rate of weathering

Completion: Write the missing word or words on the space before each number. **For items 13-20**

_____13. ___speeds up chemical weathering.
_____14. Weathering happens _____ in hot, wet (humid) climates.
_____15. Weathering occurs very slowly in _____ and _____ climates.
_____16. Without _____ changes, ice wedging cannot occur
_____17. In very _____ and _____ areas, there is little weathering.
_____18. Most weathering occurs on _____of rocks and minerals
_____19. The _____ surface area a rock has, the quicker it will weather.
_____20. Some minerals resist weathering. _____ is a mineral that weathers slowly.
Rocks made up of minerals such as feldspar, _____, and iron, weather more quickly.

21. How can **pollution hasten or speed up weathering**?

_____

22. What is **karst topography** and what does it form?

_____

_____

___23. Cracks in rocks widen as water in them **freezes and thaws**. How does this affect the surface of Earth?
A. It reduces the rates of soil formation.
B. It exposes rocks to increased rates of erosion and weathering.

24. Name the four factors that can hasten or speed up the process of weathering.

_____ _____

_____ _____

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