**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_**

**Geology Lab #3**

**A Mouthful of Minerals**

**Objective/Question:** What effect do the minerals in toothpaste have on toothpaste’s ability to clean?

**Materials**

* Samples of three different types of toothpaste
* Toothbrushes
* Tap water
* A ceramic tile stained on the unglazed side with a felt-tip marker or pen

**Procedure**

1. At the lab bench, there is a ceramic tile for everyone and toothbrush for everyone. Each lab bench will share 3 tubes of toothpaste and sink to rinse off tile
2. In the data table below, record the substances found in each of the toothpaste sample. Common minerals in toothpaste include mica, calcite, quartz (silica). Toothpaste may also include sodium bicarbonate (baking soda), sodium fluoride, aluminum or calcium phosphates, and titanium dioxide
3. For each toothpaste sample, predict how effective you think it will be in removing the stain from the tile. Record your predictions below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Toothpaste** | **Minerals Present** | **Predictions** | **Observations** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

1. Put a pea-sized (AND NO MORE) amount of the first toothpaste onto a toothbrush. ***Caution: Do NOT ingest any of the toothpaste!***
2. Brush one of the stain marks 50 times. As you brush, try to use the same amount of force for each stroke.
3. Using tap water, rinse the tile to remove all of the paste. First, turn on the water gently and then put the tile underneath the water flow. Then rinse the toothpaste out of the toothbrush.
4. Repeat steps 4-6 for the other toothpaste samples, using a different stain mark for each test. Be sure to brush with the same amount of force and for the same number of times.
5. Compare how well different toothpastes cleaned the stains. Record your observations in the data table on Page 1.

**Analyze and Conclude**

1. Which mineral or minerals were found in all of the toothpastes tested? Did any toothpaste contain materials not found in the other toothpastes?
2. Which toothpaste was most effective in removing stains?
3. Were your predictions right about which toothpaste would be most effective correct?
4. Does the toothpaste that was most effective in cleaning the tile differ in mineral content from the other toothpastes that were tested? If yes, how so?
5. What was the independent variable in this experiment What was the dependent variable? Why did you use the same amount of toothpaste, force, and number of brushstrokes in each trial?
6. How do minerals in toothpaste affect the toothpaste’s cleaning ability? Explain.
7. Your teeth have the same composition as apatite, which has a hardness of 5 on the Mohs scale. What would be the advantages and disadvantages of using toothpaste containing a mineral that is harder that apatite? Softer than apatite? Explain.