

## Lesson 2 Assessment: Key

### Viscosity Lab Investigation

Name: \_\_\_\_\_

#### What you need:

- \* 4 small plastic cups
  - Fill 1 cup  $\frac{1}{2}$  full of Nacho cheese
  - Fill 1 cup  $\frac{1}{2}$  full of vegetable oil
- \* 1 straw per person, cut in half
- \* 1 lab tray
- \* 1 ruler
- \* 1 timer: phone or stopwatch

#### Part 1 Instructions:

- \* Each person will grab  $\frac{1}{2}$  of a straw.
- \* One person at a time, place the straw into the cup of oil.
- \* Blow bubbles like you would do with a soda.
- \* Observe how hard you have to blow, and the force and size of the bubbles once the air gets through.
- \* Do the same with the Nacho Cheese using your other  $\frac{1}{2}$  of the straw.

Record your observations below. All group members will do this.

a. Blowing in the oil:

Students should note the oil was easier to blow in and it produced many bubbles. It was like blowing in water, or milk, or soda etc.

b. Blowing in the nacho cheese:

Due to the thickness of nacho cheese, it took more effort to blow in it. It produced only one big hole.

**Part 2 Instructions:**

- \* One team member will be the pourer, while another is the timer.
- \* The pourer will first grab the cup with vegetable oil. Holding the ruler vertically (either person can hold the ruler), the pourer will hold the cup approximately 12 inches above an empty cup.
- \* The timer will begin the timing as soon and the pourer begins to pour the oil into one of the empty cups.
- \* The timer will stop the stopwatch as soon as the cup of oil is empty. Record this time in the table below.
- \* Repeat steps 3-5 with the nacho cheese and the other empty cup.
- \* Get some chips and eat your cheese if you want!

| Liquid       | Time in Seconds |
|--------------|-----------------|
| Oil          |                 |
|              |                 |
| Nacho Cheese |                 |

Answer the questions below.

1. Describe your flow-test results. Why did you get the results you did?

The oil flowed much quicker than the nacho cheese. This is because the nacho cheese is thicker than the oil.

2. Is the viscosity of the oil higher or lower than the nacho cheese? How do you know?

The oil has a lower viscosity because it flows faster and is less sticky.

3. One way to decrease the viscosity of a liquid is to \_\_\_Heat\_\_\_ (heat/cool) the fluid?

4. What factors affect the viscosity of a substance?

Temperature and chemical structure

5. What would happen to the viscosity of the oil and the nacho cheese if you heated it up? What if you cooled it down?

The viscosity of both the oil and nacho cheese would be lower if heated, and higher if cooled down.

6. Can magma have different viscosities? What influences the viscosity of magma? (conduct research if you need to)

Yes, magma can have different viscosities. The temperature of the magma, and the chemical structure, including the silica content, influences the viscosity of magma.

7. If magma in a volcano has a high viscosity, would the eruption be quiet or explosive? Why? (Think of how the fluids reacted to you blowing air into them)

The eruption would be explosive. This is because it is thicker, which makes it more difficult for the gases to escape. The gases build up, and when they finally break through it is more explosive.

8. Could viscosity affect how often a volcano erupts? Why?

Yes. When magma has a higher viscosity, the gas and pressure need to build up over time before there is enough force to break through.

9. What are some dangers of a volcanic eruption with high viscosity magma?

High viscosity magma means the eruption will be more explosive. This could cause pyroclastic flows, falling rock, landslides etc.

10. What are some dangers of a volcanic eruption with low viscosity magma?

This magma is thinner and less sticky. An eruption could cause a faster lava flow and can cover a lot of area in a short amount of time.

Bonus: Do you prefer mashed potatoes with low or high viscosity? Explain.