Ch 3 Sec 2: Properties of Magma

Guide for Reading

■ Why is it helpful to know the physical and chemical properties of a substance?
■ What causes some liquids to flow more easily than others?
■ What factors determine the viscosity of magma?

Like all substances, magma and lava are made up of elements and compounds.

An element is a substance that cannot be broken down into other substances.

A compound is a substance made of two or more elements that have been chemically combined.

Each substance has a particular set of:

1. **physical properties**- A physical property is any characteristic of a substance that can be observed or measured without changing the composition of the substance. A substance always has the same physical properties under particular conditions.

   Examples of physical properties include density (mass/volume), hardness (resistance to scratching), melting point, boiling point, and whether a substance is magnetic.

2. **chemical properties**- A chemical property is any property that produces a change in the composition of matter. Evidence is: changes in color, produces a gas, or forms a new, solid substance. Ex- silver + oxygen = tarnish

   Examples of chemical properties include a substance’s ability to burn and its ability to combine, or react, with other substances.
These properties can be used to:
1. identify a substance 2. to predict how it will behave.

The physical property of liquids called **viscosity** is the resistance of a liquid to flowing. Because liquids differ in viscosity, some liquids flow more easily than others. In some liquids, there is a greater degree of **friction** among the liquid’s particles. These liquids have higher viscosity.

**The viscosity of magma depends upon its Physical properties:**
1. **silica content.** The major ingredient in magma is **silica** (50-70%), a compound made up of particles of the elements oxygen and silicon. The amount of silica in magma helps to determine its viscosity. The **more silica magma** contains, the higher its viscosity. Magma that is high in silica produces light-colored lava that is too sticky to flow very far; ex. Rhyolite. The **less silica magma** contains, the lower its viscosity. Low-silica magma flows readily and produces dark-colored lava; ex. Basalt

   **LOW = FLOW**

2. **temperature** Viscosity increases as temperature decreases. The **hotter magma** is, the lower its viscosity and the more rapidly it flows. **Cooler types of magma** have high viscosity and flow very slowly.

Temperature differences produce two different types of lava. **Pahoehoe** is fast-moving, hot lava that has low viscosity. It looks like a solid mass of wrinkles, billows & rope-like coils. **Aa** is lava that is cooler and slower-moving. It has higher viscosity than pahoehoe. It forms a rough surface of jagged chunks.

   high Viscosity = low temp. = high silica = slow flow
   low Viscosity = high temp. = low silica = easy flow