

CHEMISTRY LAB ~ SOLIDS: GLASS FLOW

WHAT TO TURN IN: Hypothesis, Data Table, Calculations (N/A), Error Analysis, Conclusion, Questions 1-6

Introduction

True solids are *crystalline*. Some substances that we consider to be solids are not; in fact, they can be extremely slow-moving liquids. Upon examination, different physical properties of these apparent solids or *amorphous solids* can be observed. Glass is an example of a *supercooled liquid*.

Objectives

- To prepare a glasslike substance and observe its properties.
- To contrast behavior and structure of true crystalline solids with amorphous solids.

Materials

small plastic cups (SS, E, MIX)
paper towels

sodium silicate solution ($\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$)
ethanol ($\text{CH}_3\text{CH}_2\text{OH}$)-water solution

Procedure

- 1) Fill a small plastic cup with sodium silicate solution ($\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$) to the fill line drawn on the cup. (Sodium silicate is also called “water glass.”) This will be approximately 25 mL of solution.
- 2) In a second small cup, pour the ethanol ($\text{CH}_3\text{CH}_2\text{OH}$)-water mixture to the fill line. This will be approximately 9 mL of solution.
- 3) Pour the contents of the ethanol-water cup and the sodium silicate cup into the cup labeled “MIX.” Quickly swirl the cup to mix. Observe; record observations in the data table.
- 4) Place a few paper towels onto the lab counter. Quickly pour the mass and its liquid into your cupped hands. CAUTION: Gloves are recommended. The alcohol stings.
- 5) Gently form a ball with the white mass. If you squeeze too hard, the mass will crumble. At first, it will bounce if dropped *gently* onto the lab table.
- 6) Place the white ball on the lab counter. Leave undisturbed for 15 minutes. Check the shape; record observations in the data table.
- 7) Clean the counters thoroughly and pack the ball in a plastic bag.

DATA TABLE

| |
|---------------------------------------|
| Observations, step 3: |
| Describe texture of the ball, step 5: |
| Describe molded shape, step 5: |
| Describe shape after 15 minutes: |

Questions

- 1) a) Is the white ball a true solid?
b) Why or why not?
- 2) a) How is this “glass” ball similar to the putty and slime we made in previous labs?
b) How is it different?
- 3) Why did the bottom of the ball become flat over time?
- 4) Why is sodium silicate also called “water glass”?
- 5) a) What is the full name of $\text{Na}_2\text{SiO}_3 \cdot 9\text{H}_2\text{O}$?
b) What type of compound is this? (Hint: it has water in its structure.)
- 6) What is another name for “true” solids?