CHEMISTRY LAB: PREPARATION OF A PUTTY-TYPE MATERIAL

WHAT TO TURN IN: Hypothesis, Data Table – 6 entries, Calculations (N/A), Error Analysis, Conclusion, Questions #1-5

Objectives

- To prepare a putty-like material
- To test the properties of the substance
- To review the concepts of true crystalline solids vs. amorphous solids

Materials

liquid glue
tap water
food coloring, optional
graduated cylinder
ruler
cafeteria tray
4% sodium borate (borax) solution: ($Na_2B_4O_7 \cdot 10H_2O$)
spoon
plastic storage bags
plastic cup, 8-12 oz.
gloves, optional

Procedure

DO NOT POUR GLUE INTO ANY GLASSWARE!

1) Fill a plastic cup about 1/3 of the way with glue. If you have a 4 oz. bottle, use the entire contents. Measure the level of glue with a ruler and write down the total number of inches.
2) Using the graduated cylinder, add 20 mL of tap water to the glue in the cup. If using food coloring, add color to the water first. Stir.
3) Using the graduated cylinder, measure sodium borate (borax) solution. For every inch of glue initially in the cup, add 20 mL of solution. Add it to the glue mixture and stir well. Adjust as necessary: if the mixture is gummy and sticky, more borax solution is needed. GLOVES ARE RECOMMENDED FOR HANDLING IF FOOD COLORING IS USED.
4) Remove solid material from the cup and spoon and place on the tray.
5) Work the putty with your hands to ensure smooth consistency. Add more borax solution if it is sticky or gummy.
6) Complete the data table on the back of this lab sheet.
7) When the lab is finished, store the material in a plastic bag.

Questions

1) What happens when the material is pulled hard and fast?
2) Design a simple test to determine the density of the putty.
3) You used a solution of sodium borate (borax). What is a practical use for borax?
4) What is the chemical formula for sodium borate?
5) Why is a plastic cup used for the glue instead of a graduated cylinder?

DATA TABLE →

DATA TABLE: entries marked with *** must be answered

1) GRAVITY

Shape the putty into a ball and set it on the cafeteria tray.
*** How many seconds does it take to *begin* losing its ball shape?

2) BOUNCE

Shape the putty into a ball. Hold it 12 inches about the lab counter. Drop it gently.
*** Record detailed observations.

3) FLATTENING

a) *** How flat of a layer, in mm, can the putty be pressed onto the tray?
b) *** How many seconds does it take to "spring back" when your hands are removed?

4) COMPRESSIBILITY

Take the putty, hold it up, and press it between the palms of your hands.
a) *** Describe how the putty compresses immediately after it was made.
b) *** Describe how the putty compresses 10 minutes after it was made.

5) TEXTURE

*** How does the putty feel? Be descriptive.

6) ELASTICITY

Slowly pull the putty apart.
a) *** How far, in mm or cm, can it be stretched without breaking immediately after it was made?
b) *** How far, in mm or cm, can it be stretched without breaking 10 minutes after it was made?