

Chemistry 110 Lab Mass & Volume Measurements

The Buoyancy and Density of Sugar Solutions & The Density of a Solid

Materials: 2 small test tubes, 2 plastic pipets, 1 10-mL pipet, ~30 mL of each sugar solution, DIH₂O, 2 Erlenmeyer flasks, 1 unknown solid, Analytical balance

Buoyancy of Red & Yellow Sugar Solutions:

Two sugar solutions (10% & 32% sugar by mass) have been prepared for analysis. The purpose of this lab is to find out which solution is more dense by trying to float each on top of the other.

Pipet ~2 mL of red solution in to a small test tube and ~2 mL of yellow solution in to another test tube. Being careful not to contaminate the pipets put ~2 mL of the yellow solution in to the test tube under the red solution. Next, put ~2 mL of red solution in to the test tube under the yellow solution. Record your observations.

Density of De-ionized Water & Sugar Solutions:

The purpose of this lab is to determine the density of the sugar solutions by weighing a 10-mL sample of each. You will also make a graph of the density vs. mass % sugar to see if there is a linear relationship.

Weigh and record the mass of 2 small, clean, dry Erlenmeyer flasks using the same analytical balance. Using a 10-mL pipet and a pump, draw up 10 mL of the red solution. Be sure the bottom of the meniscus is sitting on the calibration mark. Carefully, transfer this liquid into one of the flasks. Repeat with another 10 mL of red solution into the other flask. Weigh and record the mass of both flasks. Pour the waste into the appropriate container and rinse the flasks and pipet with tap water, then with DI water. Re-weigh the empty, dry flasks and repeat with the yellow solution. Calculate the densities of the sugar solutions.

Density of an Unknown Solid:

The purpose of this lab is to determine the density of an irregularly shaped solid by weighing it, then determining the volume by water displacement.

Obtain an unknown solid and record the unknown number. Using an analytical balance, weigh the solid and record the mass. Place ~30 mL of water in a graduated cylinder and record the actual volume. Next, tilt the cylinder and carefully let the solid slide into the water and record this final volume. Calculate the density of the unknown.

Results, Post-lab Questions and Calculations:

Pipet Volume (mL) = _____

Flask Mass w/Red (g) _____

Flask Mass w/Yellow (g) _____

Flask Mass Empty (g) _____

Flask Mass Empty (g) _____

Density _____

Density _____

Average Density _____

Average Density _____

Solid Unknown # _____

Solid Mass (g) _____

Final Volume (mL) _____

Initial Volume (mL) _____

Unknown Solid Density _____

1. Did the behavior of the sugar solutions in the test tubes allow you to determine the mass % sugar in each? Explain.
2. Using Excel plot the density vs. mass % sugar for the red solution, the yellow solution and the de-ionized water (Table 1C.1). What is the mass % sugar in de-ionized water? Attach the graph to your report pages.
3. Is there a linear relationship between the density and mass % sugar? Explain using the graph and the R^2 value.
4. The mass of the unknown solid was measured with the analytical balance, was this necessary? Explain.