Chemistry 350 Spring 2016
20 points Due In Class Friday, January 29

Problem Set # 2: Stoichiometry and Tools of the Trade

Complete all problems on separate paper. Show all work for credit. Correct use of significant figures is required for full credit.

1. What volume of 0.1092 M sodium hydroxide would be needed to quantitatively titrate 25.00 mL of 0.09884 M hydrochloric acid?

2. How many milliliters of 3.00 M sulfuric acid are required to react with 4.35 g of solid containing 23.2 % w/w $Ba(NO_3)_2$ if the reaction is $Ba^{2+} + SO_4^{2-} \rightarrow BaSO_4$ (s)?

3. Pentane is a liquid with a density of 0.626 g/mL. What is the true mass of pentane when the mass weighed in air is 15.682 g?

4. A 2-mL Class A volumetric pipet is to be calibrated. It is filled to the mark with water which is then dispensed into a beaker that has a mass (when empty) of 10.4521 g. After the addition of water from the pipet, the beaker has a mass of 12.4235 g. If all of the measurements were carried out on a standard analytical balance (calibrated with 8.0 g/mL weights) at 20 °C, what is the true volume dispensed by the volumetric pipet at 20 °C? Is the value within the tolerance of the pipet?

5. An empty 10-mL volumetric flask weighs 10.257 g. After filling to the mark with distilled water at 20°C, the mass is 20.221 g. What is the true volume of the flask at 20°C? (Be sure to correct for buoyancy.)

Temperature (°C)	Density (g/mL)	Volume of 1 g of water (mL) *corrected for buoyancy*
10	0.9997026	1.0014
15	0.9991026	1.0020
20	0.9982071	1.0029
25	0.9970479	1.0040
30	0.9956502	1.0054