

Chem 2 Lab - FS/99
Midterm Exam - Monday Section

Name _____ Section: A1 / A2 / B1 / B2

Stdnt. No. _____ TA: TBone / Mathur / Emily / Dong

Read the following before beginning.

All work must be neatly displayed, with units, to receive partial credit. Unreadable or missing work will not be considered for partial credit. Use extra paper, or the back of the page, if necessary. Circle final answers, with the correct number of significant figures. Ask about any problems that may be unclear to you.

1. If a solid object were weighed in an atmosphere of helium, rather than air, how would its measured mass compare to its mass measured in air? Explain your reasoning.
(Just the overall trend, not a quantitative calculation) (5 pt)

2. In the buoyancy experiment, the specific gravity of solids was reported rather than their density. What is the difference between the density and the specific gravity? (5 pt)

3. A metal sample was found to weigh 2.885 gm in air. The sample weighed 1.230 gm when immersed in water at 25.0 oC. Calculate the specific gravity of the metal. (6 pt)

4. Given the density of water at 25 oC is 0.99707 gm/cm³. Calculate the volume of the metal sample in the previous problem. (6 pt)

5. The density of gold is 19.32 gm/cm³ and the density of mercury is 13.59 gm/cm³. If a sample of gold weighing 25.723 gm in air is reweighed while immersed in mercury, what will its measured weight be? (6 pt)

6. In the ternary mixture experiment, calcium carbonate was solubilized by reacting with 3M HCl. Write a balanced chemical reaction for this. (5 pt)

7. The calcium from the solution above was reprecipitated by reacting with excess 1M potassium carbonate solution. Write a balanced chemical reaction for this. (5 pt)

In a ternary mixture separation experiment for three materials, A, B, and C, the following data were obtained:

original sample mass 2.573 gm

mass of recovered A 1.042 gm

mass of recovered B 0.587 gm

mass of recovered C 1.034 gm

8. Calculate the percentage of each component in the unknown mixture. (6 pt)

9. Calculate the percentage error for the overall separation of components in the mixture. (6 pt)

10. Solids can be separated from liquids by filtration or decantation. Explain decantation (5 pt)

11. Explain the difference between a homogeneous and a heterogeneous mixture. (5 pt)

12. What problem(s) may result if the water is shut off to an aspirator before disconnecting the vacuum during a vacuum filtration? (5 pt)

13. How is the reaction rate of magnesium metal controlled during the empirical formula experiment? (5 pt)

14. In the empirical formula experiment, what was the purpose of adding water to the initial product formed from the reaction of the magnesium metal? (5 pt)

15. What gas was released on addition of water, and how was it tested for? (5 pt)

16. A sample of chromium, Cr, is reacted with oxygen in an empirical formula experiment to form the oxide. From the following data, calculate the empirical formula of the oxide of chromium. Use MWt of Cr = 51.996 gm / mole, MWt of O = 16.000 gm / mole (20 pt)

Mass of crucible and chromium oxide 34.315 gm

Mass of crucible and chromium 32.927 gm

Mass of crucible 31.423 gm