CHM 130   Exam III Key   Fall 2016   Ch. 10-15
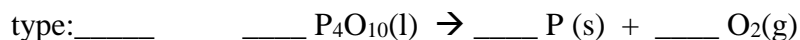
Directions. For all calculations, you must show your work with units for full credit. Make sure the answer has the correct number of significant digits and the appropriate units.
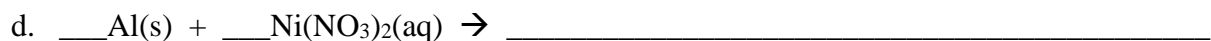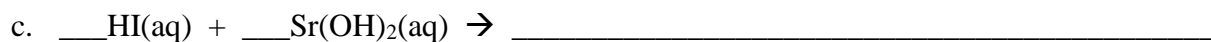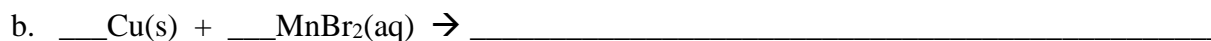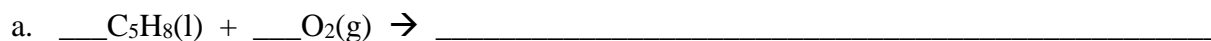**For multiple choice questions, please circle the best answer.** *Good Luck.* ☺

1. How many moles are in 6.15 x 10^{24} atoms of calcium? (4 pts)

2. How many grams is 0.8735 moles of $AgNO_3$? (4 pts)

3. How many liters is 55.3 grams of CO_2 gas at STP? (6 pts)

4. Answer a-c using this balanced reaction: 2 Al(s) + 6 HCl(aq) → 2 AlCl$_3$(aq) + 3 H$_2$(g)

    a. How many moles of H$_2$ are produced when 4.25 moles of HCl(aq) react? (4 pts)

    b. How many grams of HCl(aq) are needed to react with 9.35 grams of aluminum? (8 pts)

    c. How many liters of hydrogen gas at STP are produced from reacting 12.5 grams of Al? (8 pts)

5. What is the mass % concentration if 87.45 grams of KOH is dissolved in 238 grams of water? (5 pts)

6. Calculate the molarity if 1.525 grams of $NaC_2H_3O_2$, is dissolved in 755 mL of water. (6 pts)

7. Balance and classify these reactions as (C) combination, (D) decomposition, (B) combustion, (SR) single replacement, (DR) double replacement, and (N) acid-base neutralization. (9 pts)

type:_____   _____ Na_2CO_3(aq) + _____$MgCl_2$(aq) → _____ $MgCO_3$(s) + _____ NaCl(aq)

type:_____   _____ P_4O_{10}(l) → _____ P (s) + _____ O_2(g)

type:_____   _____ Ca(s) + _____ $AlCl_3$(aq) → _____ $CaCl_2$(aq) + _____ Al(s)

8. Write the products, physical states, and then balance these reactions. Write NR if no reaction. (17 pts)

   a. ___C_5H_8(l) + ___O_2(g) → _____

   b. ___Cu(s) + ___$MnBr_2$(aq) → _____

   c. ___HI(aq) + ___$Sr(OH)_2$(aq) → _____

   d. ___Al(s) + ___$Ni(NO_3)_2$(aq) → _____

9. (4 pts) Consider this reaction: $FeCl_3$(aq) + 3 K(s) → 3 KCl(aq) + Fe(s)

   a. Which reactant is reduced? _____

   b. Which reactant is the reducing agent? _____
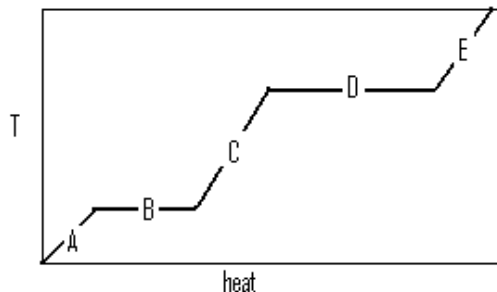
10. Identify the strongest IMF (**London, dipole-dipole or H bridge**) for the following molecules: (6 pts)

   a. NF_3 _____

   b. H_2O _____

   c. I_2 _____

11. Answer the following according to the heating curve graph below. (4 pts)

a. At which point is melting or freezing occurring? _____

b. At which point is there liquid only? _____

c. At which point is there solid only? _____

d. At which point is boiling or condensation occurring? _____

12. Butane molecules, C_4H_{10}, have London dispersion forces while butanol molecules, C_4H_9OH, have Hydrogen bridging forces. Circle the correct substance for each of the following questions. (5 pts)

a. Which has the stronger IMF?   butane   butanol

b. Which has the higher vapor pressure?   butane   butanol

c. Which has the lower boiling point?   butane   butanol

d. Which has the higher surface tension?   butane   butanol

e. Which has the lower viscosity?   butane   butanol

13. What holds the sulfur atom to a fluorine atom in a molecule of SF_2? (2 pts)

a. Ionic bond   b. polar covalent bond   c. H bridge force

d. dipole-dipole force   e. nonpolar covalent bond

14. What holds HF molecules to other HF molecules? (2 pts)

a. London forces   b. polar covalent bonds   c. H bridge forces

d. dipole-dipole forces   e. nonpolar covalent bonds

15. What holds Br_2 molecules to other Br_2 molecules in liquid bromine? (2 pts)

a. London forces   b. polar covalent bonds   c. H bridge forces

d. dipole-dipole forces   e. nonpolar covalent bonds

16. Which of these should not dissolve in water? (2 pts)

a. NaCl   b. Br_2 c. NH_3 d. HCl   e. K_3PO_4

17. Popular as a salad dressing, vinegar and oil don't mix so they are called _____. (2 pts)

a. soluble   b. insoluble   c. miscible   d. immiscible   e. unionized

Bonus: How many atoms of sodium are in 22.99 grams? (No calculations needed) _____