*Name:* _____

# Chemistry 150 Exam 2b

Be sure to put your name on each page. This page can be removed from your exam so that you will have a Periodic Table handy throughout the exam, it does not need to be turned in. Show all your work for non-multiple choice problems which require any sort of calculation, no credit will be given for answers without work shown. If you have shown a significant amount of work or multiple drawings for a problem, draw a box around what you consider your final answer.

Avogadro's Number = $6.022 \times 10^{23}$ $^{\text{units}}/_{\text{mol}}$
$32.00^{o}F = 0.000^{o}C = 273.15K$
1 foot = 12 inches
1 inch = 2.54cm (exactly)
1 pound = 453.6 g = 16 ounces
1 amu = $1.6605 \times 10^{-24}$ g
Masses of subatomic particles:
Proton 1.00728amu = $1.6726 \times 10^{-24}$ g
Neutron 1.00866amu = $1.6749 \times 10^{-24}$ g
Electron 0.000549amu = $9.1094 \times 10^{-28}$ g
Density of Water = $1.000^{g}/_{mL}$
$R = 0.08206$ $^{L \cdot atm}/_{mol \cdot K}$
PV=nRT

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 **H** 1.0079 | | | | | | | | | | | | | | | | | 2 **He** 4.0026 |
| 3 **Li** 6.941 | 4 **Be** 9.0122 | | | | | | | | | | | 5 **B** 10.811 | 6 **C** 12.011 | 7 **N** 14.007 | 8 **O** 15.999 | 9 **F** 18.998 | 10 **Ne** 20.180 |
| 11 **Na** 22.990 | 12 **Mg** 24.305 | | | | | | | | | | | 13 **Al** 26.982 | 14 **Si** 28.086 | 15 **P** 30.974 | 16 **S** 32.066 | 17 **Cl** 35.453 | 18 **Ar** 39.948 |
| 19 **K** 39.098 | 20 **Ca** 40.078 | 21 **Sc** 44.956 | 22 **Ti** 47.88 | 23 **V** 50.942 | 24 **Cr** 51.996 | 25 **Mn** 54.938 | 26 **Fe** 55.847 | 27 **Co** 58.933 | 28 **Ni** 58.69 | 29 **Cu** 63.546 | 30 **Zn** 65.39 | 31 **Ga** 69.723 | 32 **Ge** 72.61 | 33 **As** 74.922 | 34 **Se** 78.96 | 35 **Br** 79.904 | 36 **Kr** 83.80 |
| 37 **Rb** 85.468 | 38 **Sr** 87.62 | 39 **Y** 88.906 | 40 **Zr** 91.224 | 41 **Nb** 92.906 | 42 **Mo** 95.94 | 43 **Tc** (98) | 44 **Ru** 101.07 | 45 **Rh** 102.91 | 46 **Pd** 106.42 | 47 **Ag** 107.87 | 48 **Cd** 112.41 | 49 **In** 114.82 | 50 **Sn** 118.71 | 51 **Sb** 121.76 | 52 **Te** 127.60 | 53 **I** 126.90 | 54 **Xe** 131.29 |
| 55 **Cs** 132.91 | 56 **Ba** 137.33 | 57 **La** 138.91 | 72 **Hf** 178.49 | 73 **Ta** 180.95 | 74 **W** 183.84 | 75 **Re** 186.21 | 76 **Os** 190.23 | 77 **Ir** 192.22 | 78 **Pt** 195.08 | 79 **Au** 196.97 | 80 **Hg** 200.59 | 81 **Tl** 204.38 | 82 **Pb** 207.2 | 83 **Bi** 208.98 | 84 **Po** (209) | 85 **At** (210) | 86 **Rn** (222) |
| 87 **Fr** (223) | 88 **Ra** 226.03 | 89 **Ac** 227.03 | 104 **Rf** (261) | 105 **Db** (262) | 106 **Sg** (263) | 107 **Bh** (262) | 108 **Hs** (265) | 109 **Mt** (266) | 110 (269) | 111 (272) | 112 (277) | | 114 | | 116 | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 58 **Ce** 140.12 | 59 **Pr** 140.91 | 60 **Nd** 144.24 | 61 **Pm** (145) | 62 **Sm** 150.36 | 63 **Eu** 151.97 | 64 **Gd** 157.25 | 65 **Tb** 158.93 | 66 **Dy** 162.50 | 67 **Ho** 164.93 | 68 **Er** 167.26 | 69 **Tm** 168.94 | 70 **Yb** 173.04 | 71 **Lu** 174.97 |
| 90 **Th** 232.04 | 91 **Pa** 231.04 | 92 **U** 238.03 | 93 **Np** 237.05 | 94 **Pu** (244) | 95 **Am** (243) | 96 **Cm** (247) | 97 **Bk** (247) | 98 **Cf** (251) | 99 **Es** (252) | 100 **Fm** (258) | 101 **Md** (258) | 102 **No** (259) | 103 **Lr** (260) |



*Score*

**Multiple Choice: Circle the letter of the most correct response. (8pts. per question)**

1. Which of the following is ***not*** a redox reaction?
   a. $Mg(s) + 2\ HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$
   b. $4\ Fe(s) + 3\ O_2(g) \rightarrow 2\ Fe_2O_3(s)$
   c. $2\ C_2H_2(g) + 5\ O_2(g) \rightarrow 4\ CO_2(g) + 2\ H_2O(g)$
   d. $NH_4NO_3(aq) + NaC_2H_3O_2(aq) \rightarrow NH_4C_2H_3O_2(aq) + NaNO_3(aq)$
   e. $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$

2. Which of the following is ***not*** a correct gas law relationship?
   a. $PV = nRT$
   b. $n_1T_1 = n_2T_2$
   c. $V_1 / n_1 = V_2 / n_2$
   d. $P_1T_1 = P_2T_2$
   e. $P_1V_1 = P_2V_2$

3. Under which of the following conditions is a gas most likely to ***not*** be "ideal"?
   a. High temperature, high pressure
   b. High volume, low pressure
   c. High pressure, low temperature
   d. High pressure, high volume
   e. Room temperature, 25ºC

4. Which of the following is the strongest acid?
   a. $KOH(aq)$
   b. $HClO_4(aq)$
   c. $HC_2H_3O_2(aq)$
   d. $H_2O(aq)$
   e. $NH_3(aq)$

5. In which of the following formulas does bromine have the highest oxidation number?
   a. $HBr$
   b. $KBrO$
   c. $Mg(BrO_2)_2$
   d. $Br_2$
   e. $NH_4BrO_3$

6. Consider the following reaction:

   $$a\ KBr(aq) + b\ Pb(NO_3)_2(aq) \rightarrow c\ PbBr_2(s) + d\ KNO_3(aq)$$

   For every mol of KBr(aq) that reacts, how many mols of $PbBr_2(s)$ are formed?
   a. 0.25 mols
   b. 0.5 mols
   c. 1 mol
   d. 2 mols
   e. 3 mols



Score

7. Which of the following would you expect to be soluble in water?
   a. $CaCO_3$
   b. $BaSO_4$
   c. $Hg_2Br_2$
   d. $Mg(C_2H_3O_2)_2$
   e. $Sn_3(PO_4)_2$

8. Consider the following reaction:

   $$CH_4(g) + 2\ O_2(g) \rightarrow CO_2(g) + 2\ H_2O(g)$$

   What is ***oxidized*** in this reaction?
   a. $CH_4(g)$
   b. $O_2(g)$
   c. $CO_2(g)$
   d. $H_2O(g)$
   e. This is not a redox reaction

**Multiple Choice Calculations (12pts each):**

9. A 2.65L steel tank contains an ideal gas at 15.83ºC and 1.15atm. If the tank is heated to 100.0C, what is the pressure of the gas in the tank?
   a. 7.26 atm
   b. 1.48 atm
   c. 0.182 atm
   d. 0.891 atm
   e. 2.65 atm

10. What is the volume of 6.192mols of ideal gas at 0.651atm pressure and 28.61ºC?
    a. 22.3 L
    b. 9.46 L
    c. 6.14 L
    d. 236 L
    e. 99.8 L

11. You have dissolved 10.00g of lithium fluoride in enough water to make 250.00mL of solution. What is the concentration of the resulting solution?
    a. 1.542 M
    b. 1038 M
    c. 0.001542 M
    d. 0.8901 M
    e. 40.00 M

12. A reaction produces 834.1mL of ideal gas at standard temperature and pressure (STP). How many mols of gas did the reaction produce?
    a. 37.21 mols
    b. $3.602 \times 10^{-4}$ mols
    c. 10.16 mols
    d. 0.4066 mols
    e. 0.03721 mols



Score

**Problems: (20pts each)**

13. A large compressed air tank contains 325.0L of air at a pressure of 10.65atm pressure in a 21.25ºC shop. If the tank is brought outside on a 14.61ºC fall day and used to fill car tires, how many tires can be filled? Assume that a car tire has a volume of 24.6L and is filled to a pressure of 2.55atm.

14. 90.0mL of 0.892M magnesium nitrate solution is combined with 90.0mL of 0.892M ammonium phosphate solution.
    a. Write a correctly balanced equation for the reaction that takes place.
    b. How many grams of precipitate will this reaction form?



Score