**CHEM 100** **Name**_____
**Quiz 3** **Summer 2011**

1. Balance the following reactions. (8 points)
   a. Xenon hexafluoride reacts with water to make xenon trioxide and hydrogen fluoride.

   b. The reaction of toluene ($C_7H_8$) with nitric acid ($HNO_3$) to produce the explosive TNT ($C_7H_5N_3O_6$) and water.

2. A truck carrying 31,000 kg of sulfuric acid ($H_2SO_4$) is involved in an accident, spilling its cargo. HAZMAT crews use sodium bicarbonate ($NaHCO_3$) to neutralize the acid by the reaction below. (9 points)

$$H_2SO_4\,(aq) + 2\,NaHCO_3\,(s) \rightarrow Na_2SO_4\,(s) + 2\,H_2O\,(\ell) + 2\,CO_2\,(g)$$

   a. How many moles of sodium bicarbonate are needed to neutralize all the sulfuric acid?

   b. If all of the $H_2SO_4$ is neutralized, how many kilograms of water will be produced?

3. The molarity of a solution is defined as the concentration of a solution in terms of *moles of solute per liter of solution* (*mol/L*). You have prepared a solution by dissolving 22.4 grams of potassium hydroxide in a total of 200 mL of solution. What is the molarity of the potassium hydroxide? (8 points)

# PERIODIC CHART OF THE ELEMENTS

| IA | IIA | IIIB | IVB | VB | VIB | VIIB | VIII | | IB | IIB | IIIA | IVA | VA | VIA | VIIA | INERT GASES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 H 1.00797 | | | | | | | | | | | | | | | 1 H 1.00797 | 2 He 4.0026 |
| 3 Li 6.939 | 4 Be 9.0122 | | | | | | | | | | 5 B 10.811 | 6 C 12.0112 | 7 N 14.0067 | 8 O 15.9994 | 9 F 18.9984 | 10 Ne 20.183 |
| 11 Na 22.9898 | 12 Mg 24.312 | | | | | | | | | | 13 Al 26.9815 | 14 Si 28.086 | 15 P 30.9738 | 16 S 32.064 | 17 Cl 35.453 | 18 Ar 39.948 |
| 19 K 39.102 | 20 Ca 40.08 | 21 Sc 44.956 | 22 Ti 47.90 | 23 V 50.942 | 24 Cr 51.996 | 25 Mn 54.9380 | 26 Fe 55.847 | 27 Co 58.9332 | 28 Ni 58.71 | 29 Cu 63.54 | 30 Zn 65.37 | 31 Ga 69.72 | 32 Ge 72.59 | 33 As 74.9216 | 34 Se 78.96 | 35 Br 79.909 | 36 Kr 83.80 |
| 37 Rb 85.47 | 38 Sr 87.62 | 39 Y 88.905 | 40 Zr 91.22 | 41 Nb 92.906 | 42 Mo 95.94 | 43 Tc (99) | 44 Ru 101.07 | 45 Rh 102.905 | 46 Pd 106.4 | 47 Ag 107.870 | 48 Cd 112.40 | 49 In 114.82 | 50 Sn 118.69 | 51 Sb 121.75 | 52 Te 127.60 | 53 I 126.904 | 54 Xe 131.30 |
| 55 Cs 132.905 | 56 Ba 137.34 | ✳57 La 138.91 | 72 Hf 178.49 | 73 Ta 180.948 | 74 W 183.85 | 75 Re 186.2 | 76 Os 190.2 | 77 Ir 192.2 | 78 Pt 195.09 | 79 Au 196.967 | 80 Hg 200.59 | 81 Tl 204.37 | 82 Pb 207.19 | 83 Bi 208.980 | 84 Po (210) | 85 At (210) | 86 Rn (222) |
| 87 Fr (223) | 88 Ra (226) | ‡89 Ac (227) | 104 Rf (261) | 105 Db (262) | 106 Sg (266) | 107 Bh (262) | 108 Hs (265) | 109 Mt (266) | 110 ? (271) | 111 ? (272) | 112 ? (277) | | | | | | |

Numbers in parenthesis are mass numbers of most stable or most common isotope.

Atomic weights corrected to conform to the 1963 values of the Commission on Atomic Weights.

The group designations used here are the former Chemical Abstract Service numbers.

✳ Lanthanide Series

| 58 Ce 140.12 | 59 Pr 140.907 | 60 Nd 144.24 | 61 Pm (147) | 62 Sm 150.35 | 63 Eu 151.96 | 64 Gd 157.25 | 65 Tb 158.924 | 66 Dy 162.50 | 67 Ho 164.930 | 68 Er 167.26 | 69 Tm 168.934 | 70 Yb 173.04 | 71 Lu 174.97 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

‡ Actinide Series

| 90 Th 232.038 | 91 Pa (231) | 92 U 238.03 | 93 Np (237) | 94 Pu (242) | 95 Am (243) | 96 Cm (247) | 97 Bk (247) | 98 Cf (249) | 99 Es (254) | 100 Fm (253) | 101 Md (256) | 102 No (256) | 103 Lr (257) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|