IA (1)																		VIIIA (18)
1 **H** 1.0080	IIA (2)											IIIA (13)	IVA (14)	VA (15)	VIA (16)	VIIA (17)		2 **He** 4.0026
3 **Li** 6.9410	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** 20.179
11 **Na** 22.990	12 **Mg** 24.305	IIIB (3)	IVB (4)	VB (5)	VIB (6)	VIIB (7)	...... VIIIB ...... (8) (9) (10)			IB (11)	IIB (12)	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** 47.880	23 **V** 50.942	24 **Cr** 51.996	25 **Mn** 54.938	26 **Fe** 55.847	27 **Co** 58.933	28 **Ni** 58.690	29 **Cu** 63.546	30 **Zn** 65.380	31 **Ga** 69.723	32 **Ge** 72.610	33 **As** 74.922	34 **Se** 78.960	35 **Br** 79.904		36 **Kr** 83.800
37 **Rb** 85.468	38 **Sr** 87.620	39 **Y** 88.906	40 **Zr** 91.224	41 **Nb** 92.906	42 **Mo** 95.940	43 **Tc** 98.907	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** 121.75	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** 183.85	75 **Re** 186.21	76 **Os** 190.20	77 **Ir** 192.22	78 **Pt** 195.09	79 **Au** 196.97	80 **Hg** 200.59	81 **Tl** 204.38	82 **Pb** 207.20	83 **Bi** 208.98	84 **Po** 208.98	85 **At** 209.99		86 **Rn** 222.02
87 **Fr** 223.02	88 **Ra** 226.03	89 **Ac** 227.03	104 **Unq** 261.11	105 **Unp** 262.11	106 **Unh** 263.12	107 **Uns** 262.12												

1. (2 points) Write a complete, ***balanced chemical equation*** to show how hydroxylamine, $HONH_2$, behaves when dissolved in water. (Remember that chemists are precise in their use of arrows!)
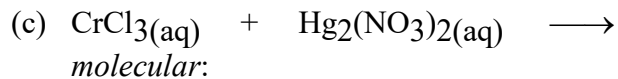
2. (9 points) For each of the following reactions, write ***balanced chemical equations*** for both the ***molecular*** and the ***net ionic*** equations. If no reaction occurs, write No Reaction. Use subscripts [(s), (aq), (g), etc.] to indicate the phase of each compound or ion.

(a) $(NH_4)_2SO_3(aq)$ + $KOH(aq)$ $\longrightarrow$
   molecular:

   net ionic:

(b) $HC_2H_3O_2(aq)$ + $Ca(OH)_2(aq)$ $\longrightarrow$
   molecular:

   net ionic:

(c) $CrCl_3(aq)$ + $Hg_2(NO_3)_2(aq)$ $\longrightarrow$
   molecular:
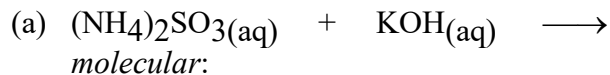
   net ionic:

3. (5 points) **SHOW ALL WORK.** A sample of helium passes through a certain membrane in 75 sec. The same amount of an unknown noble gas requires 343 sec to pass through the same membrane. Identify the unknown gas by performing an appropriate calculation.

The major concept related to this problem is known as Graham's Law of _____.

4. (2 points) Write the oxidation number of each atom in $(NH_4)_3SbO_3$.

   N _____   H _____   Sb _____   O _____

5. (2 points) BaO is the anhydride of _____. The anhydride of $HBrO_4$ is _____.

6. (5 points) **SHOW ALL WORK.** Automobile air bags inflate when a serious impact triggers the following chemical reaction. If the air bag has a volume of 24.5 L, determine the mass (in grams) of sodium azide that is required to inflate the bag to a pressure of 1250 torr at 23 °C.
(molar masses: $NaN_3 = 65.0$, $N_2 = 28.0$, $Na = 23.0$)

$$2 \, NaN_{3(s)} \longrightarrow 2 \, Na_{(s)} + 3 \, N_{2(g)}$$