Study Questions for the Final Exam

1. Dihydrogen monoselenide has many uses. Draw the Lewis structure for dihydrogen monoselenide and describe its electron pair geometry and molecular geometry. What is the H-Se-H bond angle? Is the molecule polar or nonpolar?

2. Methanol, CH_3OH, can make people blind if ingested (don't drink it! :) Methanol has an -OH bond. Draw the Lewis structure for methanol and describe its electron pair geometry and molecular geometry around the carbon atom. What is the C-O-H bond angle? Is the molecule polar or nonpolar?

3. How many grams are there in 5.62×10^{13} molecules of $C_8H_{18}O_4$?

4. How many atoms of nitrogen are in 6.5×10^6 g of $Al(NO_3)_3$?

5. How many atoms of chlorine are there in 943.1 g of chlorine (Cl_2)?

6. Gallium reacts with iodine to make gallium iodide. Write the balanced equation.

7. Lead(II) nitrate reacts in a double displacement reaction with sodium iodide. Write the balanced equation.

8. Write the electron configuration for the following atoms: Ne, Mg, Cl, Ca, V, Kr

9. Write the electron configuration for the following ions: Na^+, Al^{3+}, F^{-1}, Cr^{5+}.

10. In questions #8 and #9, above, which atoms and ions are paramagnetic? Which atom or ion is the *most* paramagnetic?

11. In questions #8 and #9, above, which atoms and ions are isoelectronic? How many valence electrons do the isoelectronic atoms and/or ions possess?

Answers appear on the next page

Study Questions for the Final Exam - *Answers*

1. H_2Se is tetrahedral / bent, 109 ° angle, polar.
2. CH_3OH is tetrahedral (at both C and the O); the MG around C is tetrahedral (around O it is bent). 109 °, polar.
3. $1.66 * 10^{-8}$ g
4. $5.5 * 10^{28}$ atoms N
5. $1.602 * 10^{25}$ atoms Cl
6. $2\ Ga\ +\ 3\ I_2\ \rightarrow\ 2\ GaI_3$
7. $Pb(NO_3)_2\ +\ 2\ NaI\ \rightarrow\ 2\ NaNO_3\ +\ PbI_2$
8. Ne: $1s^2 2s^2 2p^6$, Mg: [Ne]$3s^2$, Cl: [Ne]$3s^2 3p^5$, Ca: [Ar]$4s^2$, V: [Ar]$4s^2 3d^3$, Kr: [Ar]$4s^2 3d^{10} 4p^6$
9. Na^+: [Ne], Al^{3+}: [Ne], F^{-1}: [Ne], Cr^{5+}: [Ar]$3d^1$
10. *Paramagnetic:* Cl (1 unpaired electrons), Vanadium (3 unpaired electrons), chromium(V) (1 unpaired electron). Vanadium is the most paramagnetic.
11. *Isoelectronic:* Ne, Na^+, Al^{3+}, F^{-1}. These species have zero valence electrons.