Chemistry 1210 Exam 2 - Jordan. Fall 1999, Form A.

Name_____

ID_____

By submitting this exam, I certify that I have neither given nor recieved unauthorized aid.
Useful information: $E = h\nu$, $1/\lambda = R[1/n_1^2 - 1/n_2^2]$, $\lambda\nu = c$, $c = 3.00 \times 10^8$ m/s, $h = 6.626 \times 10^{-34}$ Js, $R = 1.097 \times 10^{-2}$ nm^{-1}, $C_F = E_v - (\#bonds + E_{nonbonding})$, bond order = $(E_{bonding} - E_{antibonding})/2$

(1) Write the net ionic reactions for the following ionic reactions

(a) $Ca(NO_3)_2 + Na_2(CO_3)$ ------> $2\ NaNO_3 + CaCO_3$

(b) $LiCl + Ag(NO)_3$ -------> $AgCl + LiNO_3$

(2) Write the net acid-base reactions for the following

(a) $NH_3 + HCl$ ----->

(b) $HClO_4 + NaOH$ -------->

(3) Balance the following half reaction in basic solution. Is this reaction an oxidation or a reduction?

$NO \text{ -----> } NO_3^-$

(4) Balance the following reaction in acidic media. List the balanced half reactions.

$$PbO_2 + Br^- \text{----> } PbO + Br_2$$

(5) The following balanced redox reaction has been the basis of blood alcohol determinations of ethanol (C_2H_5OH).

$$C_2H_5OH + 2Cr_2O_7^{2-} + 16H^+ \text{------>} 2CO_2 + 4Cr^{3+} + 11H_2O$$

If a sample required 10.23 mL of a 0.204 M solution of $K_2Cr_2O_7$ to neutralize the ethanol, how much ethanol was in the sample (in moles)?

(6) Who is credited with creating the periodic table and how did he organize his periodic table?

(7) How many electrons can the n = 3 shell hold. Break this down by subshell and make sure to show all work.

(8) For the hydrogen atom, what is the wavelength of light that corresponds to the transition from the n = 3 level to the n = 1 level. What is the energy of this light?

(9) Write the electron configurations for the following species (do not use noble gas abbreviations such as [Ar]$3s_2$...).

(a) C

(b) Se^{2-}

(10) Arrange the following by increasing 1st ionization energy.

Na, S, Cs, F, Ne

(11) Arrange the following by increasing electronegativity.

F, Cl, K, Li

(12) Order the following by increasing lattice energy

LiF,AlN, MgF_2, NaBr, MgO

(13) Write the Lewis Dot structures and give the VSEPR geometries (draw and name) for the following species

(a) BCl_3

(b) SiF_4

(c) PF_6^-

(14) What is the hybridization around the central atom for the following (for Valence Bond Theory bonding purposes)?

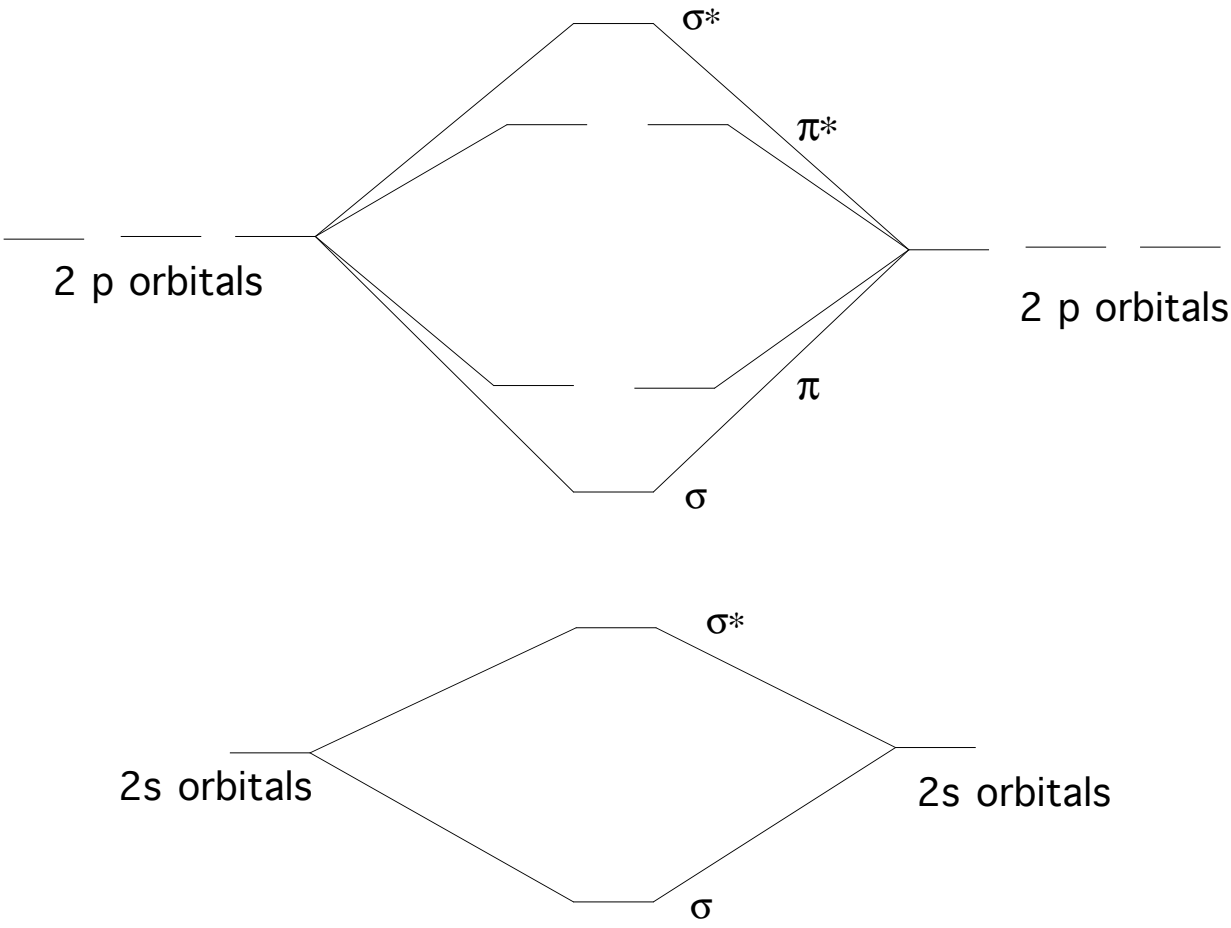
(a) BF_3

(b) CCl_4

(c) SF_6

(15) Using the Molecular Orbital diagram given on the next page, predict if the Ne_2 molecule would be stable (have bonding) and list it's bond order. Would Ne_2^+ be stable? What would the bond order for Ne_2^+ be?

Molecular Orbital Diagram for Diatomic Molecules X-X



(Extra Credit) What bond angle would you expect for the F-Be-F angle in BeF_2