Chem 1063, Exam 2. J-Term 2007

Name_____

Show all work for credit

Useful information: $\text{Formal Charge} = E_{valence} - (E_{nonbonding} + \#_{bonds})$, $\lambda\nu = c$, c= 3.00 x 10^8 m/s, $\lambda = \frac{h}{mv}$, $\frac{1}{\lambda} = R_H\left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right)$, R_H = 0.01097 nm^{-1}, 1 Hz = 1/s, h=6.626 x 10^{-34} Js, $U = f \times \frac{Z_1 Z_2}{d^2}$

(1)(4 pts) A radio station broadcasts a radio signal with a frequency of 1500 kHz. What is the wavelength of this radiation? Is it an FM or AM station?

(2)(2 pts) How is green light different from orange light?

(3)(2 pts) How is a bright white light different from a dim white light?

(4)(2 points) Which second row element should have the highest 3rd ionization energy?

(5)(2 points) Place the following in the order of increasing electron affinity:
B, Ga, N, Ba, Cs

(6)(12 points) Draw the best Lewis dot structures for the following compounds

(a) SO_3^{2-}

(b) BeF_2

(c) NF_3

(d) SiS_2

(e) AlF_3

(f) NO_2

(7)(2 points) Place the following in order of increasing lattice energy.
NaCl, Li_2S, CsI, MgO, Ca_3N_2

(8)(4 points) A neutron with a mass of 1.67×10^{-31} kg is moving at 25 m/s. What is its deBroglie wavelength?

(9)(4 points) An electron in a hydrogen atom falls from the n=6 to the n=1 level. What is the wavelength of light emitted in this process?

(10)(8 points) (8 points) Create a Born-Haber cycle to find the ΔH for the reaction below using the following information.

$Mg(s) + Br_2(g) \text{ -----> } MgBr_2(s)$ $\Delta H = ??$

Br_2 bond dissociation energy = 193 kJ/mole

Mg $\Delta H_{sublimation}$ = 146 kJ/mole
Mg (g): E_{i1} = 782 kJ/mole, E_{i2} = 1451 kJ/mole
Br(g) Electron Affinity = -325 kJ/mole
U for the reaction is 2440 kJ/mole

Extra Credit(4 points): A small radio requires 200 J of energy to play for 1 hour. If the radio was solar powered, how many photons of 500 nm light would be required to power the radio for one hour?