Homework Set 8 Solutions

(Distributed 11/2/16; Due on 11/9/16)

Read Chapter 11 in Zumdahl and complete the listed questions from the text: 49, 52, 59, 62, 79, 117, 118; as well as the following problems:

A. Infrared light waves cause the interior of your car warm up on a sunny day. If an infrared wave has a frequency of 3.0 x 10^{12} Hz, what is the wavelength and energy of the infrared radiation?

$\lambda = \frac{c}{\nu} = \frac{3 \times 10^8\ m/s}{3 \times 10^{12}\ s\text{-}1} = 1 \times 10^{-4}\ m$ *or* $100\ \mu m$

$E = h\nu = (6.626 \times 10^{-34}\ J \cdot s)\ (3.0 \times 10^{12}\ s^{-1}) = 1.99 \times 10^{-21}\ J$

B. Identify the **neutral** atoms indicated by the following electron configurations:

(i) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^4$ ***Te***

(ii) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$ ***Ca***

(iii) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}$ ***Zn***

(iv) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^1\ 4d^{10}\ 5p^6\ 6s^1$ ***Cs***

(v) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^1$ ***Ga***

C. Indicate the number of valence electrons for the following neutral atoms:

(i) Se	(ii) Sr	(iii) Si	(iv) Ne	(v) Ga
6	***2***	***4***	***0 or 8***	***3***

D. Arrange the following groups of atoms or ions according to the indicated criterion:

Increasing ionic radius: ***N < Sb < Bi***

Decreasing first ionization energy: *Xe > Sn > Rb*

Decreasing Electron Affinity: ***Sr < Si < S***

Increasing # of Valence Electrons: ***Na < In < N***