CHM151 Quiz 7a 25 Pts Spring 2010 Name: Key

Formulas: $e = mc^2$ $E = h\nu$ $c = \lambda\nu$ $\Delta E = -R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$ $R_H = 2.178 \times 10^{-18}$

SHOW ALL WORK TO RECEIVE CREDIT

1.(5) What is the energy of a photon of electromagnetic radiation with a frequency of 3.51×10^{14} Hz? ($c = 3.00 \times 10^8$ m/s, $h = 6.63 \times 10^{-34}$ J · s)

$E = h\nu = (6.63 \times 10^{-34}\ J \cdot s)(3.51 \times 10^{14}\ s^{-1})$

2.327×10^{-19} J

2.(3) Which of the following electron configurations represents an excited state of the indicated atom?

A) He: $1s^2$
B) Ne: $1s^2\ 2s^2\ 2p^6$
C) Na: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2\ 4s^1$
D) P: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2\ 4s^1$
E) N: $1s^2\ 2s^2\ 2p^3$

3.(5) What is the wavelength in **nm** of a photon having a frequency of 26.8 THz? ($n = 10^{-9}$. 1 THz = 10^{15} Hz, $c = 3.00 \times 10^8$ m/s, $h = 6.63 \times 10^{-34}$ J · s)

$c = \lambda\nu$

$\lambda = c/\nu = \frac{3.00 \times 10^8\ m \cdot s}{s \cdot 26.8 \times 10^{15}} \cdot \frac{n}{10^{-9}} = 11.2$ nm

4. (12 Pts) Write out the **complete** (i.e. start with $1s^2$ ground state electron configuration for each of the following.

a. Se: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^4$ @ $5s^1\ 4d^4$

b. Nb: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^3$

c. Fe^{2+}: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6$ (Lost the $4s^2$ electrons)

CHM151 Quiz 7B 25 Pts Spring 2010 Name: Key

Formulas: $e = mc^2$ $E = h\nu$ $c = \lambda\nu$ $\Delta E = -R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$ $R_H = 2.178 \times 10^{-18}$

SHOW ALL WORK TO RECEIVE CREDIT

1.(3) Which of the following electron configurations represents an excited state of the indicated atom?

A) He: $1s^2$
B) Ne: $1s^2\ 2s^2\ 2p^6$
C) Na: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2\ 4s^1$
D) P: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2\ 4s^1$
E) N: $1s^2\ 2s^2\ 2p^3$

2.(5) What is the wavelength in nm of a photon having a frequency of 20.1 THz? ($n = 10^{-9}$. 1 THz = 10^{15} Hz, $c = 3.00 \times 10^8$ m/s, $h = 6.63 \times 10^{-34}$ J · s)

$c = \lambda\nu$

$\lambda = \frac{c}{\nu} = \frac{3.00 \times 10^8\ m/s}{20.1 \times 10^{15}\ /s} \cdot \frac{n}{10^{-9}} = 14.9\ nm$

3.(5) What is the energy of a photon of electromagnetic radiation with a frequency of 4.64×10^{14} Hz? ($c = 3.00 \times 10^8$ m/s, $h = 6.63 \times 10^{-34}$ J · s)

$E = h\nu = 6.63 \times 10^{-34}\ J \cdot s \cdot 4.64 \times 10^{14}\ /s = 3.08 \times 10^{-19}\ J$

4. (12 Pts) Write out the **complete** (i.e. start with $1s^2$ ground state electron configuration for each of the following.

a. As: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^3$

b. Zr: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^2$

c. Co^{2+}: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^7$

↑ Lost the $4s^2$ electrons