Name: KEY Period:____

# Chapter 10 – Electron Configuaration Worksheet

1. A very bright line in the bright-line spectrum of sodium has a wavelength of 5.90E-7 m. What is the frequency of this line?

$3.00 \times 10^8$ m/s = 5.90 E-7 m · ν

$\nu = 5.085 \times 10^{14}$ 1/s

Equations:
$c = \lambda\nu$
$E = h\nu$
c = 3.00 E 8 m/s
h=6.626 E-34 J*s

2. When an electron in an atom falls from the fifth to the second energy level, 4.58 E-19 J of energy are released. What is the frequency of the electromagnetic radiation that is emitted?

4.58 E-19 J = 6.626 E-34 J·s · ν

$\nu = 6.912 \times 10^{14}$ 1/s

3. When an electron in a hydrogen atom falls from the fourth to the first energy level, 2.04 E-18 J of energy are released. What is the frequency of the corresponding electromagnetic radiation? What is its wavelength?

2.04 E-18 J = 6.626 E-34 J·s · ν

$\nu = 3.079 \times 10^{15}$ 1/s

$3.00 \times 10^8$ m/s = $\lambda \cdot 3.079 \times 10^{15}$ 1/s

$\lambda = 9.7$ E-8 m

4. Order the following regions of the electromagnetic spectrum according to energy per photon, from lowest energy to highest: X rays, infrared, ultraviolet, visible red, visible green, ~~microwaves~~.

microwaves < infrared < red < green < ultraviolet < xrays

low energy ⟶ high energy

5. List all the orbitals available for the hydrogen atom when n = 3.

$n^2$ = # of orbitals

∴ 9 orbitals

Name:_____Period:____

6. Write the complete electron configuration and draw the orbital diagram for the following elements:

(a) Arsenic (As)

$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^3$

(b) Krypton (Kr)

$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$

(c) Bromine Ion ($Br^-$) ⟶ gained an electron

$1s^2 2s^2 2p^6 3s^2 3p^5 4s^2 3d^{10} 4p^6$

(d) Calcium ion ($Ca^{2+}$) ⟶ lost two electrons

$1s^2 2s^2 2p^6 3s^2 3p^6$

8. Name the elements that correspond to each of the following electron configurations.

(a) $1s^2 2s^2 2p^1$ Boron

(b) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^3$ Vanadium

(c) $1s^2 2s^2 2p^6 3s^2$ [redacted] Magnesium

9. Write the abbreviated electron configuration for the following elements. YOU DO NOT NEED TO DRAW THEM.

(a) Arsenic (As)

[Ar] $4s^2 3d^{10} 4p^3$

(c) Carbon (C)

[He] $2s^2 2p^2$

(b) Antimony (Sb)

[Kr] $5s^2 4d^{10} 5p^3$

(d) Zinc (Zn)

[Ar] $4s^2 3d^{10}$

10. Where are there anamolies in electron configurations on the periodic table? Why does this happen?

Anamolies occur between the 4s and 3d orbitals because they are very close in energy. Also, occurs in f-block atoms as well.