Review – Sub-Atomic Particles Test Name_____ Hr_____

1. Complete the following table.

Atomic Number	Mass Number	Number of Protons	Number of Neutrons	Number of Electrons	Element Symbol
9	19	9	10	9	F
15	31	15	16	14	P^{+1}
21	45	21	24	21	Sc
45	103	45	58	45	Rh
56	137	56	81	59	~~Ba~~ $^{-3}$
13	27	13	14	13	Al
35	80	35	~~14~~ 45	~~13~~ 35	Br
33	75	33	42	33	As
19	39	19	20	21	K^{-2} ← Given

2. Complete the table.

Sub-Atomic Particle	Symbol	Location	Relative Mass
Proton	p^+	nucleus	1 amu
Neutron	n^0	nucleus	1 amu
Electron	e^-	electron cloud	1/1840 amu

3. Provide the atomic number for Oxygen and list at least three things that you know from this number.

Atomic Number: 8

Information List

1. # of protons
2. # of electrons, if neutral
3. Charge of nucleus
4. Valence electrons

4. Use the symbol, $^{20}_{9}F$, to answer the following. If you do not have enough information to answer any of the following, write NEI (Not Enough Information).

a. Number of Protons: 9
b. Number of Neutrons: 11
c. Number of Electrons: 9
d. Mass Number: 20
e. Average Atomic Mass: NEI
f. Is this an isotope? Yes
g. Name of the element: Fluorine

5. Calculate the energy of a gamma ray photon whose frequency is 5.02×10^{20} Hz. (Planck's Constant = $6.626\times10^{-34}\ J\cdot s$)

$$E_{photon} = h\nu$$
$$= (6.626\times10^{-34}\ J\cdot s)\left(5.02\times10^{20}\ \frac{1}{s}\right)$$
$$= \boxed{3.33\times10^{-13}\ J}$$

6. Complete the following table for the listed elements.

Element	Lewis Dot	Oxidation Number(s)	Electron Configuration a. spdf (no shortcut) b. noble gas shortcut	Electron Diagram Using Box Notation (Ex: ↑↓ / 1s)
a. K 19	K·	+1	a. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$ b. [Ar] $4s^1$	1s ↑↓ 2s ↑↓ 2p ↑↓ ↑↓ ↑↓ 3s ↑↓ 3p ↑↓ ↑↓ ↑ 4s
b. Al 13	·Al·	+3	a. $1s^2 2s^2 2p^6 3s^2 3p^1$ b. [Ne] $3s^2 3p^1$	1s ↑↓ 2s ↑↓ 2p ↑↓ ↑↓ ↑ 3s ↑↓ 3p ↑ — —
c. Br 35	:Br:	−1	a. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$ b. [Ar] $4s^2 3d^{10} 4p^5$	1s ↑↓ 2s ↑↓ 2p ↑↓ ↑↓ ↑↓ 3s ↑↓ 3p ↑↓ ↑↓ ↑↓ 4s ↑↓ 3d ↑↓ ↑↓ ↑↓ ↑↓ ↑ 4p
d. ~~W~~ V 23	·V·	+2	a. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^3$ b. [Ar] $4s^2 3d^3$	1s ↑↓ 2s ↑↓ 2p ↑↓ ↑↓ ↑↓ 3s ↑↓ 3p ↑↓ ↑↓ ↑↓ 4s ↑ ↑ ↑ — —

Spacing

7. Name the +1 ion whose electron configuration is: $1s^2 2s^2 2p^6 3s^2 3p^6$ → lost e^- K^{+1}

8. Name the +2 ion whose electron configuration is: $1s^2 2s^2 2p^6 3s^2 3p^6$ → lost $2e^-$ Ca^{+2}

~~9. Name the +3 ion whose electron configuration is: $1s^2 2s^2 2p^6 3s^2 3p^6$~~ $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^1$

9. ~~10.~~ Name the -1 ion whose electron configuration is: $1s^2 2s^2 2p^6 3s^2 3p^6$ → gain e^- Cl^{-1}

10. ~~11.~~ Determine the electron configuration for F^{-1} → gain $1e^-$ $1s^2 2s^2 2p^6$ (Ne)

11. ~~12.~~ Determine the electron configuration for Si^{-4} → gain $4e^-$ $1s^2 2s^2 2p^6 3s^2 3p^6$ (Ar)

12. ~~13.~~ Determine the electron configuration for Si^{+4} → lose $4e^-$ $1s^2 2s^2 2p^6$ (Ne)

13. ~~14.~~ An element occurs in nature as a mixture of two isotopes. One isotope has 17 protons and 18 neutrons. The other isotope has 17 protons and 20 neutrons.

17 + 18 = 35 17 + 20 = 37

a. What is the element? Chlorine

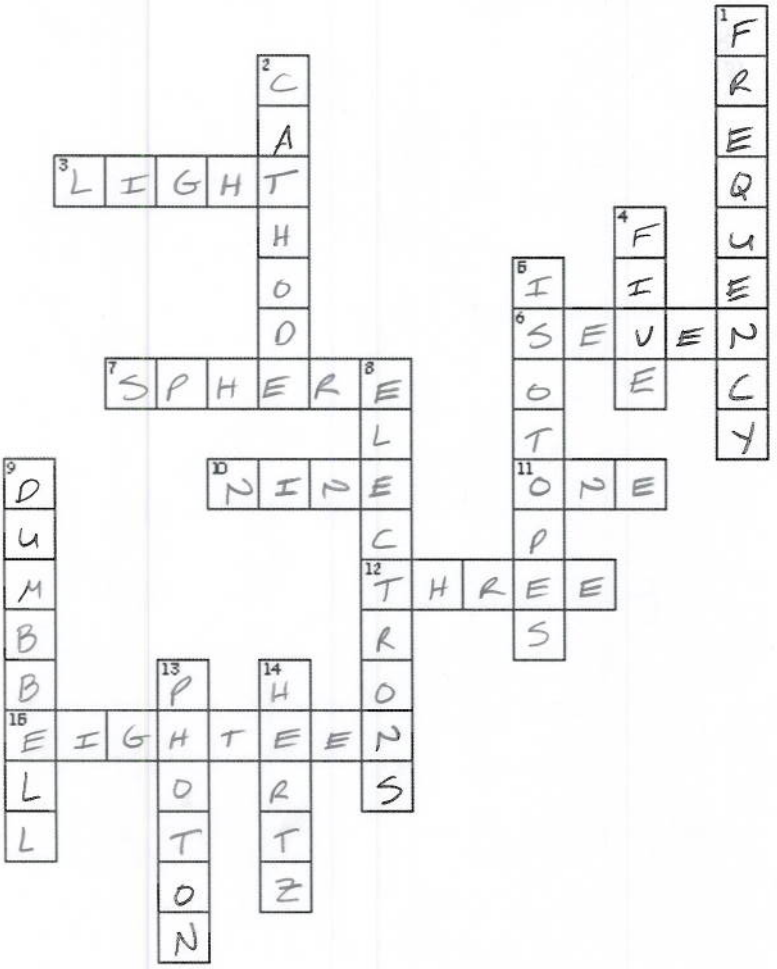
b. If the isotopes account for 75.77% and 24.23% of the mass respectively, calculate the average atomic mass.

.7577 × 35 = 26.5195

.2423 × 37 = + 8.9651

35.4846 → 35.48 amu

Review - Sub-Atomic Particles Test



Across
3. this is given off when an excited electron returns to its ground state energy level
6. the number of orbitals in the f sub-level
7. the shape of all s-orbitals
10. the total number of orbitals in the third energy level
11. the number of orbitals in the s sub-level
12. the number of orbitals in the p sub-level
15. the maximum number of electrons in the third energy level

Down
1. this measures the number of waves per second
2. these type of rays are streams of electrons
4. the number of orbitals in the d sub-level
5. atoms of the same element that differ in the number of neutrons
8. these sub-atomic particles have characteristics of both WAVES and PARTICLES
9. the shape of all p-orbitals
13. a bundle of electromagnetic energy (or light)
14. the SI unit for frequency