

Name: Key

Block: _____

Date: _____

Chemistry 11

Introduction to Atomic Theory

Assignment

1. Fill in the following chart to describe subatomic particles in an atom:

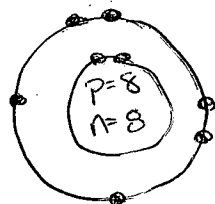
Subatomic Particle	Electric Charge	Location in the atom	Relative Mass
proton	+	nucleus	1
neutron	neutral	nucleus	slightly more than 1
electron	-	outside nucleus	almost nothing

2. Complete the following table:

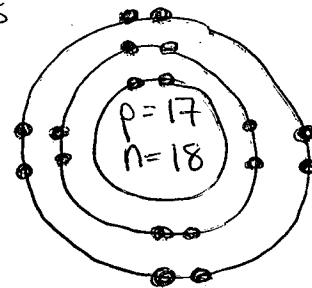
PARTICLE	ATOMIC NUMBER	MASS NUMBER	NUMBER OF PROTONS	NUMBER OF NEUTRONS	NUMBER OF ELECTRONS
$^{52}_{24}\text{Cr}$	24	52	24	28	24
$^{222}_{86}\text{Rn}$	86	222	86	136	86
$^{70}_{31}\text{Ga}$	31	70	31	39	31
$^{27}_{13}\text{Al}$	13	27	13	14	13
$^{197}_{79}\text{Au}^{3+}$	79	197	79	118	76
$^{75}_{33}\text{As}^{3-}$	33	75	33	42	36
$^{209}_{83}\text{Bi}^{5+}$	83	209	83	126	78
$X^{2-} = ^{127}_{52}\text{Te}^{2-}$	52	127	52	75	54
$X^{3+} = ^{103}_{45}\text{Rh}^{3+}$	45	103	45	58	42
$X^{3-} = ^{75}_{33}\text{As}^{3-}$	33	75	33	42	36

3. Draw Bohr diagrams for the following atoms or ions:

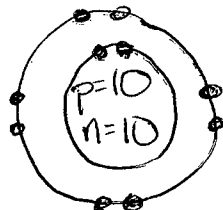
a. O - 16 e = 8



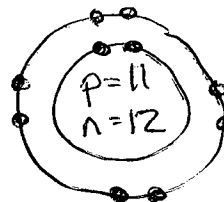
b. Cl⁻ - 35 e = 18



c. Ne - 20 e = 10



d. Na⁺ - 23 e = 10



4. Write the chemical symbol for:

a. An ion with 12 protons, 10 electrons and 12 neutrons.



b. An ion with 95 protons, 89 electrons and 148 neutrons.



c. An ion with 33 protons, 42 neutrons and 36 electrons.



5. The following mixtures of isotopes are found in nature. Calculate the expected molar mass of a sample of each mixture: (report to 2 decimal places)

a. ${}^{10}\text{B} = 18.8\%$, ${}^{11}\text{B} = 81.2\%$

$$0.188 \times 10 = 1.88$$

$$0.812 \times 11 = 8.932$$

$$\boxed{10.81 \text{ g/mol}}$$

b. ${}^{70}\text{Ge} = 20.5\%$, ${}^{72}\text{Ge} = 27.4\%$, ${}^{73}\text{Ge} = 7.8\%$, ${}^{74}\text{Ge} = 36.5\%$, ${}^{76}\text{Ge} = 7.8\%$

$$0.205 \times 70 = 14.35$$

$$0.274 \times 72 = 19.728$$

$$0.078 \times 73 = 5.694$$

$$0.365 \times 74 = 27.01$$

$$0.078 \times 76 = 5.928$$

$$\text{Total} = \boxed{72.71 \text{ g/mol}}$$

c. ${}^{64}\text{Zn} = 48.9\%$, ${}^{66}\text{Zn} = 27.8\%$, ${}^{67}\text{Zn} = 4.1\%$, ${}^{68}\text{Zn} = 18.6\%$, ${}^{70}\text{Zn} = 0.6\%$

$$0.489 \times 64 = 31.296$$

$$0.278 \times 66 = 18.348$$

$$0.041 \times 67 = 2.747$$

$$0.186 \times 68 = 12.648$$

$$0.006 \times 70 = 0.42$$

$$\text{Total} = \boxed{65.46 \text{ g/mol}}$$

6. Natural sources of carbon contain 98.90% C-12 (mass = 12.000000 g/mol) and 1.10% C-13 (mass = 13.003355 g/mol). What is the molar mass of the mixture of carbon isotopes, expressed to 3 decimal places?

$$0.9890 \times 12.000000 = 11.868$$

$$0.0110 \times 13.003355 = 0.143$$

$$\boxed{12.011 \text{ g/mol}}$$

7. Use one word or phrase to summarize the contributions of each of the scientists in the chart below:

Early Greeks	elements (but the wrong ones)	James Chadwick	neutron
Ernest Rutherford	Nucleus	J.J. Thompson	electron
Niels Bohr	electrons in orbits	Henry Moseley	proton
Medieval chemists	corpuscles	John Dalton	Atom