

Name: Key

Block: \_\_\_\_\_

Date: \_\_\_\_\_

Chemistry 11

**Introduction to Atomic Theory**  
(23 marks)

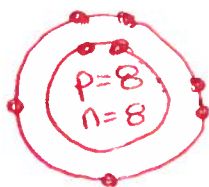
Assignment

1. Complete the following table: (10 marks)

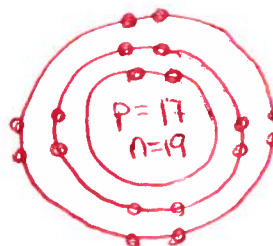
PARTICLE	ATOMIC NUMBER	MASS NUMBER	NUMBER OF PROTONS	NUMBER OF NEUTRONS	NUMBER OF ELECTRONS
$^{52}_{24}\text{Cr}$	24	52	24	28	24
$^{222}_{86}\text{Rn}$	86	222	86	136	86
$^{70}_{31}\text{Ga}$	31	70	31	39	31
$^{27}_{13}\text{Al}$	13	27	13	14	13
$^{197}_{79}\text{Au}^{3+}$	79	197	79	118	76
$^{75}_{33}\text{As}^{3-}$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

2. Draw Bohr diagrams for the following atoms or ions: (4 marks)

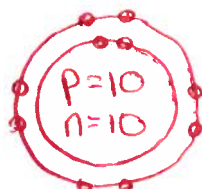
a. O - 16  $e=8$



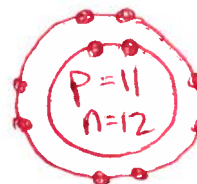
b.  $\text{Cl}^-$  - 35  $e=18$



c. Ne - 20  $e=10$



d.  $\text{Na}^+$  - 23  $e=10$



3. Write the chemical symbol for: (3 marks)

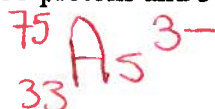
a. An ion with 12 protons and 10 electrons.



b. An ion with 95 protons and 89 electrons.



c. An ion with 33 protons and 36 electrons.



4. The following mixtures of isotopes are found in nature. Calculate the expected molar mass of a sample of each mixture: (3 marks)

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

$$0.489 \times 64 = 31.296$$

$$0.278 \times 66 = 18.348$$

$$0.041 \times 67 = 2.747$$

$$0.186 \times 68 = 12.648$$

$$0.006 \times 70 = 0.42$$

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

5. 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? (3 marks)

$$0.9890 \times 12.000000 = 11.868$$

$$0.0110 \times 13.003355 = 0.143$$

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