Year 13 Chemistry Worksheet 5

Day 1

Q1 The element Lithium (Atomic number = 3) has two isotopes with mass numbers of 6 and 7. Which of the following statements about its nucleus composition is **correct** ?

A. ^{7}Li nucleus has 3 electrons
B. ^{6}Li nucleus has 3 electrons
C. ^{6}Li nucleus has 4 protons
D. ^{7}Li nucleus has 4 neutrons

Q2 The radii of two atoms and an ion are given in the table below.

	Radius (picometres)
sodium atom	154
chlorine atom	99
chloride ion	181

Based on the above information, explain why :

(i) the sodium atom is larger than the chlorine atom. **(1 mark)**

(ii) the chloride ion is larger than the chlorine atom. **(1 mark)**

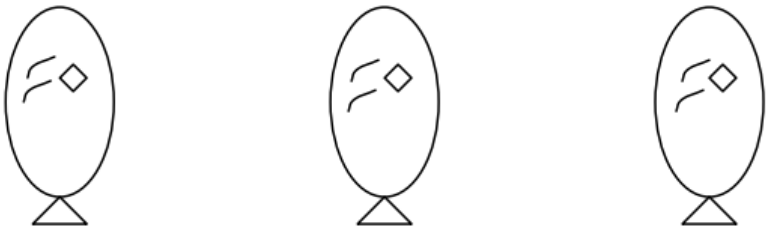
Q3 State a difference between a **sigma bond** and a **pi bond**. **(1 mark)**

Day 2

Q1 Which electronic configuration listed below is **not** possible ?

A. $1s^2\ 2s^2\ 2p^6\ 3s^1$
B. $1s^2\ 2s^2\ 3s^2\ 3p^1$
C. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^1$
D. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2$

Q2 Three identical balloons were each filled with the same volume of one of the following gases : carbon dioxide, oxygen and ammonia.



CO_2 O_2 NH_3

These balloons were then kept at constant temperature and pressure. When the volumes were compared after a day, all the balloons had decreased in size. The balloon containing CO_2 had decreased the least, while NH_3 decreased the most.

[M (NH_3) = 17 g mol^-; M (O_2) = 32 g mol^-; M (CO_2) = 44 g mol^-]

Account for these observations. **(1**

Q3 A 24 litre container holds a mixture of hydrogen and oxygen gas at 25° C. There is 0.5 g of hydrogen gas and 16 g of oxygen gas in the mixture.

(i) Calculate the amount (moles) of :

I. hydrogen
II. oxygen **(1 mark)**

(ii) Calculate the total pressure of the mixture.

[A_r : H = 1, O = 16; R = 8.31 J mol^- K^-] **(1 mark)**

Day 3

Q1 The first five ionisation energies in **kJ mol$^-$** of an element, X, are :

509, 969, 3 430, 4 700 and 6 000

The formula of the fluoride of X is

A. XF
B. XF_2
C. X_2F
D. XF_4

Q2 What causes gas pressure ? **(1 mark)**

Q3 Account for the strong magnetic property of iron. **(½ mark)**

Day 4

Q1 Using the Electron Pair Repulsion Theory, the probable shape of the compound difluoroxide, F_2O, is

A. bent.
B. linear.
C. trigonal planar.
D. trigonal pyramid.

Q2 The following questions are based on the unbalanced equation given below.

$$H_2C_2O_{4(aq)} + MnO_{4(aq)}^{-} \rightarrow CO_{2(g)} + Mn^{2+}{}_{(aq)}$$

(a) Write the balanced oxidation half equation. **(1 mark)**

(b) Write the balanced reduction half equation. **(1 mark)**

(c) Write the overall balanced redox equation. **(1 mark)**

Q3 Indicate the type of intermolecular forces that will be prominent in each of the substances given below.

HCl,	CH_3COOH,	CCl_4,	Br_2

(2 marks)

Day 5

Q1 Using the Electron Pair Repulsion Theory, the probable shape of the compound difluoroxide, F_2O, is

A. bent.
B. linear.
C. trigonal planar.
D. trigonal pyramid.

Q2 A sample of air at 18° C and 100.1 kPa occupies 30 mL. Calculate the volume it would occupy at S.T.P. **(2 marks)**

Q3 Identify the **two** conditions in which a real gas approaches an ideal gas behaviour. **(1 mark)**