

S.5 CHEMISTRY REVISION QUESTIONS

Paper 2

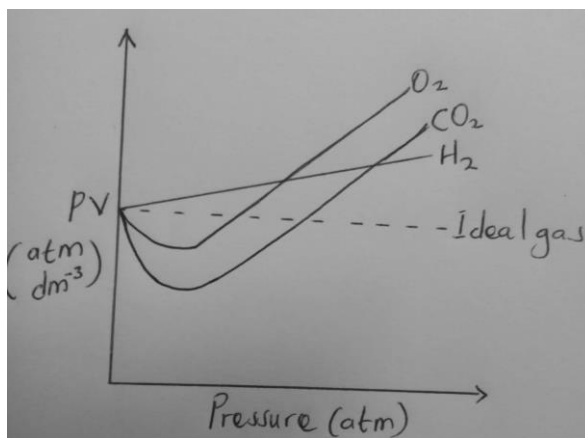
1. (a) State what is meant by the term an ideal gas and state its properties.

(b) Explain how liquefaction of a gas can be affected by;

(i) Pressure

(ii) Temperature.

(c) The curves below show deviations of some gases from ideal



behavior.

(i) State why hydrogen shows a small deviation from ideal behavior compared to the other gases

(ii) Compare the deviations of oxygen and carbon dioxide from ideal behavior

(d) A gas Q contains 30.43% nitrogen and the rest being oxygen 0.23g of Q occupied 154.11cm^3 at 150°C and 840mmHg . Determine the;

(i) Empirical formula of Q

(ii) Molecular formula of Q

[1 mole of a gas occupies 24dm^3 at a temperature of 25°C and pressure of 760mmHg]

2. (a) Define the following terms

- (i) Empirical formula
 - (ii) Molecular formula
- (b)
- (i) 20 cm^3 of a hydrocarbon C_xH_y needs 70 cm^3 of oxygen for complete combustion. 40 cm^3 of carbon dioxide is produced as well as 60 cm^3 of steam. Calculate the molecular formula of the hydrocarbon.
 - (ii) 20 cm^3 of a hydrocarbon C_xH_y was mixed with 80 cm^3 of oxygen in excess in a graduated tube. The resultant gases occupied 60 cm^3 after cooling, addition of sodium hydroxide solution reduced the value to 40 cm^3 . Calculate the molecular formula of the hydrocarbon.
 - (iii) 10 cm^3 of an unknown hydrocarbon was sparked with 90 cm^3 of oxygen. When the resulting gases were cooled back to the original temperature, they had a volume of 70 cm^3 . Exposure of the gases to sodium hydroxide reduced the volume to 40 cm^3 . Find the formula of the hydrocarbon.
 - (iv) 20 cm^3 of an unknown hydrocarbon required 120 cm^3 of oxygen for complete combustion. 80 cm^3 of carbon dioxide was produced. All volumes were measured at room temperature and pressure. Find the formula of the hydrocarbon.
 - (v) 10 cm^3 of a hydrocarbon, C_aH_b , are exploded with excess oxygen. A contraction of 35 cm^3 occurs. On treatment of the product with sodium hydroxide solution, a contraction in volume of 40 cm^3 occurs. Deduce the formula of the hydrocarbon.
 - (vi) 25 cm^3 of a mixture of methane and ethane were completely oxidized by 72.5 cm^3 of oxygen, measured at the same temperature and pressure. What is the composition of the mixture?
 - (vii) 10 cm^3 of a hydrocarbon, C_4H_8 were exploded with an excess of oxygen. On cooling to room temperature, a contraction in volume of $a \text{ cm}^3$ occurs. On treatment with sodium hydroxide solution a further contraction of $b \text{ cm}^3$ occurs. Find the values of a and b .

(viii) 10 cm^3 of a hydrocarbon, C_aH_b were exploded with excess of oxygen. On cooling to room temperature, a contraction of 25 cm^3 occurs. On adding sodium hydroxide solution, a further contraction of 40 cm^3 occurs. Deduce the formula of the hydrocarbon.

(c) (i) What is meant by structural isomerism.

(ii) Describe three types of structural isomerism giving a suitable example in each case.

(d) A compound has the formula $C_3H_6Cl_2$. Write down the three possible structures for the compound.

3. (a) Define the following terms:

(i) ionization energy

(ii) electron affinity

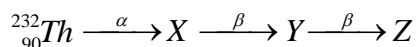
b) The first ionization energy and first electron affinities of group VII elements are given in the table below:

Element	1 st ionization energy (kJ/mol)	1 st electron affinity (kJ/mol)
Fluorine	1681	-328
Chlorine	1250	-349
Bromine	1139	-325
Iodine	1007	-295

(i) State and explain the trend in first ionization energy down the group.

(ii) State and explain the trend in first electron affinity down the group.

- (iii) Explain why the first electron affinity is negative sign while the second electron affinity is positive.
4. (a) Explain what is meant by the term relative atomic mass
- (b) Explain how relative atomic mass of an element can be determined by mass spectrometer. (No diagram is required)
- (c) The mass spectrum of an element, R, contained 4 lines at mass/charge of 54, 55, 56 and 58 with relative intensities of 5.84, 91.68, 2.17 and 0.31 respectively.
- (i) Explain why the mass spectrum of R exhibits 4 lines
- (ii) Calculate the relative atomic mass of R
- (d) Thorium decays according to the following equations



Determine the mass number and atomic number of X, Y and Z (03 marks)

- a) Aluminium has similar properties to those of Beryllium.
- (i) State the relationship that exists between aluminium and Beryllium
- (ii) State three properties in which aluminum resembles Beryllium
- (iii) List two reason why aluminum and Beryllium have similar chemical properties
5. Potassium manganate(VII) is not used as a primary standard in volumetric analysis and has to be standardized.
- (a) (i) What is meant by the term by the term primary standard?
- (ii) State three characteristics of a primary standard.
- (iii) Explain how potassium manganate(VII) is not used as a primary standard.
6. (a) Define the following terms
- (i) Electron affinity
- (ii) Electronegativity
- (iii) First ionization energy
- (iv) Electroposivity

(v) Atomic radius.

(c) State the factors and explain that affect the magnitude of each of the terms in (a) above.

(d) Explain how each of the terms varies;

(i) Across the period.

(ii) Down the group.

END