1.   Calculate the no. of atoms present in 11.5 litres of H_2 at N.T.P.

2.   Calculate the no. of moles of 5.68 gm. of iron.

3.   What is the effect of temp. on molality and molarity?

4.   An atom of an element is 10.1 times heavier than the mass of a carbon atom. What is its mass in a.m.u.?

5.   Differentiate between molarity and molality.

6.   1.82 g. of glucose (molar mass-180) is dissolved in 25g of water. Calculate (a) the molality (b) mole fraction of glucose and water.

7.   The molecular mass of an organic compound is 90 and its %age composition is C-26.6%; O=71.1% and H=2.2%. Determine the molecular formula of the compound.

8.   Commercially available sulphuric acid contains 91% acid by mass and has a density of 1.83g mL^{-1} (i) Calculate the molarity of the solution (ii) volume of concentrated acid required to prepare 3.5L of 0.50 M H_2SO_4

9.   What are empirical and molecular formulae? How are they related to each other?

10.   Differentiate between normality and molarity?

11.   Why molality is preferred over molarity in expressing the concentration of a solution?

12.   From the following nuclei select the isotopes and isobars.

$^{238}_{92}$ U, $^{234}_{90}$Th, $^{234}_{92}$ U, $^{23}_{91}{}^{4}$P a, $^{238}_{93}$N p

13.   Discuss drawbacks of Rutherford's Model

14.   An organic compound has the percentage composition: C = 26.09%, H = 4.35% and O = 69.5%. Find the empirical formula of compound.

15.   A crystalline hydrated salt on being rendered anhydrous, loses 45.6% of its weight. The percentage composition of anhydrous salt is : Al = 10.5%, K = 15.1%, S = 24.8% and O = 49.6%. Find the empirical formula of the anhydrous and crystalline salts

16.   A monobasic acid, containing nitrogen, hydrogen and oxygen only, gave the percentage composition by weight as: N = 22.22%, H = 1.59%. Determine the molecular formula of the acid

17.   2 One gram of a hydrated copper sulphate gave, on heating 0.6393 g of anhydrous salt. Calculate the number of molecules of water of crystallization per molecule of the hydrated salt. [Cu = 63.5, S = 32]

18.   How much potassium chlorate must be heated to get as much oxygen as would be obtained from 21.6 g of mercuric oxide?

19.   1 12.46 g of a mixture of MgO and MgCO3 on strong heating lost 4.4 g in weight. What is the composition of mixture

20.   5 A mixture of cuprous oxide (Cu O) 2 and cupric oxide (CuO) was found to contain 88% copper. Calculate the amount of each oxide in 2 g sample of the mixture.

21.   Take the reaction: $NH_3 + O_2 \rightarrow NO + H_2O$. In an experiment, 3.25 g of NH_3 are allowed to react with 3.50 g of O_2

a. Which reactant is the limiting reagent?

b. How many grams of NO are formed?

c. How much of the excess reactant remains after the reaction?

22.   If 4.95 g of ethylene (C_2H_4) are combusted with 3.25 g of oxygen

a. What is the limiting reagent?

b. How many grams of CO_2 are formed?

23.   Consider the reaction of $C_6H_6 + Br_2 \rightarrow C_6H_5Br + HBr$

a. What is the theoretical yield of C_6H_5Br if 42.1 g of C_6H_6 react with 73.0 g of Br_2?

b. If the actual yield of C_6H_5Br is 63.6 g, what is the percent yield?

24.   Use the following reaction: $C_4H_9OH + NaBr + H_2SO_4 \rightarrow C_4H_9Br + NaHSO_4 + H_2O$ If 15.0 g of C_4H_9OH react with 22.4 g of NaBr and 32.7 g of H_2SO_4 to yield 17.1 g of C_4H_9Br, what is the percent yield of this reaction?

25.   Silicon nitride (Si_3N_4) is made by a combining Si and nitrogen gas (N_2) at a high temperature. How much (in g) Si is needed to react with an excess of nitrogen gas to prepare 125 g of silicon nitride if the percent yield of the reaction is 95.0%?

26.   A reaction container holds 5.77 g of P_4 and 5.77 g of O_2.The following reaction occurs: $P_4 + O_2 \rightarrow P_4O_6$. If enough oxygen is available then the P_4O_6 reacts further: $P_4O_6 + O_2 \rightarrow P_4O_{10}$.

a. What is the limiting reagent for the formation of P_4O_{10}?

b. What mass of P_4O_{10} is produced?