(i) $MCl_5(s) + Na_2S(s) \rightarrow MS_n(s) + S(l) + NaCl(s)$

(ii) $MS_n(s) + O_2(g) \rightarrow MO_3(s) + SO_2(g)$

(iii) $SO_2(g) + Fe^{3+}(aq) \rightarrow Fe^{2+}(aq) + SO_4^{2-}(aq)$

(iv) $Ba^{2+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s)$

Assume that you begin with 4.55 g of MCl_5 and that reaction (i) proceeds with 90% yield. After oxidation of MS_n produced, oxidation of SO_2, and precipitation of SO_4^{2-} ions, 6.99 g of $BaSO_4$ is obtained. (Ba = 137)

28. How many moles of sulphur are present in the MS_n sample?

(a) 0.01
(b) 0.02
(c) 0.03
(d) 0.04

29. Which of the following may be a permissible value of n?

(a) 1
(b) 2
(c) 4
(d) 6

30. If the value of n is 2, then the atomic weight of metal, M, is

(a) 95.5
(b) 232.5
(c) 125.8
(d) 187.6

Comprehension XI

Sixty millilitres of a mixture of equal volumes of chlorine and an oxide of chlorine were heated and then cooled back to the original temperature. The resulting gas mixture was found to have volume of 75 ml. On treatment of caustic soda solution, the volume contracted to 15 ml. Assuming that all measurements were made at the same temperature and pressure. The oxide of chlorine on heating decomposes quantitatively into oxygen and chlorine.

31. What is the volume of chlorine in the original mixture?

(a) 15 ml
(b) 30 ml
(c) 45 ml
(d) 40 ml

32. What is the simplest formula of the oxide of chlorine?

(a) ClO_2
(b) Cl_2O
(c) Cl_2O_3
(d) Cl_2O_5

33. The gas finally present is

(a) O_2
(b) Cl_2O
(c) Cl_2
(d) Cl_2O_5