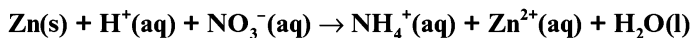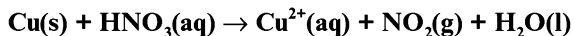## Comprehension VIII

A quantity of 1.5 g of brass containing Cu and Zn reacts with 3 M-HNO_3 solution, the following reactions (unbalanced) take place:

$$Cu(s) + HNO_3(aq) \rightarrow Cu^{2+}(aq) + NO_2(g) + H_2O(l)$$

$$Zn(s) + H^+(aq) + NO_3^-(aq) \rightarrow NH_4^+(aq) + Zn^{2+}(aq) + H_2O(l)$$

The liberated $NO_2(g)$ was found to be 1.04 l at 25°C and 1 atm.

22. What is the percentage of copper in brass?
(a) 80%   (b) 90%
(c) 85%   (d) 10%

23. How many millilitres of 3 M-HNO_3 will be required for complete reaction with brass?
(a) 9.56 ml   (b) 14.34 ml
(c) 6.37 ml   (d) 19.12 ml

24. How many grams of ammonium nitrate will be formed in the reaction?
(a) 0.046 g
(b) 0.183 g
(c) 0.092 g
(d) 0.55 g

Comprehension IX

Crude calcium carbide is made in an electric furnace by the reaction:

$$CaO + 3C \rightarrow CaC_2 + CO\uparrow$$
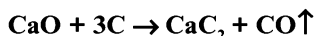
The product contains 80% CaC_2 and 20% unreacted CaO.

25. How much CaO is to be added to the furnace charge for each 1280 kg of pure CaC_2 produced?
(a) 1120 kg   (b) 1440 kg
(c) 1152 kg   (d) 1344 kg

26. How much CaO is to be added to the furnace charge for each 1280 kg of crude product?
(a) 1120 kg   (b) 1440 kg
(c) 1152 kg   (d) 1344 kg

27. What will be the volume of CO gas evolved, measured at 0°C and 1 atm, when 1280 kg of crude product is formed?
(a) 448 m^3
(b) 358.4 m^3
(c) 537.6 m^3
(d) 89.6 m^3

Comprehension X

A certain metal sulphide, MS_n (where n is a small integer), is widely used as a high temperature lubricant. The substance is prepared by reaction of the metal pentachloride (MCl_5) with sodium sulphide (Na_2S). Heating the metal sulphide to 700°C in air gives the metal trioxide (MO_3) and sulphur dioxide (SO_2), which react with Fe^{3+} ion under aqueous acidic conditions to give sulphate ion. Addition of aqueous $BaCl_2$ then forms a precipitate of $BaSO_4$. The chemical reactions (unbalanced) concerned are