

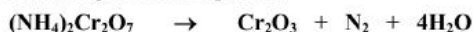
Stoichiometry I

Question 1

- (e) When 19.05 g of copper reacted with nitrogen, 20.45 g of copper nitride were produced.
Deduce the empirical formula of copper nitride.

Question 2

- (b) When crystals of ammonium dichromate $[(\text{NH}_4)_2\text{Cr}_2\text{O}_7]$ are heated strongly, they decompose fully according to the following balanced equation.



When 12.6 g of these crystals were heated strongly, calculate

- (i) how many moles of ammonium dichromate reacted, (6)
(ii) the mass of chromium(III) oxide (Cr_2O_3) formed, (6)
(iii) the volume at s.t.p. of nitrogen gas evolved, (6)
(iv) the number of molecules of water produced. (7)
How many atoms did this quantity of water contain? (7)

Question 3

- (g) Find the empirical formula of a compound containing 40% sulfur and 60% oxygen, by mass.

Question 4

- (h) Potassium iodide (**KI**) is sometimes added to table salt to supplement diets low in iodide ion (**I⁻**). Calculate the daily mass of potassium iodide needed to supply 0.15 mg of iodide ion, the Recommended Daily Amount (RDA) for normal human thyroid function.



Question 5

- (e) When hydrogen gas was passed over 1.59 g of copper oxide, 1.27 g of metallic copper were produced.
Find by calculation the empirical formula of the copper oxide.

Question 6

- (d) How many atoms of iron are there in a 30 g bowl of cornflakes that contains 0.0024 g iron per 30 g serving?

Question 7

- (e) How many iron atoms should be consumed daily to meet the recommended daily intake of iron in the diet of 0.014 g?

Question 8

- (h) A 500 cm³ can of beer contains 21.5 cm³ of ethanol. Calculate its % alcohol, i.e. the concentration of alcohol in the beer as a % (v/v).

Question 9

- (h) When 3.175 g of copper reacts with chlorine gas 6.725 g of copper chloride is formed. Find by calculation the empirical formula of the chloride.

Question 10

- (j) Complete and balance the following equation:



Question 11

- (h) What is the percentage by mass of iron in iron(III) oxide (Fe_2O_3)?

Question 12

- (g) What is the percentage by mass of nitrogen in ammonium nitrate, NH_4NO_3 ?