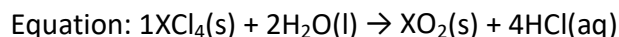


Answer on Question #77577, Chemistry / Physical Chemistry

Question:

A 0.17 g sample of a Group 4 chloride, XCl_4 , reacted with water to produce an oxide, XO_2 , and HCl.



The HCl produced was absorbed in 100 cm^3 of 0.10 mol/dm^3 sodium hydroxide solution (an excess). In a titration, the unreacted sodium hydroxide solution required 30.0 cm^3 of 0.20 mol/dm^3 hydrochloric acid for complete neutralization.

(a) Calculate the amount, in moles, of hydrochloric acid used in the titration to neutralize the unreacted sodium hydroxide solution.

amount = mol

Solution:

Amount of HCl used in the titration: $0.20 \cdot 0.0300 = \mathbf{0.006 \text{ mol}}$

I suppose the full solution should be as follows:

Amount of unreacted NaOH: $\mathbf{0.006 \text{ mol}}$

Starting amount of NaOH: $0.10 \cdot 0.100 = \mathbf{0.01 \text{ mol}}$

Amount of reacted NaOH: $0.01 - 0.006 = \mathbf{0.004 \text{ mol}}$

Amount of produced HCl: $\mathbf{0.004 \text{ mol}}$

Amount of XCl_4 : $0.004 / 4 = \mathbf{0.001 \text{ mol}}$

Molar Weight of XCl_4 : $0.17 / 0.001 = \mathbf{170 \text{ g/mol}}$

Atomic weight of X: $170 - (4 \cdot 35.45) = \mathbf{28.20 \text{ g/mol}}$

X is **Silicon (Si)**

XCl_4 is **SiCl_4**

Answer:

(a) amount = 0.006 mol (also see solution above)