

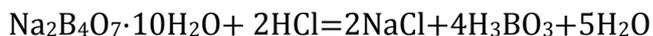
Answer on Question #54174 – Chemistry – General Chemistry

Task:

Calculate the mass of borax (sodium tetraborate decahydrate, $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$) required to give a titre volume of 20.00 mL when reacted with 0.1 M HCl.

Is it necessary to accurately measure the 100 mL of deionised water used to dissolve the borax? Briefly explain.

Answer:



$$v(\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}) = \frac{1}{2} v(\text{HCl})$$

$$v = C_M \cdot V$$

$$v(\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}) = \frac{1}{2} C_M(\text{HCl}) \cdot V(\text{HCl})$$

$$v(\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}) = \frac{1}{2} \cdot 0.02 \cdot 0.1 = 0.001 \text{ mol}$$

$$C_M = \frac{v}{V} \qquad v = \frac{m}{M}$$

$$M(\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}) = 381.2 \text{ g/mol}$$

$$m(\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}) = 0.001 \cdot 381.2 = 0.3812 \text{ g}$$

It is necessary to accurately measure 100 mL of deionized water to dissolve Borax because any shifts in volume will consequently result in shifts of Borax concentration.