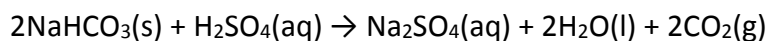


Question #63903, Chemistry / General Chemistry

Some sulfuric acid is spilled on a lab bench. You can neutralize the acid by sprinkling sodium bicarbonate on it and then mopping up the resultant solution. The sodium bicarbonate reacts with sulfuric acid as follows:



Sodium bicarbonate is added until fizzing, which is due to the released carbon dioxide, stops. If 16 mL of 5.5 M sulfuric acid was spilled on the counter, how much NaHCO_3 must be added to the spill to exactly neutralize the acid.

Answer:

According to equation:

$$\begin{aligned}n(\text{NaHCO}_3) &= 2 \times n(\text{H}_2\text{SO}_4) \\n(\text{H}_2\text{SO}_4) &= c(\text{H}_2\text{SO}_4) \times V(\text{H}_2\text{SO}_4) \\n(\text{H}_2\text{SO}_4) &= 5.5 \frac{\text{mol}}{\text{L}} \times 0.016 \text{ L} = 0.088 \text{ mol} \\n(\text{NaHCO}_3) &= 2 \times 0.088 \text{ mol} = 0.176 \text{ mol} \\n(\text{NaHCO}_3) &= \frac{m(\text{NaHCO}_3)}{M(\text{NaHCO}_3)} \\m(\text{NaHCO}_3) &= n(\text{NaHCO}_3) \times M(\text{NaHCO}_3) \\M(\text{NaHCO}_3) &= 84.007 \frac{\text{g}}{\text{mol}} \\m(\text{NaHCO}_3) &= 0.176 \text{ mol} \times 84.007 \frac{\text{g}}{\text{mol}} = \mathbf{14.79 \text{ g}}\end{aligned}$$