

Answer on Question #66416 - Chemistry -General Chemistry

How many grams of HNO_3 will be produced if we produce 6.39 grams of Ag_2SO_4 in the reaction
 $2 \text{AgNO}_3 + \text{H}_2\text{SO}_4 \rightarrow 2 \text{HNO}_3 + \text{Ag}_2\text{SO}_4$

Solution:

$$M(\text{Ag}_2\text{SO}_4) = 2 \cdot \text{Ar}(\text{Ag}) + \text{Ar}(\text{S}) + 4 \cdot \text{Ar}(\text{O}) = 2 \cdot 108 + 32 + 4 \cdot 16 = 312 \text{ g/mol}$$

$$n(\text{Ag}_2\text{SO}_4) = \frac{m(\text{Ag}_2\text{SO}_4)}{M(\text{Ag}_2\text{SO}_4)} = \frac{6.39}{312} = 0.02 \text{ mol}$$

$$n(\text{HNO}_3) : n(\text{Ag}_2\text{SO}_4) = 2 : 1$$

$$n(\text{HNO}_3) = 2 \cdot n(\text{Ag}_2\text{SO}_4) = 2 \cdot 0.02 = 0.04 \text{ mol}$$

$$M(\text{HNO}_3) = \text{Ar}(\text{H}) + \text{Ar}(\text{N}) + 3 \cdot \text{Ar}(\text{O}) = 1 + 14 + 3 \cdot 16 = 63 \text{ g/mol}$$

$$m(\text{HNO}_3) = n(\text{HNO}_3) \cdot M(\text{HNO}_3) = 0.04 \cdot 63 = 2.52 \text{ g}$$

Answer:

2.52 grams.