Answer on Question #83191 – Chemistry – Other

Question:

In an experiment, 5.575 g of iron metal reacts with 3.107 g of yellow sulfur. Using the conservation of mass law, predict the mass of product.

$$Fe_{(s)} + S_{(s)} \rightarrow FeS_{(s)}$$

Solution:

First, let's find how much of each reactant are there. Atomic weight of iron is 55.845 (g per mole), hence amount of iron in moles is

$$\frac{5.575}{55.845} = 0.09983.$$

Atomic weight of sulfur is 32.06, hence amount of sulfur in moles is

$$\frac{3.107}{32.06} = 0.096912.$$

One atom of iron reacts with one atom of sulfur, i.e. proportion of reactants must be 1:1, equal. Therefore, iron is in excess and only 0.096912 mole of iron reacted.

Conservation of mass law states that total mass of reactants doesn't change, therefore the mass of product FeS must equal to mass of reacted iron and sulfur:

$$0.096912 \times 55.845 + 0.096912 \times 32.06 = 85.19.$$

Answer:

The mass of product will be 85.19 g.

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