Answer on Question #40489, Chemistry, Other

Task:

What is the maximum mass of S_8 that can be produced by combining 84.0 g of each reactant?

$8SO_2+16H_2S=3S_8+16H_2O$

Answer:

$$v=\frac{m}{M}$$

where m-mass, grams;

M-molar mass, gram/mol.

$M(SO_2)=64.1\,g/mol$ $M(H_2S)=34.1\,g/mol$

$$v(SO_2)=\frac{84.0}{64.1}=1.31 \text{ moles}$$

$$v(H_2S)=\frac{84.0}{34.1}=2.46 \text{ moles}$$

Let's calculate the amount of S_8, that can be produced from 84.0 grams of each reactant:

$$v(S_8)=\frac{v(SO_2)}{8}\cdot 3=\frac{1.31}{8}\cdot 3=0.49 \text{ moles}$$

$$v(S_8)=\frac{v(H_2S)}{16}\cdot 3=\frac{2.46}{16}\cdot 3=0.46 \text{ moles}$$

As we can see from the previous calculations, the amount of H_2S is the determining factor.

There will be an excess amount of SO_2. That is why:

$m(S_8)=v(S_8)\cdot M(S_8)$

$M(S_8)=256.5\ g/mol$

That is why the maximum mass of S_8, that can be produced is equal to:

$m(S_8)=0.46\cdot 256.5=118\,g$