Answer on Question #47826, Chemistry, Other

Task:

What is the maximum mass of S_8 that can be produced by combining 75.0 g of each reactant?

Answer:

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

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

where m-mass, grams;

M-molar mass, gram/mol.

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

$$\nu(SO_2)=\frac{75.0}{64.1}=1.17 \text{ moles}$$

$$\nu(H_2S)=\frac{75.0}{34.1}=2.2 \text{ moles}$$

Let's calculate the amount of S_8, that can be produced from 75.0 grams of each reactant:

$$\nu(S_8)=\frac{\nu(SO_2)}{8}\cdot 3=\frac{1.17}{8}\cdot 3=0.44 \text{ moles}$$

$$\nu(S_8)=\frac{\nu(H_2S)}{16}\cdot 3=\frac{2.2}{16}\cdot 3=0.41 \text{ moles}$$

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:

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

$M(S_8)=256.5$ g/mol

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

$m(S_8)=0.41\cdot 256.5=105 g$