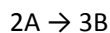


Answer on Question #40478 - Chemistry - Other

Question

In a chemical reaction, exactly 2 mol of substance A react to produce exactly 3 mol of substance B



How many molecules of substance B are produced when 29.2 g of substance A reacts?

The molar mass of substance A is 26.6 g/mol.

Step 1: Convert the mass of A to moles.

Step 2: Convert the number of moles of A to the number of moles of B.

Step 3: Convert the number of moles of B to the molecules of B.

Answer:

Step 1. Number of moles of substance A equals:

$$n(A) = \frac{m}{M}$$

m – Mass of A, m = 29.2 g.

M – Molar mass of A, M = 26.6 g/mol.

Then number of moles in 29.2 g of substance A equals:

$$n(A) = \frac{29.2}{26.6} = 1.10 \text{ mol}$$

Step 2. Make a proportion:

2 mol of substance A react to produce 3 mol of substance B

1.10 mol of substance A – x moles of substance B

So, the number of moles of substance B produced from 29.2 g of substance A equals:

$$x = \frac{1.10 \cdot 3}{2} = 1.65 \text{ mol}$$

$$n(B) = x = 1.65 \text{ mol}$$

Step 3. Number of molecules of substance B equals:

$$N = n(B) \cdot N_A$$

N_A – the Avogadro constant, $N_A = 6.022 \cdot 10^{23}$.

$$N = 1.65 \cdot 6.022 \cdot 10^{23} = 9.94 \cdot 10^{23}$$

Answer: $9.94 \cdot 10^{23}$ molecules of substance B.