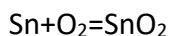
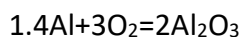


A mixture of powdered aluminum and tin was burned in the atmosphere of oxygen in a way such that the resulting oxides could be collected and weighed 0.5488g; the mixture of Al<sub>2</sub>O<sub>3</sub> and SnO<sub>2</sub> weighed 0.7712g. Calculate the weight percent and atom percent of Al and Sn in the initial mixture .

Solution:



2. Let  $m(Al) = x$  gram, so,  $m(Sn) = (0.5488 - x)$  gram, according to the condition of the task.

3.  $M(Al) = 27$  gram/mole;

$M(Sn) = 119$  gram/mole;

$M(Al_2O_3) = 102$  gram/mole;

$M(SnO_2) = 151$  gram/mole.

4. I make a proportion, where a, b are mass Al<sub>2</sub>O<sub>3</sub> and SnO<sub>2</sub>:

$$\frac{x \text{ gram}}{4 \times 54 \frac{\text{gram}}{\text{mole}}} = \frac{a}{2 \times 102 \frac{\text{gram}}{\text{mole}}};$$

$$\frac{(0.5488 - x) \text{ gram}}{1 \times 119 \frac{\text{gram}}{\text{mole}}} = \frac{b}{1 \times 151 \frac{\text{gram}}{\text{mole}}};$$

$$a = \frac{x \times 2 \times 102}{4 \times 27} = 1.889x;$$

$$b = \frac{(0.5488 - x) \times 151}{119} = 0.7 - 1.27x;$$

$m(Al_2O_3) + m(SnO_2) = a + b = 0.7712$  gram;

$$1.889x + 0.7 - 1.27x = 0.7712$$

$$x = 0.115$$

$x = m(Al) = 0.115$  gram

$m(Sn) = 0.5488 - 0.115 = 0.4338$  gram

$$5. \omega(Al) = \frac{0.115}{0.5488} \times 100\% = 20.95\%$$

$$\omega_1(Sn) = \frac{0.4338}{0.5488} \times 100\% = 79.05\%$$

$$6. n(Al) = \frac{0.115}{27} = 0.0043 \text{ mol}$$

$$n(\text{Sn}) = \frac{0.4338}{119} = 0.00365 \text{ mol}$$

$$7. N(\text{Al}) = 0.0043 \times 6.02 \times 10^{23} = 0.0259 \times 10^{23}$$

$$N(\text{Sn}) = 0.00365 \times 6.02 \times 10^{23} = 0.022 \times 10^{23}$$

$$\sum (N(\text{Al}) + N(\text{Sn})) = 0.0259 \times 10^{23} + 0.022 \times 10^{23} = 0.0479 \times 10^{23};$$

$$8. \omega_2(\text{Al}) = \frac{0.0259 \times 10^{23}}{0.0479 \times 10^{23}} \times 100\% = 54\%$$

$$\omega_3(\text{Sn}) = \frac{0.022 \times 10^{23}}{0.0479 \times 10^{23}} \times 100\% = 46\%$$

Answer:  $\omega(\text{Al}) = 20.95\%$ ;  $\omega_1(\text{Sn}) = 79.05\%$ ;  $\omega_2(\text{Al}) = 54\%$ ;  $\omega_3(\text{Sn}) = 46\%$ .

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