Answer on Question #40476 - Chemistry – Other

Question

Small quantities of oxygen can be prepared in the laboratory by heating potassium chlorate, $KClO_3$(s). The equation for the reaction is

$$2KClO_3 \rightarrow 2KCl + 3O_2$$

Calculate how many grams of O_2(g) can be produced from heating 95.9 grams of $KClO_3$(s).

Answer:

Molar mass of $KClO_3$ equals:

$$M(KClO_3) = M(K) + M(Cl) + 3M(O) = 39.1 + 35.5 + 3 \cdot 16.0 = 122.6 \frac{g}{mole}$$

Mass of 2 moles of potassium chlorate equals:

$$2 \cdot 122.6 = 245.2\ g$$

Molar mass of O_2 equals:

$$M(O_2) = 2M(O) = 2 \cdot 16.0 = 32.0 \frac{g}{mole}$$

Mass of 3 moles of O_2 equals:

$$3 \cdot 32.0 = 96\ g$$

Then we make a proportion:

245.2 g of $KClO_3$ produce 96.0 g of O_2

95.9 g of $KClO_3$ – *x* g of O_2

$$x = \frac{95.9 \cdot 96.0}{245.2} = 37.5\ g$$

Answer: $m(O_2)$ = 37.5 g.