

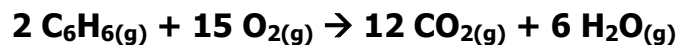
The following reactions take place at a pressure of 1.0 atm and a temperature of 298 K.

1) Given:



How many grams of calcium carbonate will be needed to form 4.29 liters of carbon dioxide?

2) Given:

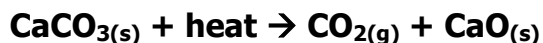


If 2.45 liters of benzene are consumed in this reaction, how many liters of water can be formed?

Solutions

The following reactions take place at a pressure of 1.00 atm and a temperature of 300 K.

1) Given:



How many grams of calcium carbonate will be needed to form 4.29 liters of carbon dioxide?

$$n = \frac{PV}{RT} = \frac{(1.00 \text{ atm})(4.29 \text{ L CO}_2)}{(0.0821 \text{ L atm/mole K})(300 \text{ K})} = 0.1742 \text{ moles CO}_2$$

$$0.1742 \text{ mole CO}_2 \times \frac{1 \text{ mole CaCO}_3}{1 \text{ mole CO}_2} \times \frac{100.09 \text{ g CaCO}_3}{1 \text{ mole CaCO}_3} = 17.4 \text{ g CaCO}_3$$

2) Given:



If 2.45 liters of benzene are consumed in this reaction, how many liters of water can be formed?

$$n = \frac{PV}{RT} = \frac{(1.00 \text{ atm})(2.45 \text{ L C}_6\text{H}_6)}{(0.0821 \text{ L atm/mole K})(300 \text{ K})} = 0.0995 \text{ moles C}_6\text{H}_6$$

$$0.0995 \text{ mole C}_6\text{H}_6 \times \frac{2 \text{ mole H}_2\text{O}}{2 \text{ mole C}_6\text{H}_6} = 0.0995 \text{ mole H}_2\text{O}$$

$$V = \frac{nRT}{P} = \frac{(0.0995 \text{ mole H}_2\text{O})(0.0821 \text{ L atm/mole K})(300 \text{ K})}{(1 \text{ atm})} = 2.45 \text{ L H}_2\text{O}$$