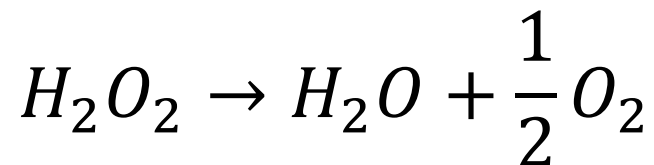


Enthalpy of Reaction

Calculate the total enthalpy change when one mole of H_2O_2 decomposes:



The thermodynamic data are:

$$\Delta_f H^\circ(H_2O) = -286 \text{ kJ/mol}$$

$$\Delta_f H^\circ(H_2O_2) = -187.8 \text{ kJ/mol}$$

Enthalpy of Reaction

Solution: The heat of reaction is:

$$\Delta_{rxn}H^{\circ} = \Delta_f H^{\circ}(H_2O) - \Delta_f H^{\circ}(H_2O_2)$$
$$\Delta_{rxn}H^{\circ} = (-286) - (-187.8) = -98.2$$

The number of moles of H_2O_2 is:

$$n_{H_2O_2} = \frac{m_{H_2O_2}}{M_{m,H_2O_2}} = \frac{1 \text{ gm}}{34 \text{ gm/mol}} = 0.0294 \text{ moles}$$

The heat is:

$$q_{H_2O_2} = n_{H_2O_2} \Delta_{rxn}H^{\circ} = (0.0294 \text{ moles}) \left(-98.2 \frac{\text{kJ}}{\text{mol}} \right)$$

The final value of the total heat for this reaction is:

$$q_{H_2O_2} = -2.89 \text{ kJ}$$