Enthalpy

A more commonly used thermodynamic property is called the enthalpy (H), and is defined as: $H = E + PV$

Enthalpy is used because at constant pressure the equation simplifies to: $\Delta H = q_p$

In other words at constant pressure the enthalpy is equal to the heat flow. This is useful because we can measure the heat flow and use it to get at the different in enthalpy between the products and reactants.

$$\Delta H = H_{\text{products}} - H_{\text{reactants}}$$

The $\triangle$H value will frequently be written after the chemical reaction and can be used to calculate the amount of energy absorbed or released using stoichiometry.

$$Mg_{(s)} + \tfrac{1}{2}O_{2(g)} \rightarrow MgO_{(s)} + 601.6kJ$$

ΔH=-601.6kJ

Calculate ΔH from q

$$HC_2H_3O_{2(aq)} + NaHCO_{3(s)} \rightarrow CO_{2(g)} + H_2O_{(aq)} + NaC_2H_3O_{2(aq)}$$

$$q_{water} = 100g \cdot 4.18Jg^{-1}\ {}^{\circ}C^{-1} \cdot (8.6 - 20.1)^{\circ}C$$

$q_{water} = -q_{rxn}$

$$\Delta H = \frac{q_{rxn}}{n} = \frac{4807J}{0.100mol}$$

$$\Delta H = 48070\ J\ mol^{-1} = 48.07\ kJ\ mol^{-1}$$

Stoichiometry with enthalpy

$$26kJ \cdot \frac{1molNaHCO_3}{48.07kJ} \cdot \frac{84.01g}{1molNaHCO_3} = 45gNaHCO_3$$

Ex: