Chemistry Formula Sheet

Chapter by chapter, topic by topic. Written by the PadhoNa team for quick revision.

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CHAPTER 5

Thermodynamics

First law and work

$$\Delta U = q + w \quad (w = -P_{\text{ext}}\Delta V \text{ for expansion})$$

REVERSIBLE ISOTHERMAL

$$w = -2.303\, nRT \log \frac{V_2}{V_1}$$

$$\Delta H = \Delta U + \Delta n_g RT, \qquad C_p - C_v = R$$

Enthalpy changes

HESS'S LAW

$$\Delta_r H = \sum \Delta_f H_{\text{products}} - \sum \Delta_f H_{\text{reactants}}$$

FROM BOND ENTHALPIES

$$\Delta_r H = \sum \text{BE}_{\text{bonds broken}} - \sum \text{BE}_{\text{bonds formed}}$$

NEUTRALISATION

$$\Delta H \approx -57.1 \text{ kJ mol}^{-1} \text{ (strong acid + strong base)}$$

Entropy, Gibbs energy and equilibrium

$$\Delta S = \frac{q_{\text{rev}}}{T}; \qquad \Delta G = \Delta H - T\Delta S$$

$$\Delta G^\circ = -RT \ln K = -2.303\, RT \log K; \qquad \Delta G = \Delta G^\circ + RT \ln Q$$

SPONTANEITY

$$\Delta G < 0 \text{ spontaneous}; \qquad T = \frac{\Delta H}{\Delta S} \text{ at the switch}$$

PHASE CHANGE

$$\Delta S = \frac{\Delta H_{\text{trans}}}{T}$$

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