

# CHEM5 – Energetics, Redox and Inorganic Chemistry

## Definitions to Learn

### 10. Thermodynamics

Enthalpy of atomisation	Enthalpy change that accompanies the formation of one mole of gaseous atoms from the element in its standard state e.g. $\text{Na(s)} \rightarrow \text{Na(g)}$ or $\frac{1}{2}\text{Cl}_2\text{(g)} \rightarrow \text{Cl(g)}$
Bond enthalpy	Enthalpy needed to break one mole of gaseous covalent bonds to form two moles of gaseous atoms e.g. $\text{Cl}_2\text{(g)} \rightarrow 2\text{Cl(g)}$
Mean bond enthalpy	Enthalpy needed to break one mole of gaseous covalent bonds averaged over many compounds
Enthalpy of lattice formation	Enthalpy change when one mole of an ionic solid is formed from its constituent gaseous ions ( $\Delta H$ is negative) e.g. $\text{Na}^+\text{(g)} + \text{Cl}^-\text{(g)} \rightarrow \text{NaCl(s)}$
Enthalpy of lattice dissociation	Enthalpy change when one mole of a solid ionic lattice is separated into gaseous ions ( $\Delta H$ is positive) e.g. $\text{NaCl(s)} \rightarrow \text{Na}^+\text{(g)} + \text{Cl}^-\text{(g)}$
Electron affinity	Enthalpy change when one mole of gaseous atoms form one mole of gaseous negative ions e.g. $\text{Cl(g)} + \text{e}^- \rightarrow \text{Cl}^-\text{(g)}$
Enthalpy of solution	Enthalpy change per mole for the following process e.g. $\text{NaCl(s)} \rightarrow \text{Na}^+\text{(aq)} + \text{Cl}^-\text{(aq)}$
Enthalpy of hydration	Enthalpy change per mole for the following process e.g. $\text{Na}^+\text{(g)} \rightarrow \text{Na}^+\text{(aq)}$ or $\text{Cl}^-\text{(g)} \rightarrow \text{Cl}^-\text{(aq)}$
Feasible or spontaneous Reaction	A reaction that is possible because $\Delta G \leq 0$
Perfect Ionic Model	Ions can be regarded as perfect spheres Only electrostatic attraction

### 11. Redox Equilibria

Standard conditions	298K, 100kPa and all solutions at 1 mol dm <sup>-3</sup>
Electrochemical series	A list of reduction half-equations in order of increasing or decreasing electrode potential

### 12. Periodicity

Periodicity	A trend in the properties of the elements across a period, repeated across the next period
Hydrolysis	Splitting up using water



### 13. Transition Metals

Complex	A central metal ion surrounded by co-ordinately bonded ligands
Ligand	A species that can donate one or more lone pairs of electrons
Co-ordination number	Number of co-ordinate bonds formed in a complex ( <b>not</b> just the number of ligands)
Bidentate ligand	Has two lone pair donor atoms
Active site	Place where reactants are adsorbed and where reaction occurs
Heterogeneous catalyst	A catalyst that is in a different state to the reactants
Homogeneous catalyst	A catalyst that is in the same state as the reactants

### 14. Metal Ions in Aqueous solution

Lewis acid	lone pair acceptor
Lewis base	lone pair donor