Subject	Year	Term
Chemistry	12	3

Topic

3.2.1 Enthalpy changes.

Content (Intent)

Prior Learning (Topic) 11C2 Electrolysis, energy changes and equilibria, 2.1.1, 2.1.3, 2.1.4 Atoms and reactions, 3.2.2 Rates 3.2.3 Equilibrium

Enthalpy changes: ΔH of reaction, formation, combustion and neutralisation

(a) explanation that some chemical reactions are accompanied by enthalpy changes that are exothermic (ΔH, negative) or endothermic (ΔH, positive) (b) construction of enthalpy profile diagrams to show the difference in the enthalpy of reactants compared with products

(c) qualitative explanation of the term activation energy, including use of enthalpy profile diagrams

(d) explanation and use of the terms:

(i) standard conditions and standard states (physical states under standard conditions)

(ii) enthalpy change of reaction (enthalpy change associated with a stated equation, Δ_r H)

(iii) enthalpy change of formation (formation of 1 mol of a compound from its elements, Δ_f H)

(iv) enthalpy change of combustion (complete combustion of 1 mol of a substance, Δ_c H)

(v) enthalpy change of neutralisation (formation of 1 mol of water from neutralisation, Δ_{neut}H).

(e) determination of enthalpy changes directly from appropriate experimental results, including use of the relationship: q = mcΔT

Bond enthalpies

(f) (i) explanation of the term average bond enthalpy (as the breaking of 1 mol of bonds in gaseous molecules)

(ii) explanation of exothermic and endothermic reactions in terms of enthalpy changes associated with the breaking and making of chemical bonds

(iii) use of average bond enthalpies to calculate enthalpy changes and related quintets **(see also 2.2.2 f)**

Hess' law and enthalpy cycles

(g) Hess' law for construction of enthalpy cycles and calculations to determine indirectly:

(i) an enthalpy change of reaction from enthalpy changes of combustion

(ii) an enthalpy change of reaction from enthalpy changes of formation

(iii) enthalpy changes from unfamiliar enthalpy cycles

(h) the techniques and procedures used to determine enthalpy changes directly and indirectly.

Future Learning (Topic) 5.2.1 Lattice Enthalpy, 5.2.2 Enthalpy and entropy

How will knowledge and skills be taught? (Implementation)	How will your understanding be assessed & recorded (Impact)
Practical work PAG 3.1 - Determination of the enthalpy change of neutralisation PAG 3.2 - Determination of the enthalpy change of a reaction by Hess's Law PAG 3.3 - Determination of the enthalpy changes of combustion	- exam questions in lessons - 1 x homework of exam style questions - 1 x standard homework (Grade given. Written feedback. Verbal feedback to the group.) -Unit 5 end of topic test (Grade given. Verbal feedback to class and individuals.)

Written Energy profile diagrams for exo and endothermic reactions Calculating enthalpy changes of reaction by direct experiment Using bond enthalpies to calculate the enthalpy change Explanation of what ex/endo means in terms of bond breaking/forming Hess's law Hess's cycles and calculating enthalpy changes of reactions	

How can parents help at home?

Look at the topic specific resources on the VLE
Use appropriate websites: MachemGuy, Allery Chemistry, Chemistry World – by Royal Society of Chemistry, ChemGuide.
Take an interest! Ask your children what they have learnt and be curious about their learning.

Helpful further reading/discussion

Reading	**Vocabulary Lists**	**Careers Links**
The Science of Everyday Life by Marty Jopson Why Chemical Reactions Happen by Keeler and Wothers Chapter 9 of A level chemistry for OCR	*Enthalpy* *Exothermic* *Endothermic* *Enthalpy profile diagram* *Activation energy* *Standard conditions/states* *Combustion* *Formation* *Neutralisation* *Extrapolation* *Enthalpy cycle*	Analytical chemist Chemical engineer Clinical biochemist Forensic scientist Pharmacologist Process chemist Quality control analyst Research scientist Science writer Site chemist Teacher or lecturer Degrees; Chemistry Biochemistry Biomedical science Biological sciences Medicine Research chemist Veterinary medicine