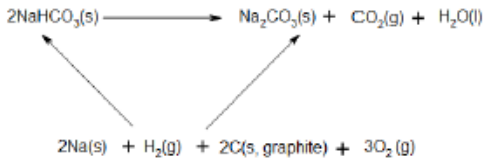
Energetics - Mark Scheme

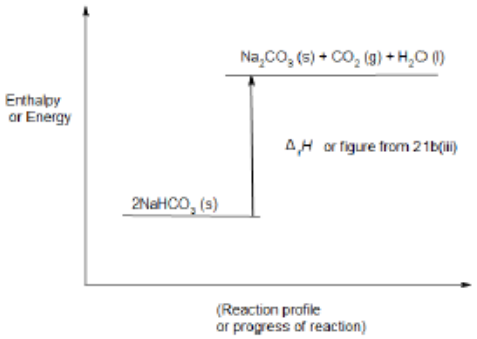
Q1.

Question number	Answer	Additional guidance	Mark
(a)	• hard to measure the temperature change when you're heating something or • heat losses due to high temperatures involved or • at 300 °C/high temperatures the water will be gaseous	Allow it is difficult to measure the temperature of a solid	1

Question number	Answer	Additional guidance	Mark
(b)(i)	An answer that makes reference to the following points: • (the enthalpy change when) one mole of the substance (is formed) • from its elements in their standard states (under standard conditions).		2

Question number	Answer	Additional guidance	Mark
(b)(ii)	A diagram that includes: • all species correct (1) • all state symbols correct and species balanced. (1)	 Do not penalise missing graphite	2

Question number	Answer	Additional guidance	Mark
(b)(iii)	• correct application of Hess's law (1) • correct figures used (1) • correct calculation (1) • units and sign (1)	Example of calculation: $\Delta_r H = -\Delta H_1 + \Delta H_2$ or $\Delta_f H\,(Na_2CO_3) + \Delta_f H\,(CO_2) + \Delta_f H\,(H_2O) = 2\Delta_f H(NaHCO_3) + \Delta_r H$ $-1130.7 + (-285.8) + (-393.5) = 2 \times (-950.8) + \Delta_r H$ $\Delta_r H = 91.6$ $\Delta_r H = +91.6$ kJ mol^{-1} Correct answer with no working scores (4) TE from M1 TE from incorrect M2	4

Question number	Answer	Additional guidance	Mark
(b)(iv)	• products energy level above reactants **and** arrow (1) • label on vertical arrow **and** vertical axis label (1)	 Allow reactants/products in place of chemical formulae Horizontal axis label not required Direction of arrow and endothermic/exothermic diagram must agree with sign in 21b(iii) Allow a correct exothermic enthalpy level diagram for an exothermic answer in 21b(iii)	2

Q2.

Question number	Answer	Mark
(a)	A 2.5 °C	1

Question number	Answer	Mark
(b)	C redox	1