**ANSWERS: Explaining** endothermic and exothermic reactions

**1.**

C6H12O6(s)+ 6O2(g)

 Ea

**Enthalpy**

 ∆*r*H

6CO2(g)+ 6H2O(g)

**Reaction coordinate**

This is an endothermic reaction because

• the enthalpy of products is greater than the enthalpy of reactants

• ∆*r*H for the reaction is given as a positive value (+2820 kJ mol–1)

• light energy is needed for the reaction (so energy enters the reaction)

 **2.** i) Energy is released as the reaction has a negative sign so it is an exothermic reaction

ii) and iii)

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| EnthalpyReaction coordinate |

iv) The overall yield of oxygen gas will be exactly the same if a catalyst is used because a catalyst increases the rate of a reaction, a catalyst does not change the overall yield.

**3.**

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| ii) the condensation of water vapour | i) the boiling of water |
| H2O(l)EnthalpyH2O(g)Reaction coordinate | H2O(l)EnthalpyH2O(g)Reaction coordinate |

**4.**

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| N2(g) + 3H2(g) 🡪 2NH3(g) ΔrH  *=* - 92 kJmol–1This is an exothermic reaction and thereaction gives out heat because the reactants have more energy than the products, this is shown by the minus sign |
| N2(g) + 3H2(g) Enthalpy2NH3(g) Reaction coordinate |

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| C(s) + 2H2(g) 🡪 CH4 (g) This is an endothermic reaction and thereaction takes in heat because the products have more energy than the reactants, this is shown by the positive sign |
| CH4 (g) EnthalpyC(s) + 2H2(g) Reaction coordinate |

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| C12H22O11(s) + 12O2(g) arrow 12CO2(g) + 11H2O(l)This is an exothermic reaction and thereaction gives out heat because the reactants have more energy than the products, this is shown by the minus sign |
| C12H22O11(s) + 12O2(g)Enthalpy12CO2(g) + 11H2O(l)Reaction coordinate |

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| 2C4H10(g) + 13O2(g) arrow 8CO2(g) + 10H2O(l)This is an exothermic reaction and thereaction gives out heat because the reactants have more energy than the products, this is shown by the minus sign |
| 2C4H10(g) + 13O2(g) Enthalpy8CO2(g) + 10H2O(l)Reaction coordinate |

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