Test yourself

Chapter 6

1 Which one of these reactions is endothermic?

A The combustion of ethanol

B The thermal decomposition of copper(II) sulfate

C The reaction of hydrochloric acid with sodium hydroxide

D Respiration in plants

2 Which one of these enthalpy changes can not be measured directly?

A $Ca(OH)_2(aq) + 2HCl(aq) \rightarrow CaCl_2(aq) + 2H_2O(l)$

B $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$

C $4C(graphite) + 5H_2(g) \rightarrow C_4H_{10}(g)$

D $KOH(s) + aq \rightarrow KOH(aq)$

3 Which one of the following statements about an endothermic reaction is correct?

A The energy absorbed in bond breaking is greater than the energy released in bond forming

B The energy absorbed in bond breaking is less than the energy released in bond forming

C The energy released in bond breaking is greater than the energy absorbed in bond forming

D The energy released in bond breaking is less than the energy absorbed in bond forming

4 Which one of these equations relates to the standard enthalpy change of formation of sodium chloride?

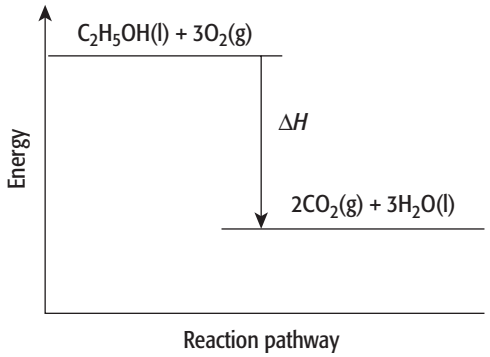
A $2Na(s) + Cl_2(g) \rightarrow 2NaCl(s)$

B $Na(s) + Cl(g) \rightarrow NaCl(s)$

C $Na(s) + \frac{1}{2}Cl_2(g) \rightarrow NaCl(s)$

D $Na^+(s) + Cl^-(g) \rightarrow 2NaCl(s)$

5 Which statement about the enthalpy level diagram below is correct?



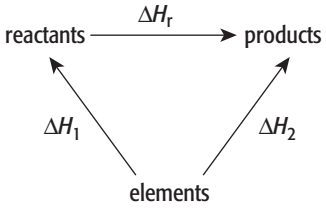
A The reaction is endothermic

B More bonds are formed than are broken

C ΔH represents the enthalpy change of combustion of ethanol

D ΔH represents the enthalpy change of formation of carbon dioxide

6 An enthalpy cycle for finding the enthalpy change of reaction ΔH_r is shown below.



Which one of these equations relating to this enthalpy cycle is correct?

A $\Delta H_r = \Delta H_1 + \Delta H_2$

B $\Delta H_r = -\Delta H_2 - \Delta H_1$

C $\Delta H_r = \Delta H_1 - \Delta H_2$

D $\Delta H_r = \Delta H_2 - \Delta H_1$

7 Hydrogen reacts with chlorine to form hydrogen chloride:

$H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$

Which one of the values below gives the correct value for the enthalpy change for this reaction? (Use the bond energies E(H–H) = 436 kJ mol^{-1}, E(Cl–Cl) = 243 kJ mol^{-1}, E(H–Cl) = 432 kJ mol^{-1})

A +185 kJ mol^{-1}

B –185 kJ mol^{-1}

C +92.5 kJ mol^{-1}

D –92.5 kJ mol^{-1}

8 A calorimetry experiment was carried out to find the enthalpy change of combustion of cyclohexanol. When 0.100 g of cyclohexanol was burnt it raised the temperature of 50.0 g of water by 17.8 °C.
(specific heat capacity of water = 4.18 J g^{-1} $°C^{-1}$, molar mass of cyclohexanol = 100)

What is the enthalpy change of combustion?

A 372 kJ mol^{-1}

B 890 kJ mol^{-1}

C 1490 kJ mol^{-1}

D 3720 kJ mol^{-1}

9 Which one of these equations relates to the standard enthalpy change of atomisation of iodine?

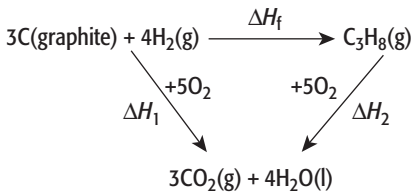
A $\frac{1}{2}I_2(s) \rightarrow I(g)$

B $\frac{1}{2}I_2(g) \rightarrow I(g)$

C $I_2(s) \rightarrow 2I(g)$

D $I_2(s) \rightarrow I_2(g)$

10 An enthalpy cycle to find the enthalpy change of formation of propane, C_3H_8, is shown below.



Which of these equations gives the correct enthalpy change of formation of propane?

A $\Delta H_c^{\ominus}[C(\text{graphite})] + \Delta H_c^{\ominus}[H_2(g)] - \Delta H_c^{\ominus}[C_3H_8(g)]$

B $3\Delta H_c^{\ominus}[C(\text{graphite})] + 4\Delta H_c^{\ominus}[H_2(g)] - \Delta H_c^{\ominus}[C_3H_8(g)]$

C $3\Delta H_c^{\ominus}[C(\text{graphite})] + 4\Delta H_c^{\ominus}[H_2(g)] + \Delta H_c^{\ominus}[C_3H_8(g)]$

D $\Delta H_c^{\ominus}[C_3H_8(g)] - \Delta H_c^{\ominus}[C(\text{graphite})] + 4\Delta H_c^{\ominus}[H_2(g)]$