Chapter Summary Worksheet

Chapter 5
Energetics

Print out and complete this worksheet to generate a summary for Chapter 5.

Use the information below to answer multiple-choice questions 1 and 2.

5 g (an excess) of magnesium was added to 25 cm^3 of a 0.500 mol dm^{-3} solution of copper sulfate in an insulated container. The temperature rose from 18.3 °C to 52.4 °C.

$$Mg(s) + CuSO_4(aq) \rightarrow Cu(s) + MgSO_4(aq)$$

(Assume that the solution has a density of 1.0 g cm^{-3} and a specific heat capacity of 4.2 J g^{-1} $°C^{-1}$.)

1 The amount of heat produced, in joules, is

- ☐ **A** 3581
- ☐ **B** 4297
- ☐ **C** 5502
- ☐ **D** 6602

2 The amount (in moles) of copper sulfate that reacted is

- ☐ **A** 0.0125
- ☐ **B** 0.02
- ☐ **C** 0.05
- ☐ **D** 12.5

3 In another experiment, 0.104 mol of copper sulfate reacted with excess magnesium and produced 29 790 J of heat energy. The enthalpy change, ΔH_r, is

- ☐ **A** +286 kJ mol^{-1}
- ☐ **B** −286 kJ mol^{-1}
- ☐ **C** +286 000 kJ mol^{-1}
- ☐ **D** −286 000 kJ mol^{-1}

4 When methane, CH_4, burns, the products are carbon dioxide and water vapour:

$$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g) \qquad \Delta H = -803 \text{ kJ mol}^{-1}$$

ΔH_f of $CO_2(g)$ is −394 kJ mol^{-1}

ΔH_f of $CH_4(g)$ is −75 kJ mol^{-1}

The enthalpy of formation of $H_2O(g)$ is

- ☐ **A** −484 kJ mol^{-1}
- ☐ **B** +484 kJ mol^{-1}
- ☐ **C** −242 kJ mol^{-1}
- ☐ **D** +242 kJ mol^{-1}

5 Ignoring the sign, would the enthalpy of formation of $H_2O(l)$ be

- ☐ **A** greater than that for $H_2O(g)$?
- ☐ **B** less than that for $H_2O(g)$?
- ☐ **C** the same at a temperature of 25 °C?
- ☐ **D** the same at a temperature of 100 °C?

6 Which equation represents the change when the standard enthalpy of combustion of butane, C_4H_{10}, is measured?

- ☐ **A** $2C_4H_{10}(g) + 13O_2(g) \rightarrow 8CO_2(g) + 10H_2O(l)$
- ☐ **B** $C_4H_{10}(g) + 6\frac{1}{2}O_2(g) \rightarrow 4CO_2(g) + 5H_2O(l)$
- ☐ **C** $2C_4H_{10}(g) + 9O_2(g) \rightarrow 8CO(g) + 10H_2O(l)$
- ☐ **D** $C_4H_{10}(g) + O_2(g) \rightarrow C_4H_{10}O_2(l)$

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