5.1 Energetics

Question Paper

Course	DP IB Chemistry
Section	5. Energetics / Thermochemistry
Topic	5.1 Energetics
Difficulty	Easy

Time allowed: 20

Score: /10

Percentage: /100

Question 1

Which equation below can represent both an enthalpy change of formation and combustion?

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

B. $2Na(s) + ½O_2(g) \rightarrow Na_2O(s)$

C. $HCl(aq) + NaOH(aq) \rightarrow NaCl(aq) + H_2O(l)$

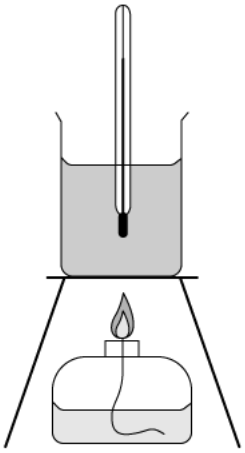
D. $CO(g) + C(s) \rightarrow CO_2(g)$

[1 mark]

Question 2

A student carried out an experiment to determine the enthalpy change for the combustion of ethanol.

The following results were obtained by the student. The specific heat capacity of water is 4.18 J g^{-1} K^{-1}.



start temperature of the water	21 °C
final temperature of the water	41 °C
mass of alcohol burner before burning	259.75 g
mass of alcohol burner after burning	259.18 g
mass of glass beaker plus water	150.00 g
mass of glass beaker	50.0 g

How much of the heat energy produced by the burning of ethanol went into the water?

A. 100 x 4.18 x 20 J

B. 150 x 4.18 x 20 J

C. 0.57 x 4.18 x 20 J

D. 100 x 4.18 x 41 J

[1 mark]

Question 3

When a sample of ammonium chloride is added to a small beaker of water and stirred, the temperature drops as the ammonium chloride slowly dissolves in the water.

Which statement about the process is true?

A. The process is endothermic and ΔH is -

B. The process is exothermic and ΔH is -

C. The process is endothermic and ΔH is +

D. The process is exothermic and ΔH is +

[1 mark]

Question 4

Which statement is true about all exothermic reactions?

A. Gases are formed during the reaction

B. They give out heat

C. The reaction is fast

D. They are combustion reactions

[1 mark]

Question 5

Which processes have a negative enthalpy change?

I. The combustion of an alcohol
II. The reaction between hydrochloric acid and sodium hydroxide
III. Water vapour condensing

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

[1 mark]

Question 6

The enthalpy change of a chemical reaction can be found using the following relationship:

$$q = mc\Delta T$$

In this expression, which of the following is true?

A. m represents the amount of substance in moles

B. The temperature is measured in Centigrade

C. c is the specific heat capacity of the substance

D. The unit of q is kJ

[1 mark]

Question 7

Which is the correct definition for the standard enthalpy of combustion?

A. The enthalpy change when the reactants in a stoichiometric equation react to give the products, under standard conditions

B. The enthalpy change when one mole of a substance is burnt in excess oxygen, under standard conditions

C. The enthalpy change when one mole of water is formed by reacting an acid and an alkali, under standard conditions

D. The enthalpy change when one mole of a product is formed from its elements, under standard conditions

[1 mark]

Question 8

1.20 g of ethanol is combusted releasing 35 500 J of energy.

What is the molar enthalpy change for the combustion of ethanol?

A. $-\frac{(35500 \times 46.0)}{(1.20 \times 1000)}$

B. $-\frac{(35500 \times 1000)}{(1.20 \times 46.0)}$

C. $\frac{(35500 \times 46.0)}{(1.20 \times 1000)}$

D. $\frac{(35500 \times 1000)}{(1.20 \times 46.0)}$

[1 mark]

Question 9

Which enthalpy change is described as the enthalpy change when the reactants in a stoichiometric equation react, under standard conditions, to form the products?

A. $\Delta H^{\ominus}_{c}$

B. $\Delta H^{\ominus}_{neut}$

C. $\Delta H^{\ominus}_{r}$

D. $\Delta H^{\ominus}_{f}$

[1 mark]

Question 10

Which statement describes a closed system?

A. Only matter can be transferred across the boundary

B. Only energy can be transferred across the boundary

C. Energy and matter can be transferred across the boundary

D. Energy and matter cannot be transferred across the boundary

[1 mark]