

# 5.3 Bond Enthalpy

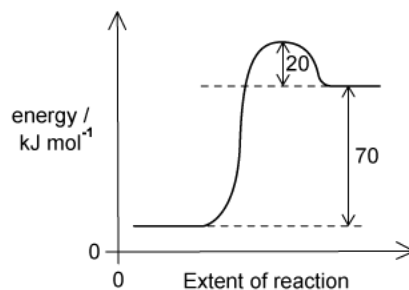
## Question Paper

Course	DPIB Chemistry
Section	5. Energetics / Thermochemistry
Topic	5.3 Bond Enthalpy
Difficulty	Easy

**Time allowed:** 20  
**Score:** /10  
**Percentage:** /100

### Question 1

The reaction pathway for a reversible reaction is shown below:



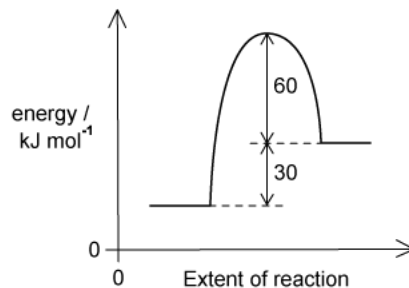
Which statement is correct?

- A. The activation energy of the reverse reaction is  $+90 \text{ kJ mol}^{-1}$
- B. The activation energy of the forward reaction is  $+20 \text{ kJ mol}^{-1}$
- C. The activation of the reverse reaction is  $+20 \text{ kJ mol}^{-1}$
- D. The enthalpy change of forwards reaction is  $-70 \text{ kJ mol}^{-1}$

[1 mark]

## Question 2

The reaction pathway for a reversible reaction is shown below.



Which statements are correct?

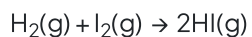
- I. The forward reaction is endothermic
- II. The enthalpy change for the backward reaction is  $-30 \text{ kJ mol}^{-1}$
- III. The activation energy for the forward reaction is  $+90 \text{ kJ mol}^{-1}$

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

[1 mark]

## Question 3

Hydrogen atoms bond covalently to iodine atoms to form hydrogen iodide as shown in the equation below:



Which statement best describes what is meant by the average HI bond enthalpy?

- A. The energy stored in a covalent bond.
- B. The energy required to break one covalent bond in the gas phase.
- C. The energy required to break one mole of the HI bonds in the gas phase.
- D. The energy released when two atoms form a covalent bond.

[1 mark]

### Question 4

The enthalpy of atomisation of a compound can be calculated using a range of different enthalpy changes.

Which statement below correctly describes the enthalpy change of atomisation?

- A. The energy stored in a covalent bond
- B. The energy required to break one covalent bond in the gas phase
- C. The energy required to break all bonds in an element
- D. The energy released when two atoms form a covalent bond

[1 mark]

### Question 5

Which quantity gives the best indication of the relative strength of the hydrogen bonds between water molecules in the liquid state?

- A. Enthalpy changes of vaporisation
- B. Bond dissociation energies
- C. Enthalpy of formation
- D. Activation energy

[1 mark]

### Question 6

When a sample of calcium oxide, CaO, is added to dilute hydrochloric acid the temperature rises. Which of the following statements is correct?

- A. More bonds are broken than are formed in the reaction
- B. More bonds are formed than are broken in the reaction
- C. The energy of the bonds broken is greater than of the bonds formed
- D. The energy of the bonds broken is less than of the bonds formed

[1 mark]

### Question 7

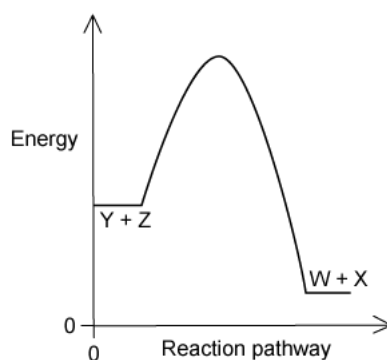
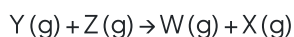
Which is the correct definition of mean bond enthalpy?

- A. The amount of energy required to break a specific covalent bond in the gas phase
- B. The energy required to break one mole of a specific covalent bond with all chemicals in their standard states
- C. The amount of energy required to break a specific covalent bond with all chemicals in their standard states
- D. The energy required to break one mole of a specific covalent bond in the gas phase, with all chemicals in their standard states

[1 mark]

### Question 8

This energy profile diagram represents the reaction pathway for the following reaction:



Which statement is true about the reverse reaction,  $W(g) + X(g) \rightarrow Y(g) + Z(g)$ ?

- A. It will have a negative  $\Delta H$
- B. It will have a positive  $\Delta H$
- C. It will have a smaller activation energy
- D. The temperature of the surroundings increase

[1 mark]

### Question 9

Which of the following statements about oxygen and ozone are correct?

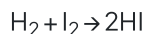
- I. Ozone contains delocalised  $\pi$  bonds
- II. The bond orders of oxygen and ozone are not the same
- III. The bond in oxygen requires radiation of higher energy and longer wavelength than the bond in ozone to break

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

[1 mark]

### Question 10

The reaction of hydrogen with iodine to form hydrogen iodide is shown below:



Use the bond energy data given to calculate the enthalpy of reaction,  $\Delta H_r^\ominus$ .

Bond	Energy, $\text{kJ mol}^{-1}$
H-H	432
I-I	149
H-I	295

- A.  $\Delta H_r^\ominus = 432 + 149 + 295$
- B.  $\Delta H_r^\ominus = 432 + 149 + (2 \times 295)$
- C.  $\Delta H_r^\ominus = 432 + 149 - (2 \times 295)$
- D.  $\Delta H_r^\ominus = 432 + 149 - 295$

[1 mark]