2023 Ch H1 Q4

Section: Chemistry in Society

Topic: Chemical Energy

Question Summary

An energy diagram is provided. The question asks: Which of the following has a value of 150 kJ mol^{-1}?
A: Activation energy of the reverse reaction
B: Enthalpy change of the reverse reaction
C: Activation energy of the forward reaction
D: Enthalpy change of the forward reaction

Worked Solution

From the energy diagram:
• The enthalpy change (ΔH) is the difference between products and reactants.
• The activation energy (E_a) is the difference between the reactants and the peak of the curve.
In this diagram, the forward reaction has

an enthalpy change of +50 kJ mol^{-1} (endothermic).

The total rise from reactants to the peak is 200 kJ mol^{-1}, so the activation energy of the forward reaction is 200 kJ mol^{-1}.

For the reverse reaction:

• The activation energy is the drop from products to the peak: 150 kJ mol^{-1}.

• The enthalpy change is −50 kJ mol^{-1}.

Final Answer

A — Activation energy of the reverse reaction

Revision Tips

• ΔH = difference between product and reactant energy levels.

• E_a = difference between reactants (or products, for reverse) and the peak.

• Forward and reverse reactions share the same energy profile but swap roles for ΔH and E_a.