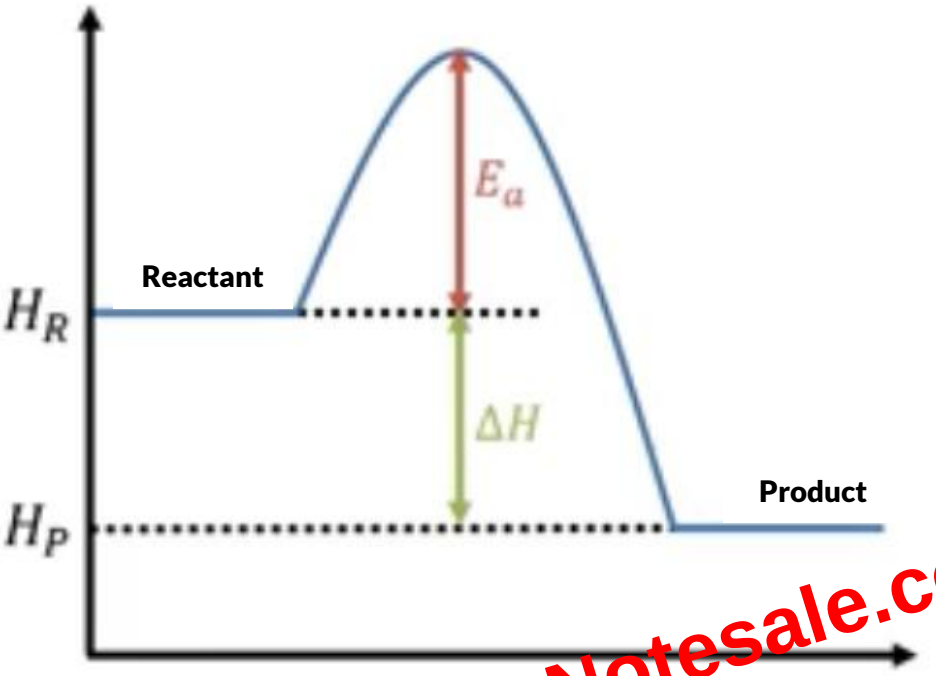
Activation Energy in Exothermic Reactions



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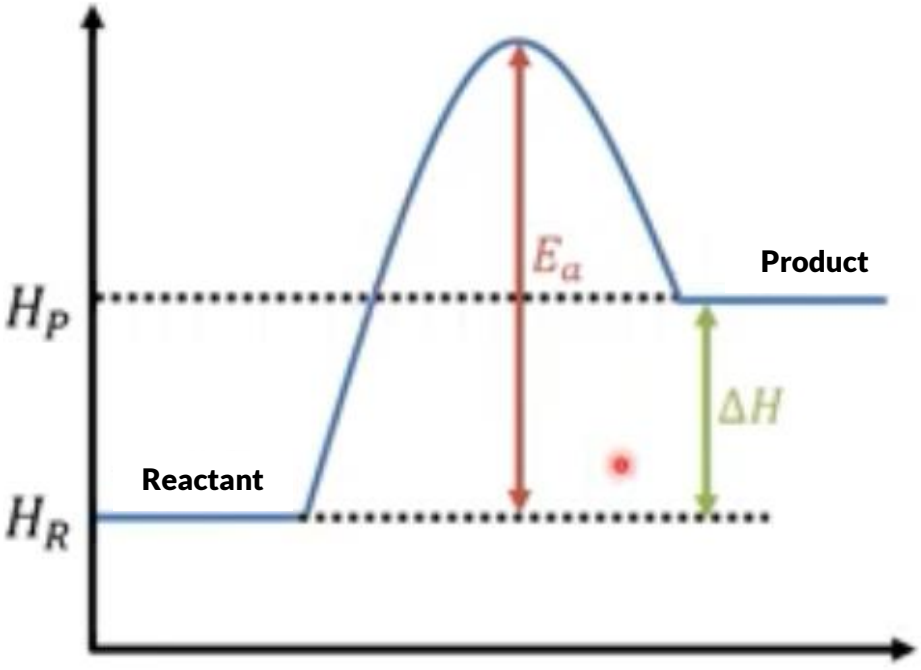

Ans.

We use the fast method:

$v = k\,[BrO_3^-]^x\,[Br^-]^y\,[H^+]^z$

$[BrO_3^-]^x \longrightarrow 2^x = 2,\ x = 1$

$[Br^-]^y \longrightarrow 2^y = 4,\ y = 2$

$[H^+]^z \longrightarrow 2^y.2^z = 8$

$2^2.2^z = 8$

$2^z = 2$

$z = 1$

So, the reaction rate equation: $v = k\,[BrO_3^-]\,[Br^-]^2\,[H^+]$

11. In the reaction A + B + C ⟶ D + E, obtained the following data:

- ✓ If the concentration A is fixed, the concentration of B and C each is raised twice, then the reaction rate is twice as large as.
- ✓ If the concentration of A and C each is raised twice, while the concentration B is fixed, then the reaction rate is eight times greater.
- ✓ If the concentration of A and B each is raised twice, while the concentration of C is fixed, the reaction rate is four times greater.

Determine the total reaction order from the reaction

Ans.

$v = k[A]^x[B]^y[C]^z$

	[A]	[B]	[C]	v
1	a	b	c	v
2	a	2b	2c	2v
3	2a	b	2c	8v
4	2a	2b	c	4v

We use the fast method:

$2^x.(\frac{1}{2})^y = 4 \longrightarrow 2^{x-y} = 2^2 \longrightarrow x - y = 2....(1)$

$2^y.2^z = 2 \longrightarrow 2^{y+z} = 2 \longrightarrow y + z = 1....(2)$

$2^x.(\frac{1}{2})^z = 2 \longrightarrow 2^{x-z} = 2 \longrightarrow x - z = 1....(3)$

We use the elimination method:

(2) $y + z = 1$

(3) $x - z = 1$ +

$x + y = 2....(4)$

(1) $x - y = 2$

(4) $x + y = 2$ +

$2x = 4$

$x = 2$

$y = 0$ (using equation number 4)

$z = 1$ (using equation number 2)

The total reaction order: $x + y + z = 2 + 0 + 1 = 3$