

$$\text{Rate} = k[A]^x[B]^y$$

Order of a Reaction

Chemical Kinetics Core Concept & Exam Tricks

$$\text{Rate} = k[A]^x[B]^y$$

Order = sum of the exponents in the rate law.

Given: Rate = $k[A]^x[B]^y$

Overall Order = $x + y$

Example 3.3: Calculating Overall Order

Part A

$$\text{Rate} = k[A]^{1/2}[B]^{3/2}$$

$$\text{Order} = \frac{1}{2} + \frac{3}{2}$$

$$= 2$$

Second Order

Part B

$$\text{Rate} = k[A]^{3/2}[B]^{-1}$$

$$\text{Order} = \frac{3}{2} + (-1)$$

$$= 1/2$$

Half Order



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$$E=mc^2$$



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Mapping Order to the Units of k

$$0 \longrightarrow \text{mol L}^{-1} \text{ s}^{-1}$$

$$1 \longrightarrow \text{s}^{-1}$$

$$2 \longrightarrow \text{mol}^{-1} \text{ L s}^{-1}$$

JEE Trap Alert ⚠

Order can be 0, a whole number, or a fraction — molecularity cannot.

Order	Molecularity
Experimental quantity. 0, 0, fractions, and integers allowed.	Theoretical integer (colliding species). NEVER 0 or fractional.

Identify the reaction order from the rate constant:

$$k = 3 \times 10^{-4} \text{ s}^{-1}$$

[A] Zero Order

[B] First Order

[C] Second Order

[D] Half Order

Correct: [B]. The unit s^{-1} exclusively identifies a First Order reaction.

Master Unit Formula for k

$$(\text{mol L}^{-1})^{1-n} \text{s}^{-1}$$

Where n = overall order



Screenshot for Exam Revision

Key Takeaways



The Definition: Order is purely experimental—calculated strictly by adding the exponents in the rate law.



The Unit Trick: Always check the units of k . Use $(\text{mol L}^{-1})^{1-n} \text{s}^{-1}$ to instantly identify the order.



The Fraction Trap: Order can be fractional or zero. Molecularity is always a whole number (1, 2, or 3).



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