

MOLECULAR COLLISION

A molecular collision happens when two or more molecules come into contact with each other - that is when they physically bump or interact in space.

These collisions are the foundation of chemical reactions - because for a reaction to occur, reactant molecules must collide.

Types of molecular collisions

1) Elastic collision

* The molecules bounce off each other without any change in their internal energy.

* Total kinetic energy is conserved.

Example - Gas molecules colliding in an ideal gas.

Important Calls

✓ Things to Do

✓ Meetings

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Tuesday

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24	25	26	27	28

2) Inelastic collisions →

* Part of the kinetic energy is converted into potential energy or internal energy.

* These can lead to chemical reactions if enough energy is transferred.

conditions for a chemical reaction (Effective collision theory) →

Not all collisions lead to reactions - only effective collisions do.

For a collision to be effective, it must satisfy two conditions.

1) Proper orientation →

Molecules must collide in a specific way so that the reactive parts are aligned

Important Calls

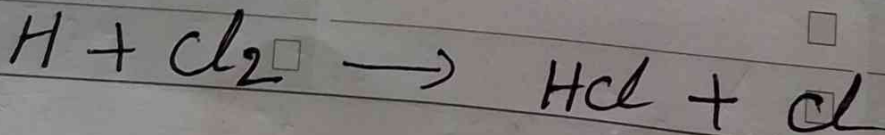
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Things to Do

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Meetings

Example — In the reaction



2) Sufficient Energy →

Molecules must collide with at least the activation energy - the minimum energy required to break bonds in the reactants and form new bonds in the products.

Energy and collision Frequency →

collision Frequency (z) →

The number of collisions per second per unit volume.

It increases with temperature and concentration.

* Fraction of effective collisions!

only a small fraction of total collisions have energy $\geq E_a$

This idea is captured in the Arrhenius equation

Things to Do
Meetings

$$K = Ae^{-E_a/RT}$$

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3	4	5	6
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 $k =$ ~~the~~ Rate constant $A =$ Frequency factor $E_a =$ Activation energy $R =$ Gas constant $T =$ Temperature

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