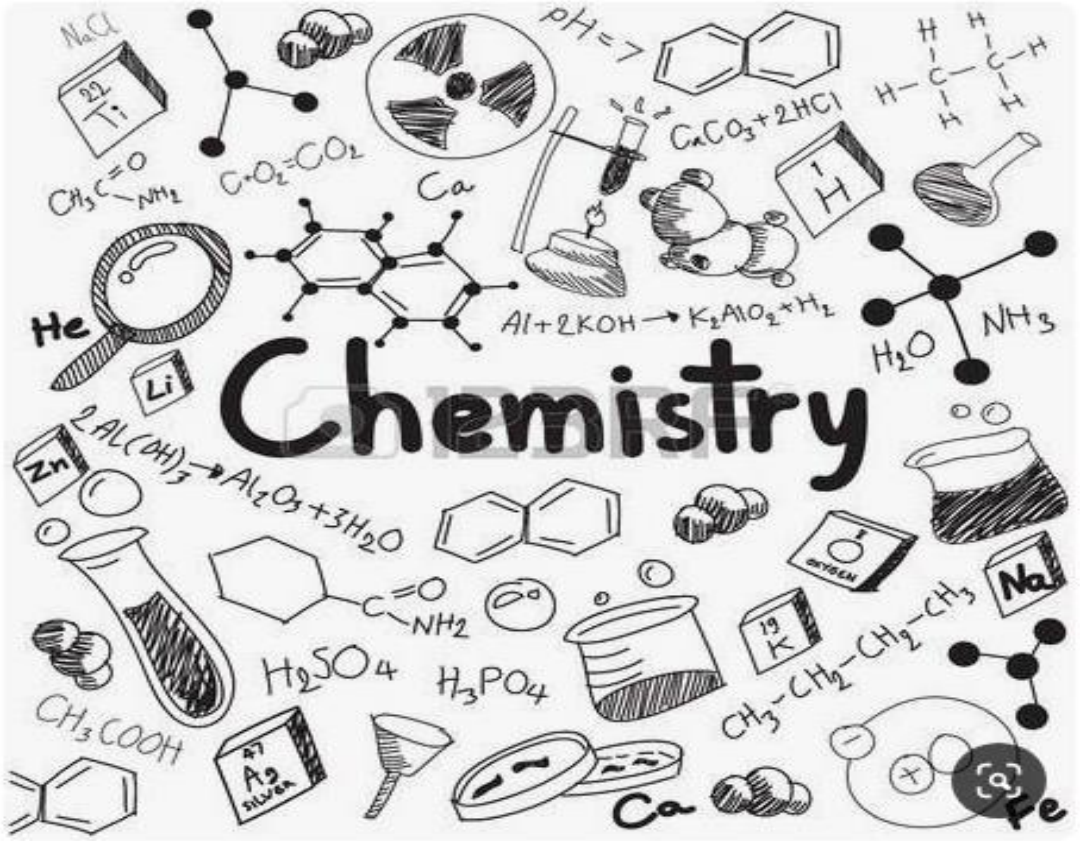
The National Orthodox School Shmaisani

- Chapter 12
- Lesson: (Surface area and rate of reaction)
- Scholastic Year: 2022-2023
- Grade: 8CS



What is the collision theory?

Collision Theory states that particles must collide with a certain amount of energy for a reaction to take place. This is the ACTIVATION ENERGY.

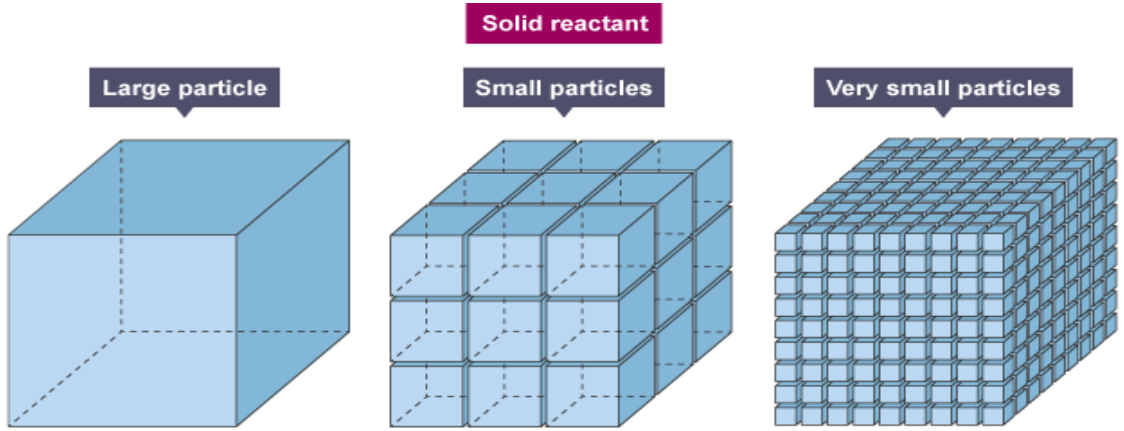
Anything that increases the force that particles collide or the number of collisions will increase the rate of a reaction

Factors affecting rate of reaction

- **Concentration of reactant**
- **Temperature**
- **Surface area**

Surface area (Particle size)

- The rate of a chemical reaction can be raised by increasing the surface area of a solid reactant. This is done by cutting the substance into small pieces, or by grinding it into a powder.
- large pieces = small surface area
- small pieces (powder) = large surface area



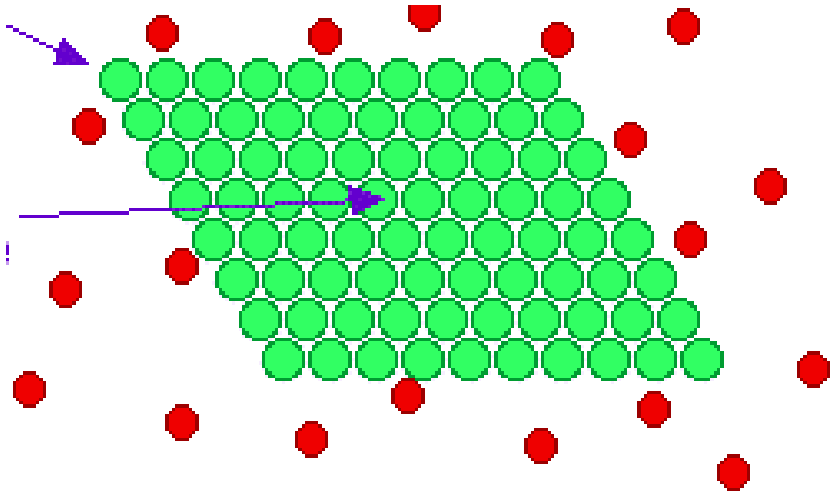
If the surface area of a reactant is increased:

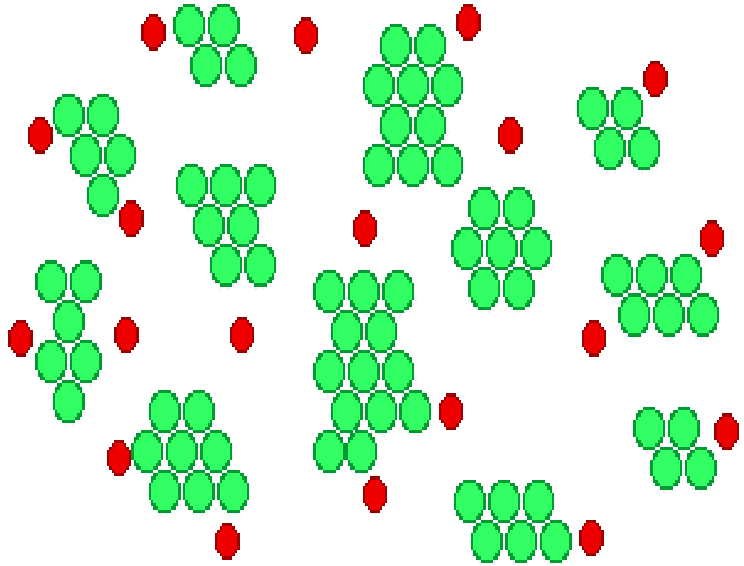
- more particles **are exposed** to the other reactant
- there is a **greater chance** of particles colliding, which leads to more successful collisions **per second**

With the same number of particles but now split into smaller bits, the number of particles on the surface (exposed to the reactant) will increase

The reaction will take place only on the surface

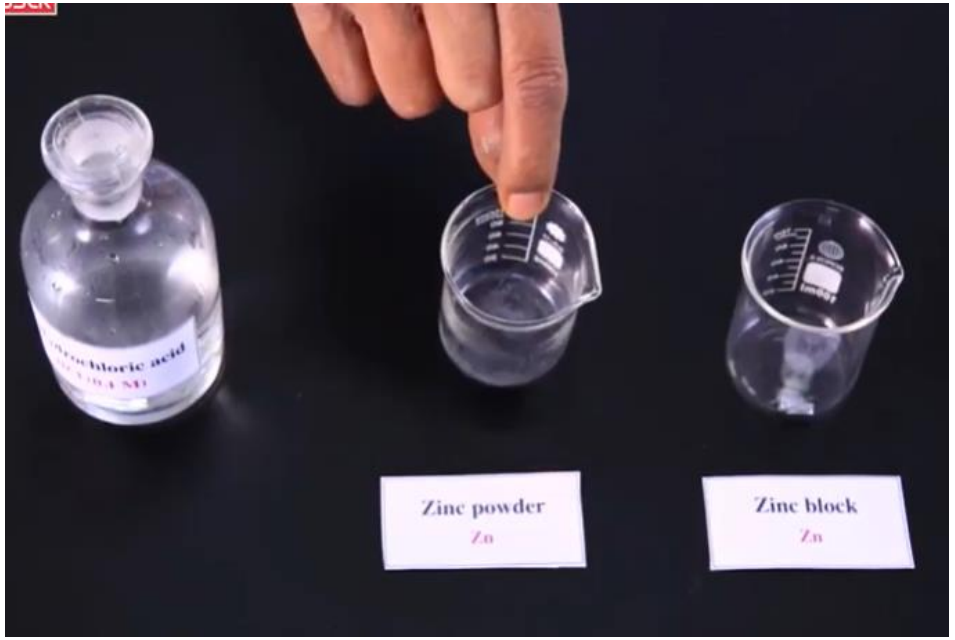
But some particles are not exposed to the reactant



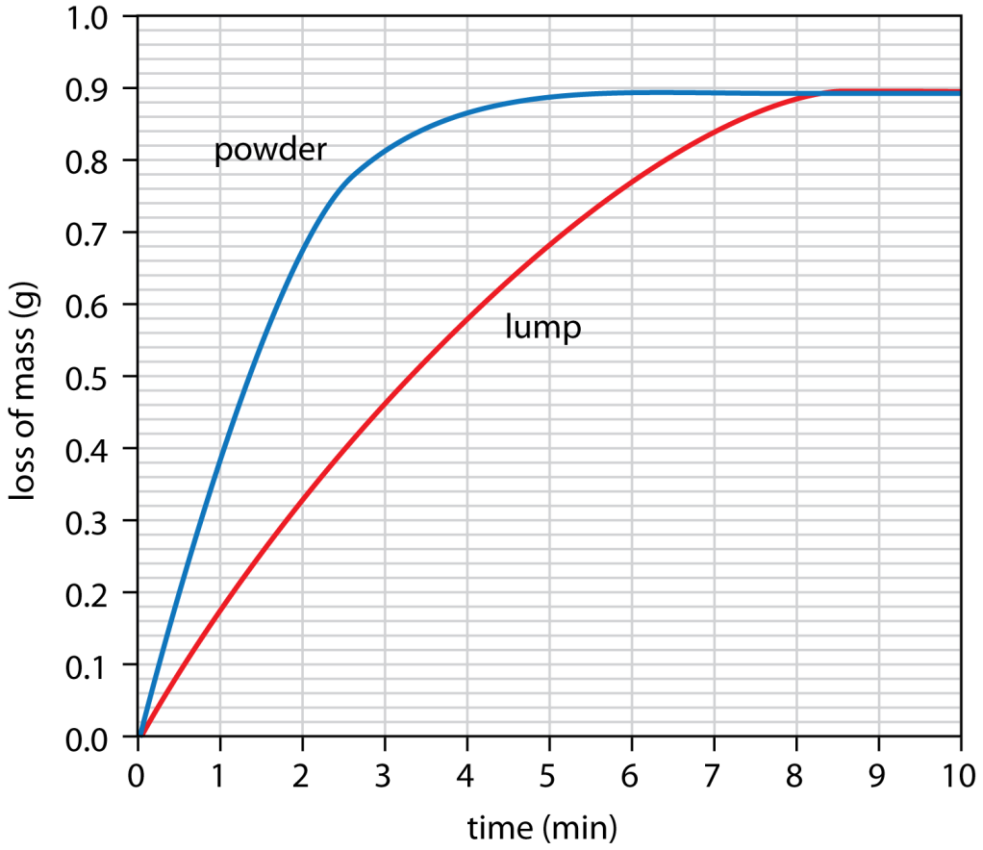


Examples:

- https://www.youtube.com/watch?v=Qq4nqbxYddY



- https://www.youtube.com/watch?v=BWN8xVuzuFI



The graph shows what happens when the same mass of calcium carbonate reacts with excess hydrochloric acid.

It took the powder around 5 minutes to finish the reaction, where it takes around 8 minutes for the lump (of the same mass) to finish the reaction