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# Introduction to Mixing

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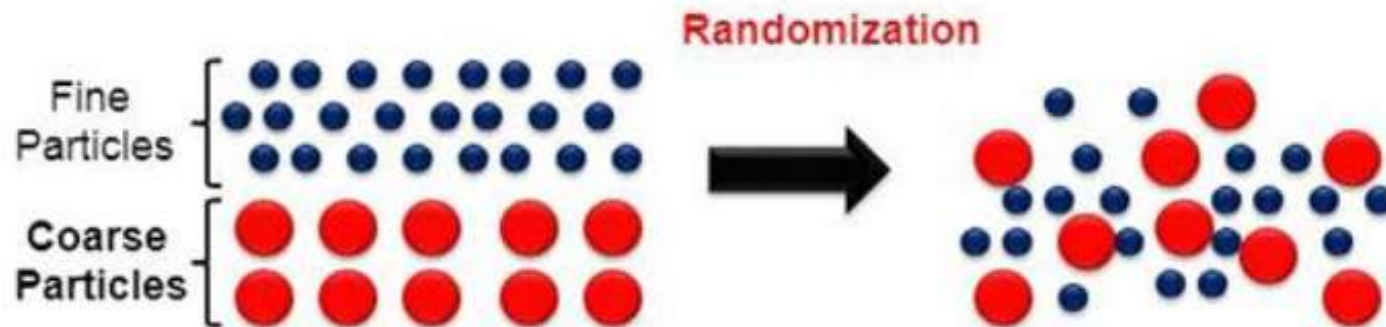
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# Introduction

## Definition

- Mixing is a process that results in **randomization** of dissimilar particles within a system.





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# Definition of mixing

- ▶ Mixing may be defined as a unit operation in which two or more components, in an unmixed or partially mixed state, are treated so that each unit (particle, molecule etc.) of the components lies as nearly as possible in contact with a unit of each of the other components.



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## Objective of mixing

- ▶ To ensure uniformity
- ▶ To initiate or to enhance the physical or chemical reactions e.g. diffusion, dissolution etc.
- ▶ To make the following products:
  - Tablets
  - Suspensions
  - Emulsions
  - Pastes
  - Creams
  - Ointments
  - Solutions
  - Syrups
  - Tablet coatings





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## TYPES OF MIXTURES AND ENERGY REQUIREMENTS

There are 3 types of mixtures:

- ✓ positive mixtures:
  - ▶ Formed from materials such as, gases or miscible liquids.
  - ▶ The materials mix spontaneously and irreversibly by diffusion
  - ▶ No input of energy if time of mixing is unlimited, although time will be shorten if energy is supplied.



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✓ negative mixtures:

- materials have the tendency to separate out from each other.
- Energy needs to be supplied to keep components adequately dispersed.
- Some separate faster, while for others, the separation is slower.
- For example,
  - a) In a suspension, there is the dispersion of solid in the solution (fast separation)
  - b) Emulsions, creams and viscous suspension have a slow separation.
  - c) Are more difficult to be formed and require high degree of mixing efficiency.



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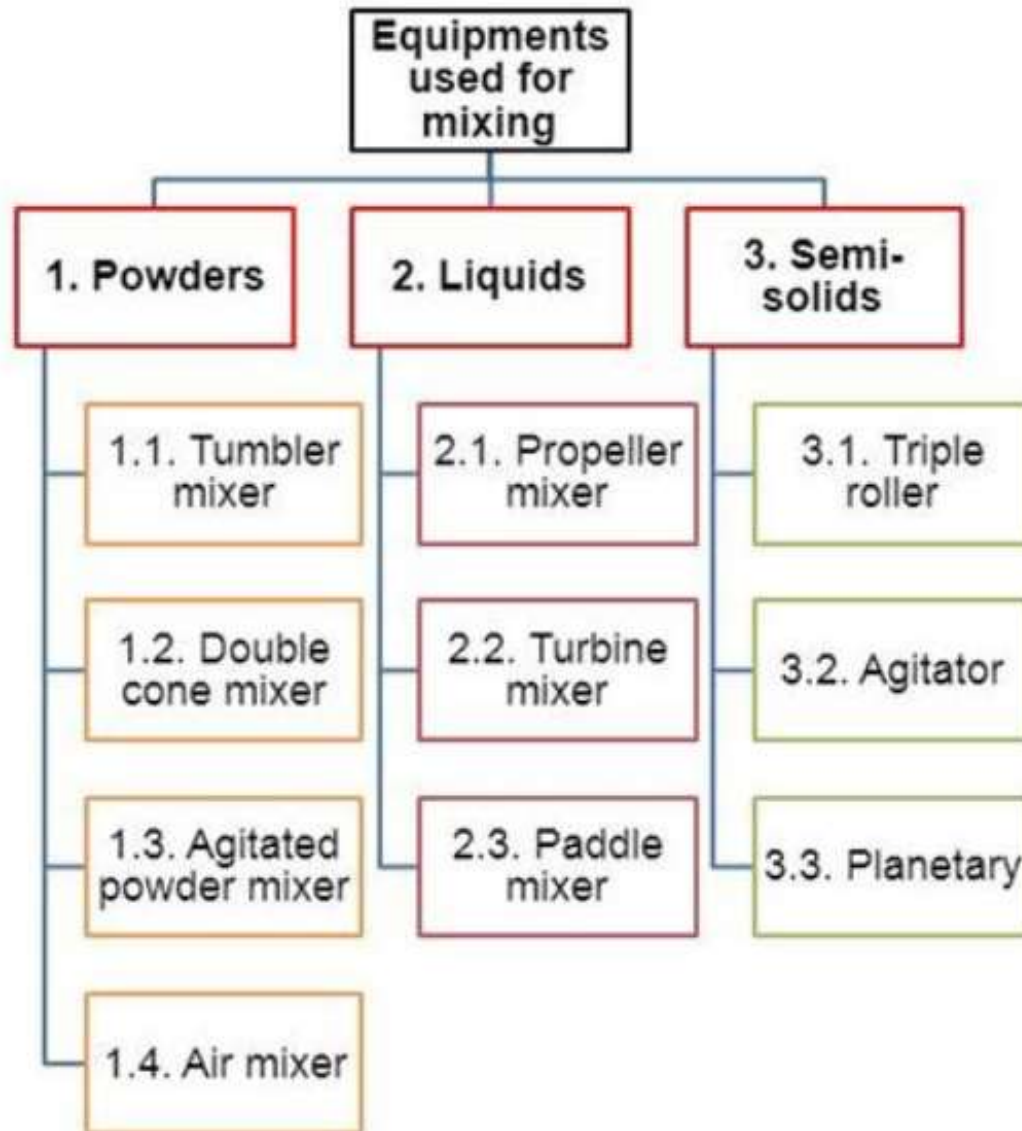
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- ✓ Neutral mixtures:
- ▶ Are static in behaviour
- ▶ Neither mixing nor de-mixing occurs, unless acted upon by an external system of forces.
- ▶ Examples are:
  - a) Mixed powders
  - b) Pastes
  - c) Ointments.



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**4. Homogenization** (Mixing of immiscible Liquids)

- 4.1. Hand homogenizer
- 4.2. Silverson homogenizer
- 4.3. Colloidal mill

**5. Viscosity**





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Thank you

