Industrial Pharmacy II
5th Stage
College of Pharmacy

Lab 4
Wet Granulation Method

By : Dr. Mahmood Raad Atta
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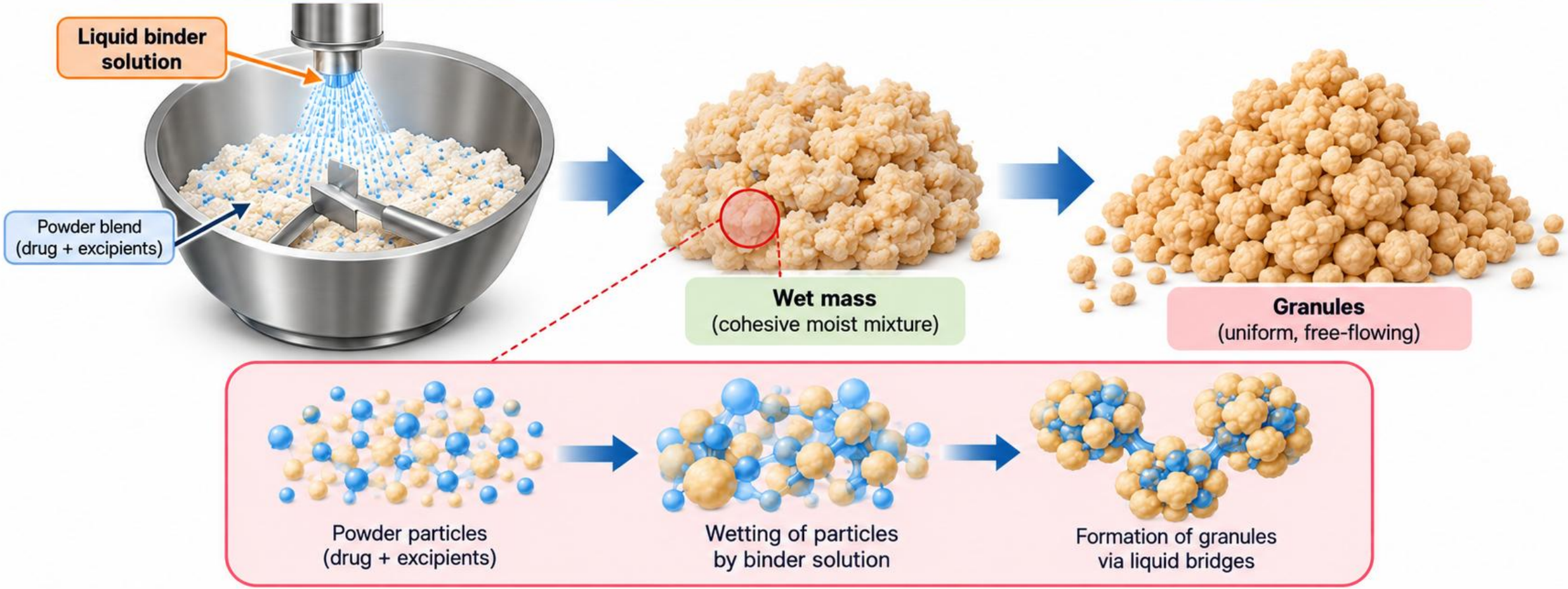
Wet Granulation

Wet granulation is the most widely used process of agglomeration in the pharmaceutical industry, where a **liquid binder** is added to a powder blend to form a wet mass, which is then dried and sized to produce **granules suitable for compression into tablets or filling into capsules**.



Wet granulation

- The wet granulation employs **water or alcohol** as granulating liquid, binder usually added to the granulating liquid to obtain solution or suspension containing binder used to bind powder and form granules. However, the binder some times is added as a dry powder followed by addition of granulating liquid.

Granulating liquid

- -Volatile
- -Non-toxic

e.g.

Water, Ethanol , Isopropanol

Binding agent-

Natural Polymers:

Starch, Pregelatinized Starch

synthetic binders:

PVP, MC, HPMC, Maltrodextrins

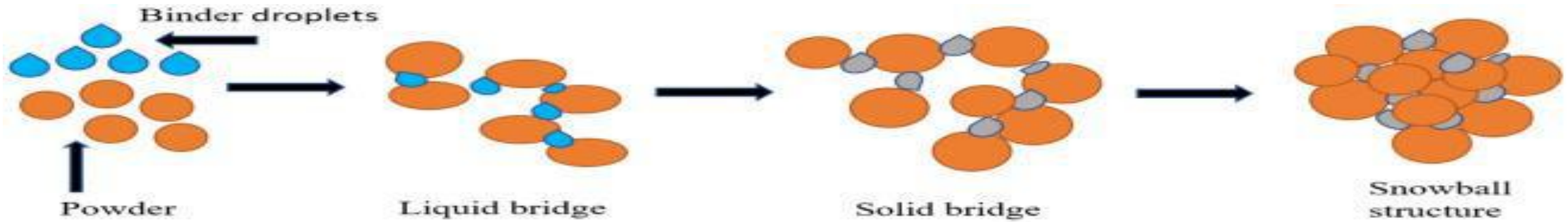
The method of introducing the binder (as a liquid or dry) depends on:(important)

1. **Solubility of the binder** : the prepared solution should be fluid enough to disperse readily in the mass.
2. **Components of the mixture**: the mixture should be moist, and there is a limit to the amount of the solvent added (granulating liquid).

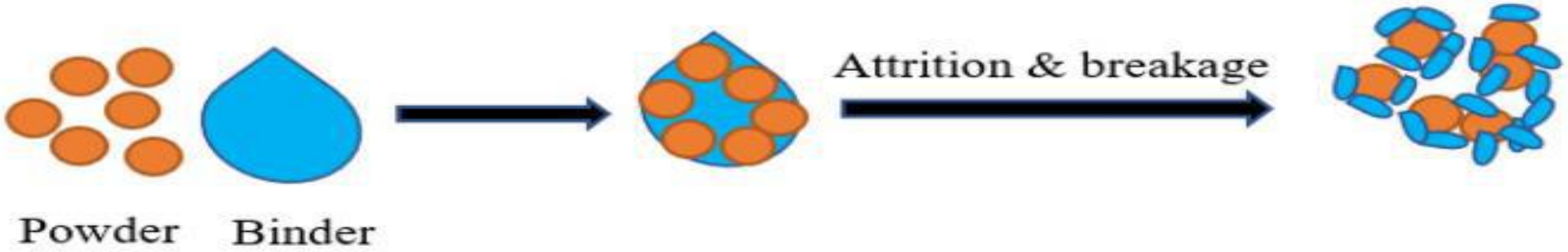
Important notes:

- When a small amount of solvent is needed, the binder is added as **dry powder** but when large quantity is required, the binder is added as a **solution**.
- Over-wet mass dries slowly and forms hard aggregates which in turn convert to powder again during milling

Mechanism of granule formation in wet granulation, (A)Solid particlesize >l iquid droplet. (B)Liquid droplet > solid particle.



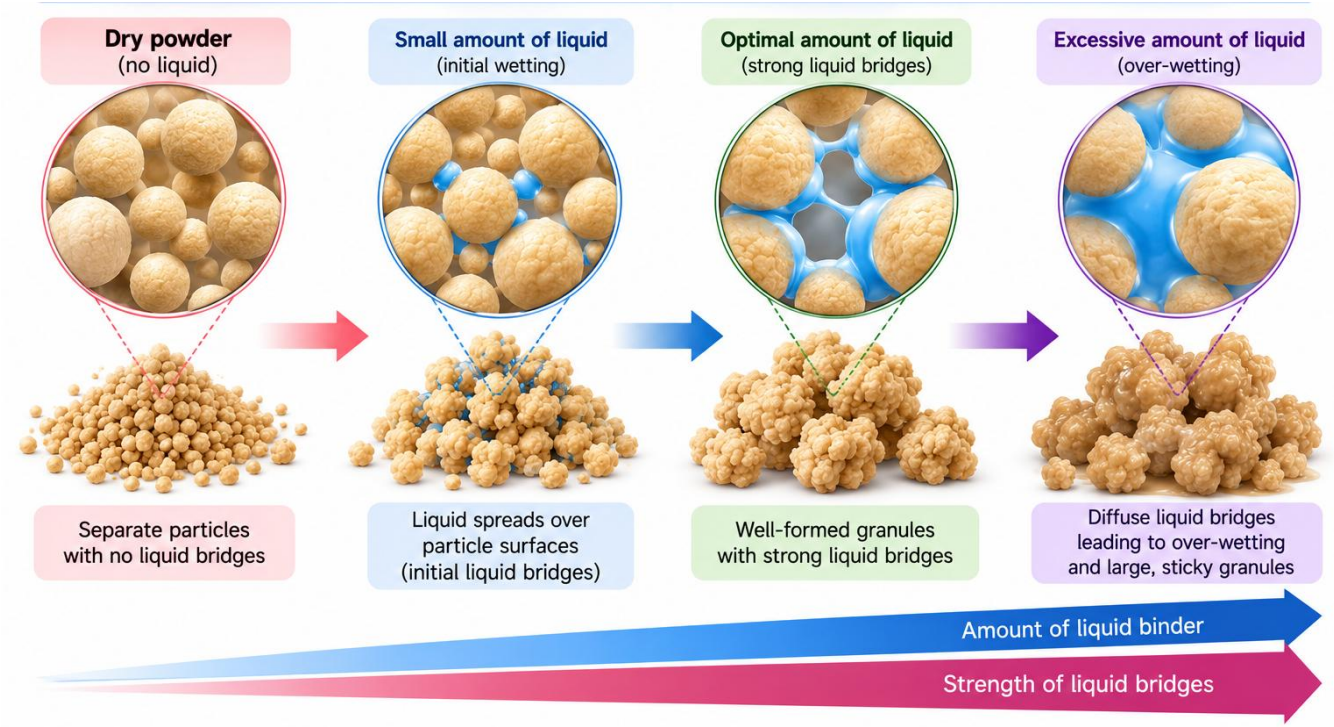
(A)



(B)

Role of liquid in granulation process

- The liquid plays a key role in the granulation process, **liquid bridges** are developed and the strength of these bridges increases as the amount of liquid binder increases.



Problems in wet granulation:



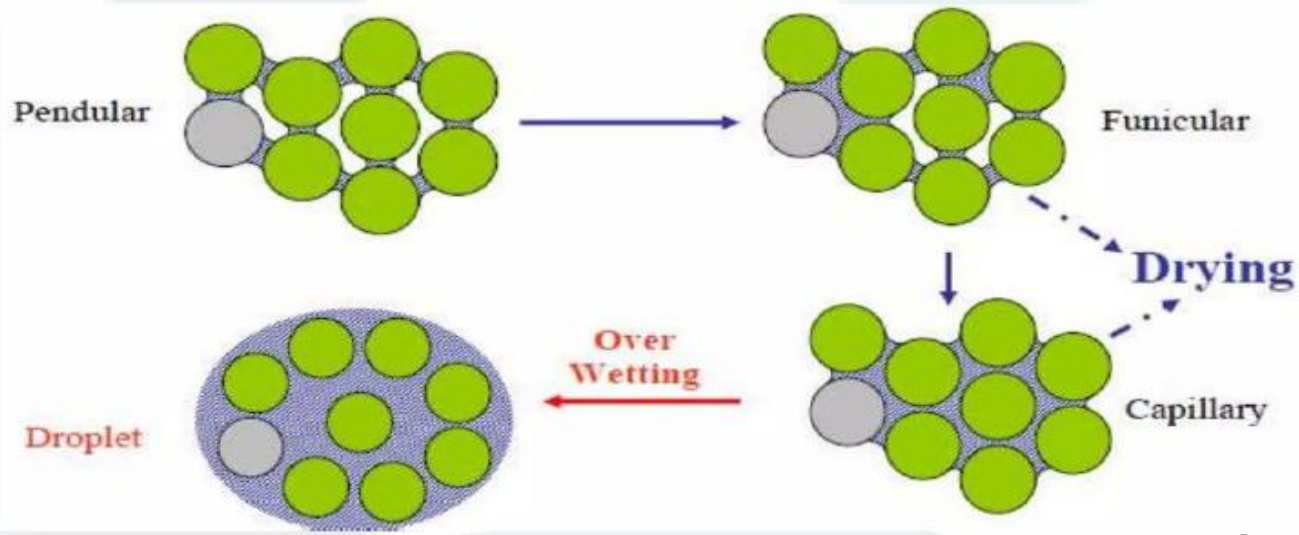
A-Over wetting :

Can be lead to:

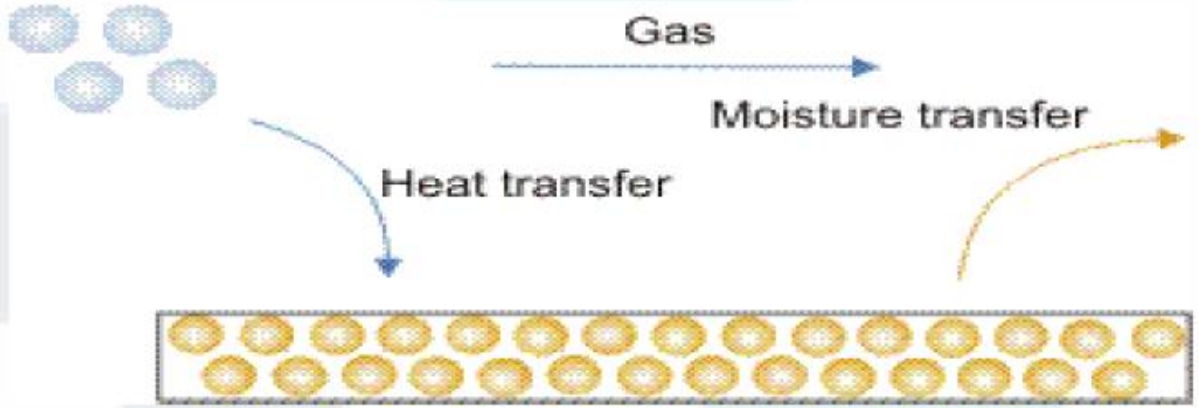
1 -A hard aggregate.

2- Some of the materials may block the sieve or screen.

3 -Slows the drying process.



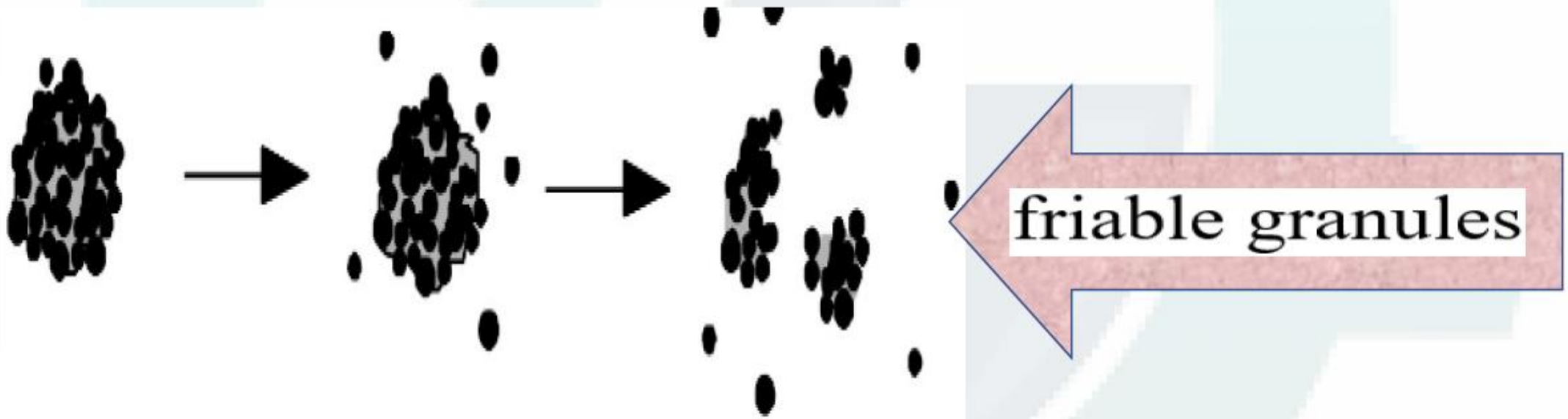
Problems in wet granulation:



B-Over drying:

Can be lead to:

weak forces and friable granules.



(A)

Granules size lower than 0.84 mm



FAILURES OF AGGREGATION PHENOMENA

(B)

Granules size (1.68 - 0.84) mm



BEST PERFORMANCE in terms of granulation yield and flowability

(C)

Granules size greater than 1.68 mm



OVERWETTING PHENOMENA

Steps Involved in Wet Granulation

1. Mixing of the drug(s) and excipients,
2. Preparation of binder solution,
3. Mixing of binder solution with powder mixture to form a wet mass,
4. Coarse screening(WET) of wet mass using a suitable sieve (sieve no. 6 -12)
5. Drying of moist granules,
6. Screening (DRY) of dry granules through a suitable sieve (sieve no. 14 -20)
7. Mixing of screened granules with disintegrant, glidant, and lubricant, and
8. Tablet compression

Experimental study of 500 mg paracetamol tablet prepared by wet granulation

- Investigated 500 mg paracetamol tablet :

Ingredient	Amount per tablet (mg)	Function
Paracetamol	**500**	Active ingredient (API)
Lactose	**33**	Diluent
Starch (intragranular)	**33**	Diluent / disintegrant
Starch paste (as binder)	**20**	Binder (prepared from starch)
Talc	**30**	Glidant / antiadherent
Magnesium stearate	**4**	Lubricant
Total tablet weight	**620 mg**	


THANK
YOU