Wet Granulation

Wet Granulation

- It is the process of formation granules by binding the powder together by using an adhesive (binder) instead of compaction.

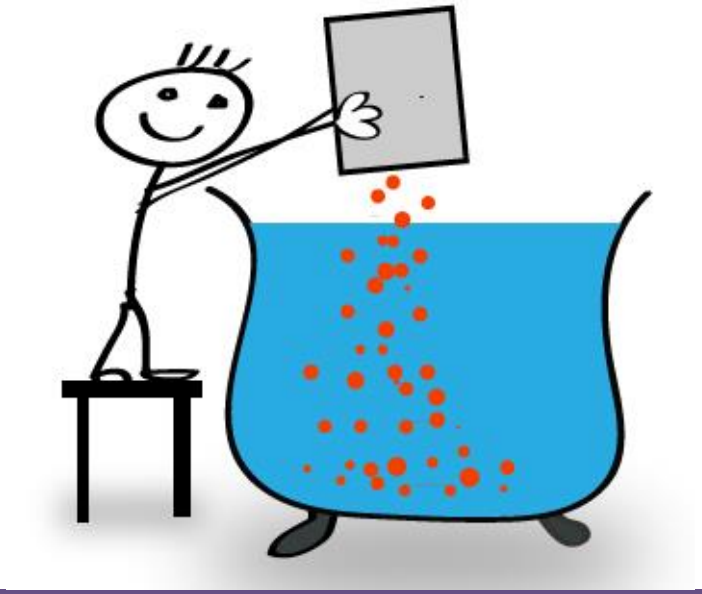
- The wet granulation employs water or alcohol as granulating liquid, binder usually added to the granulating liquid to obtain solution or suspension containing binder used to bind powder and form granules.

- However, the binder sometimes is added as a dry powder followed by addition of granulating liquid.

Wet Granulation

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

1. Solubility of the binder: the prepared solution should be fluid enough to disperse readily in the mass.



Wet Granulation

2. Components of the mixture: the mixture should be moist, and there is a limit to the amount of the solvent added (granulating liquid).

When small amount of solvent is needed, the binder added as dry powder but when large quantity is required, the binder added as solution.

Over-wet mass dries slowly and form hard aggregates which in turn convert to powder again during milling.

Wet Granulation

⦿ 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.

Surface tension forces and capillary pressure are responsible for formation of granules and strength; uniform dispersion is obtained at the beginning followed by consolidating of the particles.

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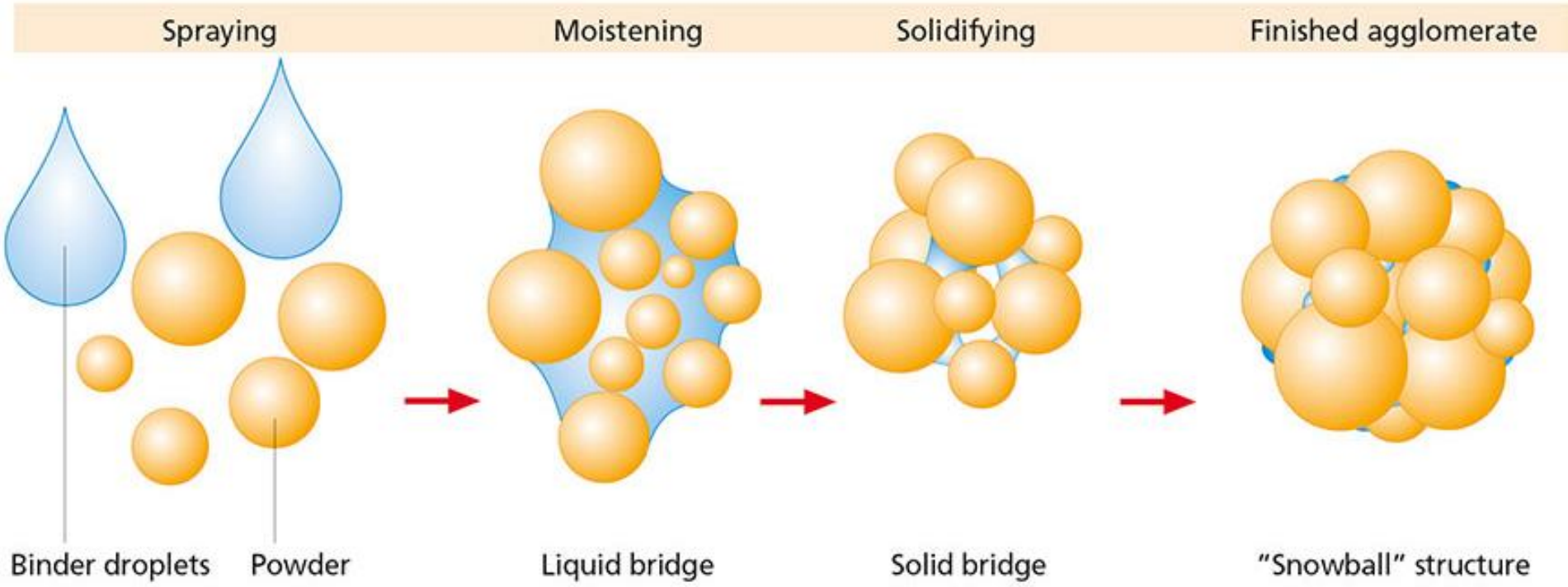

Wet Granulation

⦿ Advantages of wet granulation

1. **Improve powder compressibility because the added binder coats the particles individually and hence less compression force is needed for compression.**

2. **Good and uniform distribution of low dose drug and colours. At the same time suitable for high dose drugs.**

Wet Granulation

3. No segregation of particles, because granulation homogenises the size and shape of particles (good flowability)

4. Dissolution rate may improve for hydrophobic drugs as a result of using certain binders.

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⦿ Disadvantages of wet granulation

1. Expensive method and needs large space, labour, and equipment.
2. Needs more time compared to other methods.
3. Cannot be used for moisture or heat sensitive drugs.
4. Increase incompatibility between ingredients.
5. Modification of crystal shape leads to change in disintegration and dissolution properties.
6. Migration of dyes.

Wet Granulation

Experimental work

- Sulfadiazine was selected as a model drug to be prepared by wet granulation method.
- Sulfadiazine is weak base, white powder, stable in dry air and not affected by moisture or heat but decomposed in presence of light.
- According to these properties the preferable method for preparation is wet granulation method.

Wet Granulation

General procedure

1. According to the optimized formula, weigh the ingredients except the lubricant and mix them (after preparation of different solution binders acacia, gelatine and starch).

2. Add the binder solution drop by drop to the mixture until a wet mass is obtained (positive ball test).

Wet Granulation

General procedure

3. Sieve the wet mass to obtain suitable granules size.

4. Dry the wet granules for 10 minutes.

5. Homogenize the dried granules.

6. Weigh the granules and calculate real number of tablets to know the exact amount of lubricant that should be added.

Wet Granulation

General procedure

7. Compress after addition of lubricant.

8. Measure the hardness to show the effect of using different binders.

Wet granulation

Formula

1-Sulfadiazine **500 mg**

2-Calcium carbonate **250 mg**

3-Explotab **50 mg**

4-Zin stearate 10mg

5- Acacia 10 % ?

a-Calculate the weight of acacia in each tablet

(If we use for example 5 ml of (10%w/v)

10 gm 100 ml

x 5ml = **0.5 gm** for 10 tablets

Formula

1-Sulfadiazine 500 mg

2-Calcium carbonate 250 mg

3-Explotab 50 mg

4-Zin stearate 10mg

5- Acacia 10 % ?

a-Calculate the Exact amount of lubricant (Zinc stearate)

1- Weigh the granules formed after drying and take 1% to find amount of lubricant (for example weight of granules is 4500 mg

Amount of lubricant = 1% of granules = 1 * 4500/100 = 45 mg

Formula

1-Sulfadiazine 500 mg

2-Calcium carbonate 250 mg

3-Explotab 50 mg

4-Zin stearate 10mg

5- Acacia 10 %

a-Calculate the Exact amount of lubricant (Zinc stearate)

2- by calculation Real number of tablets

Real number = weight of granules / weight of one tablets without lubricant

Exact amount of lubricant = real number * amount of lubricant in one tablet


Thank You