Useful aspects of film coating are as follows:

1. Coating time and cost are low.
2. The weight and volume of the tablet do not increase much (10 %, 20-200 µm).
3. It does not crack easily because it is flexible.
4. It does not cover the signs and texts on the tablet.
5. It protects cores against external influences, moisture, light and air.
6. It does not have much effect on disintegration time.
7. It easily provides to combine incompatible materials in the form of separate layers in the same dosage form.
8. Coating solutions are made with organic liquids. However, aqueous dispersions can also be used. Even today, they are preferred for health, safety and environmental protection.
9. It can be applied to modify the release rate.
10. Not only tablets, but also capsules, granules, powders, active substance crystals and inert beads may be coated.

Film coating types

Non-functional

- Appearance
- Taste
- Color
- Patient acceptability
- Stability
- Discrimination

Functional

- Protect from various physiological conditions
- To reach the absorption zone
- To provide a modified active substance release
- To prevent damage to the GI mucosa

Active coating

- The active substance in the coating

Polymers used in non-functional (IR) film coating

Polymer groups	Examples
Cellulose derivatives	Hydroxypropyl methylcellulose Hydroxypropyl cellulose Hydroxyethyl cellulose
Vinyl polymers	Poly (vinylpyrrolidone) Poly (vinyl alcohol) Poly (vinylpyrrolidone) and poly (vinyl acetate) copolymers Poly (vinyl alcohol) and poly (ethyleneglycol) copolymers
Glycols	Poly (ethyleneglycol)
Acrylics	Amino alkyl methacrylate copolymers
Other carbohydrates	Maltodextrins Polidextrose

Polymers used in film coating for modified release

Delayed release (enteric release)	Extended release
Cellulose acetate phytalate	Fats and waxes (wax; carnauba wax; cetyl alcohol; cetostearyl alcohol)
Cellulose acetate trimellitate	Shellac
Polivinyl acetate phytalate	Zein
Hydroxypropyl methylcellulose phthalate	Ethyl cellulose
Hydroxypropyl methylcellulose acetate succinate	Cellulose esters (i.e. acetate ester)
Poly (MA – EA) (1:1) (Eudragit L100)	Acrylic ester copolymers Poly(ethyl acrylate-co-methyl methacrylate-co-trimethylammonioethyl methacrylate chloride) (Eudragit RL ve RS)
Poly (MA – MMA) (1:2) (Eudragit L100-55)	
Poly (MA – MMA) (1:2) (Eudragit S100)	

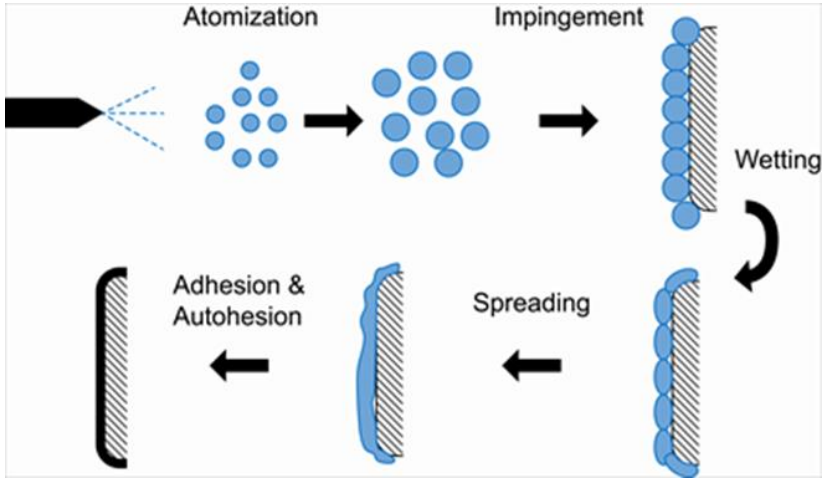
Plasticizers

1. They reduce the fragility of the film.
2. They increase the film flexibility.
3. They reduce the film forming temperature of polymers (Tg, MFFT).
4. The choice of plasticizers depends on the polymer used.
5. They can affect film permeability depending on their chemical structure.
6. They increase the adhesion of the film on the core.

PLASTICIZERS

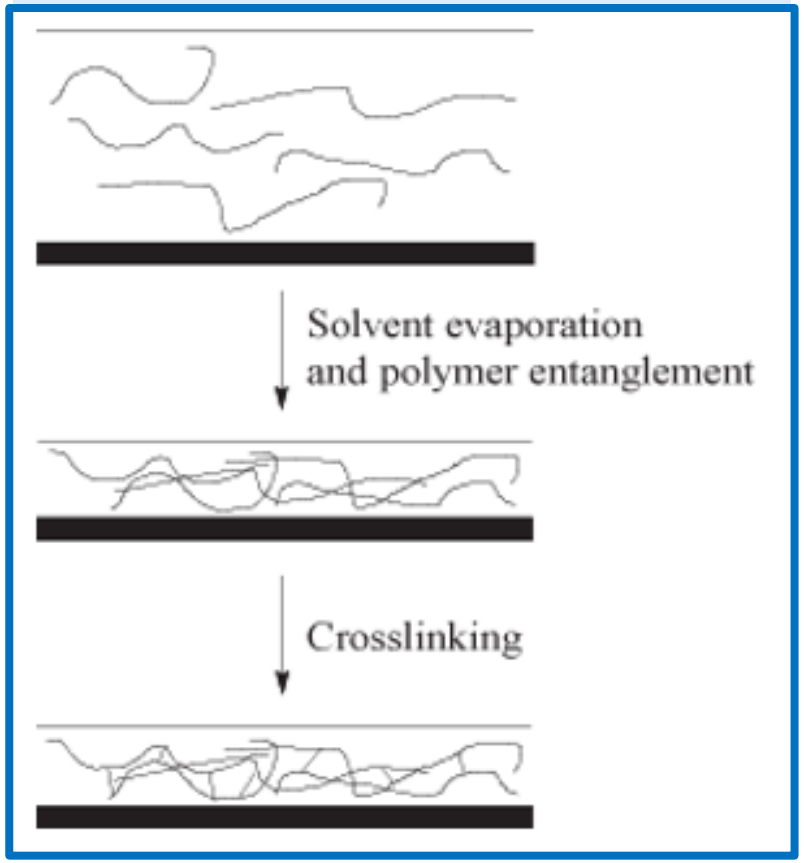
Polyhydric alcohols	• PG • Glycerol • PEGs
Acetate and citrate esters	• Glyceryl (Triasetin) • Trietil citrate ; Acetyl triethyl citrate • Tributyl citrate; Acetyl tributyl citrate
Phytalate esters	• Diethyl phytalate • Dibutyl phytalate • Dimethyl phytalate
Sebacate esters	• Diethyl sebacate • Dibutyl sebacate
Glycerids	•Glycerol monostearate
Oils	• Indian oil • Liquid paraffin
Polymers	• POE/POP copolymers

Film formation

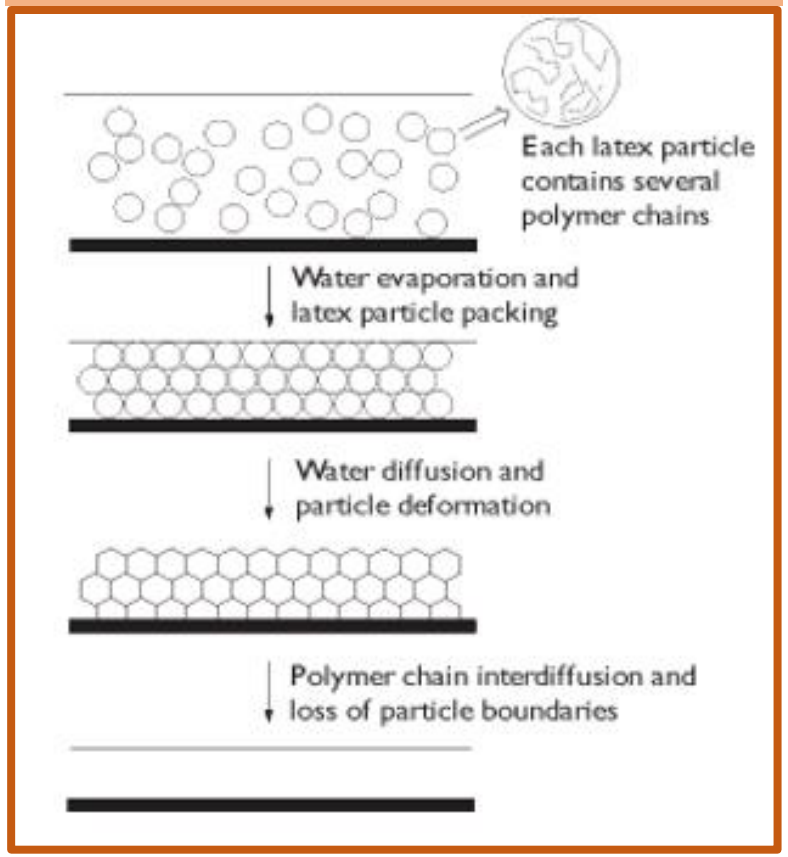


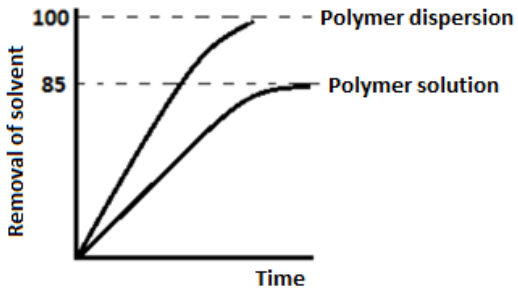
- Increasing the concentration of polymer with a rapid solvent evaporation from the droplets and the surface of the core,
- When the solvent is removed from the core surface by diffusion and at a low speed, the polymer concentration on the surface for the formation of the film increases to the point where the polymer molecules become immobilized,
- The solidification point where the molecules of the polymers are immobilized on the surface,
- Diffusion of residual solvent from dry membrane.

Film formation from polymer solutions

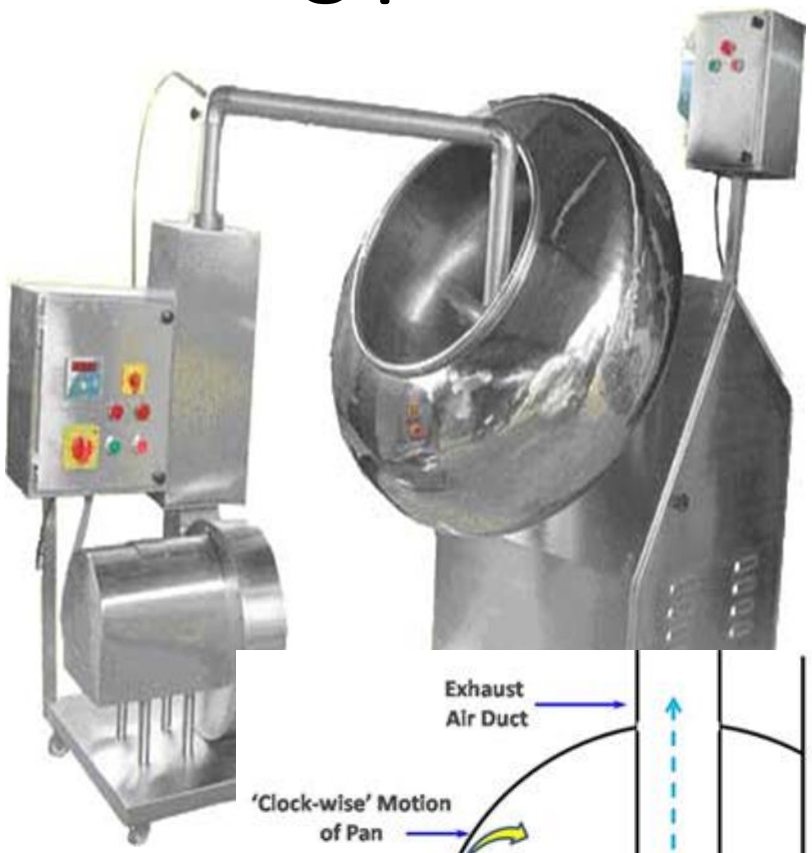


Film formation from aqueous polymer dispersions





Coating pan



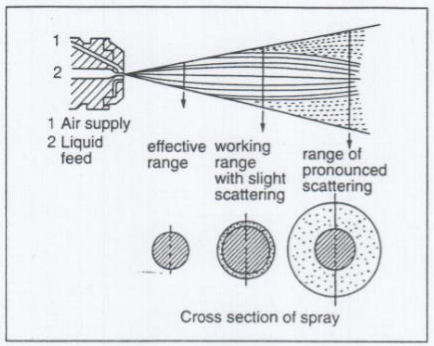


Fig. 7–4. Spray of an air nozzle

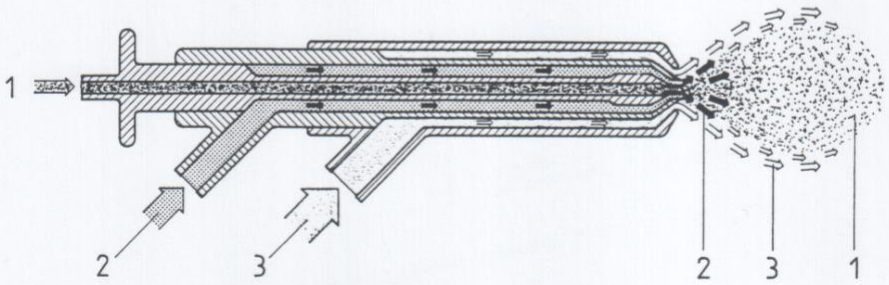
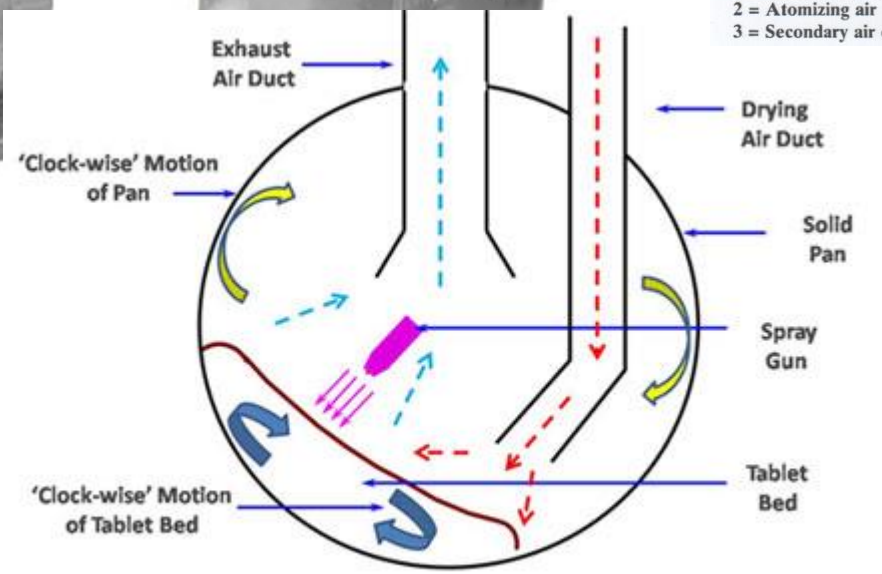


Fig. 7–5. Hüttlin 3-component nozzle (intern. pat.)
1 = Coating Liquid
2 = Atomizing air
3 = Secondary air or gas



Conventional coating pan (front view)

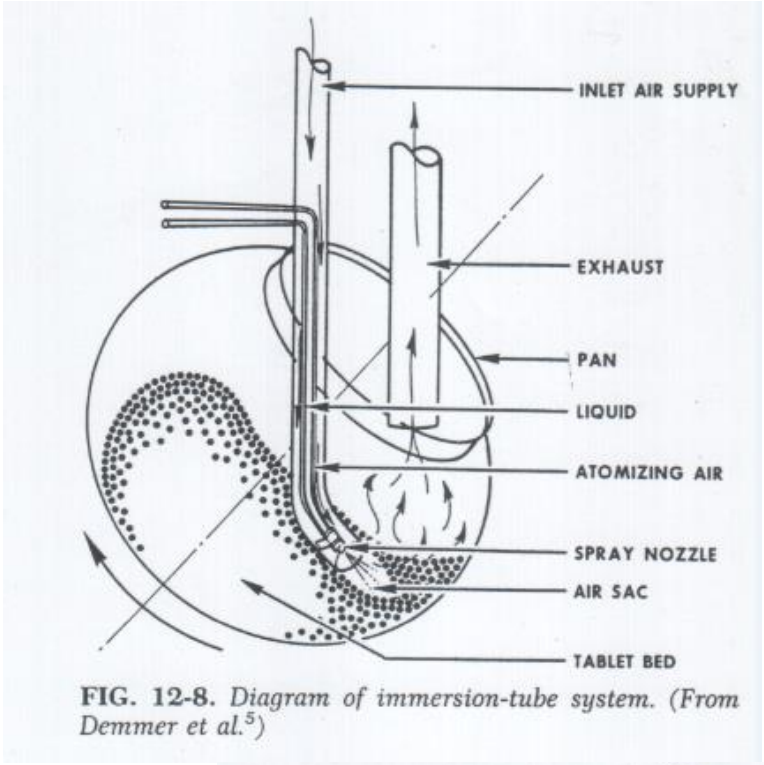


FIG. 12-8. *Diagram of immersion-tube system. (From Demmer et al.[5])*

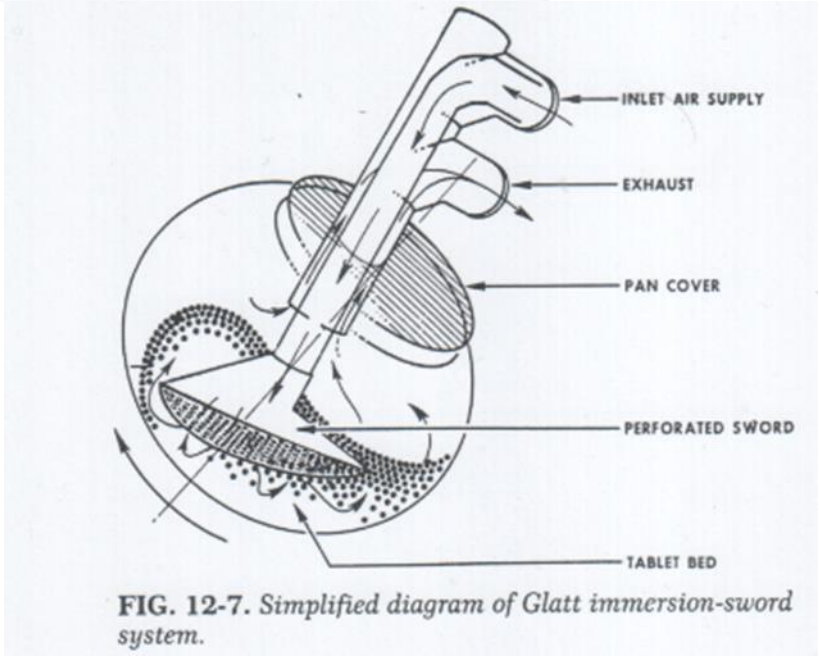


FIG. 12-7. *Simplified diagram of Glatt immersion-sword system.*

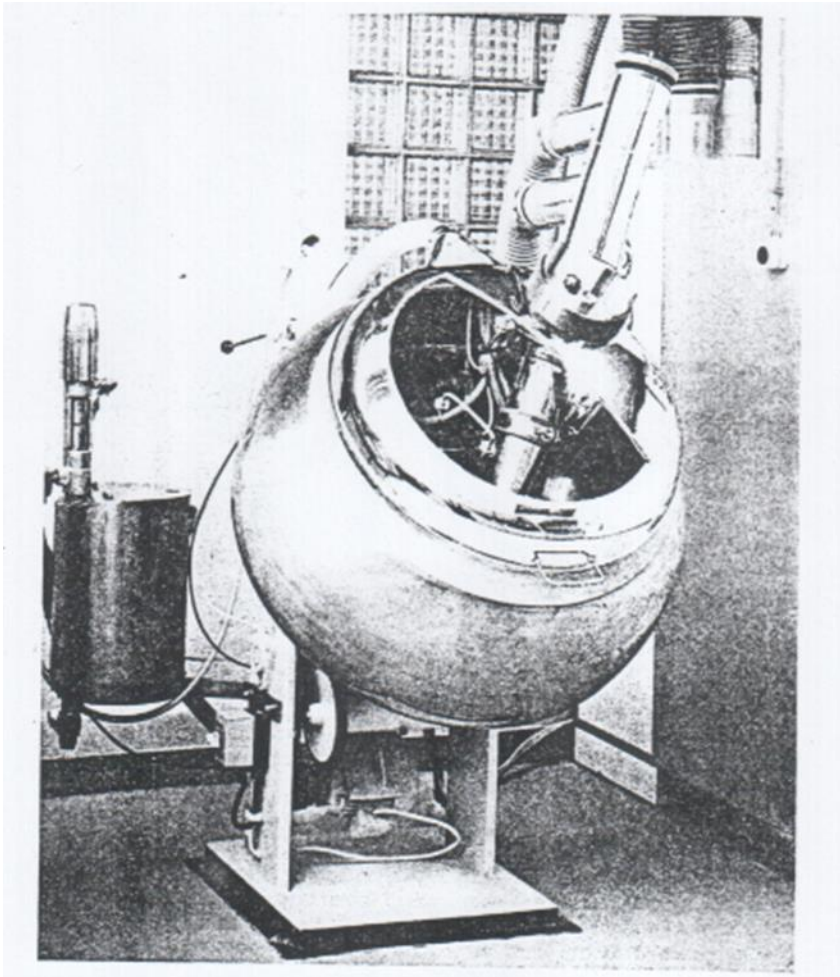
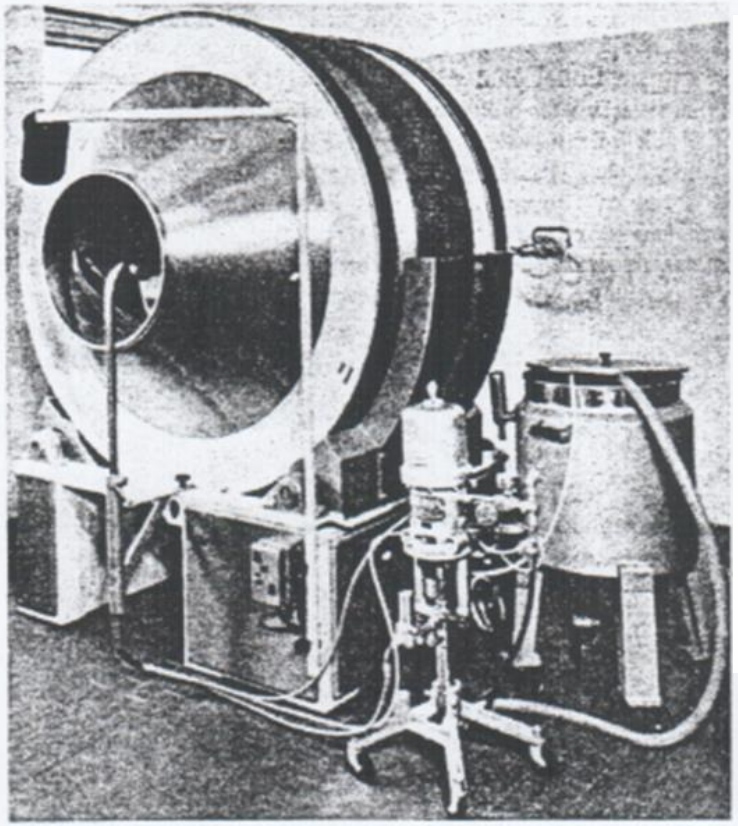
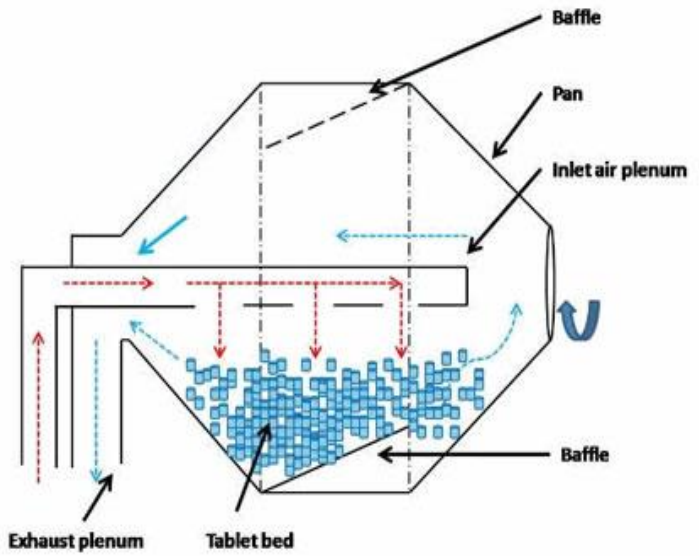


Figure 13 Illustration of conventional coating pan with Glatt "immersion sword" apparatus installed. (Courtesy of Glatt Air Techniques, Ramsey, New Jersey.)





Modified pan coating (side view)

Fig. 7–13. Pan rotating on a horizontal axis (Pietro Pellegrini, Milan, Italy)

Figure 14 Illustration of Pellegrini coating pan. (Courtesy of Nicomac, Englewood, New Jersey.)

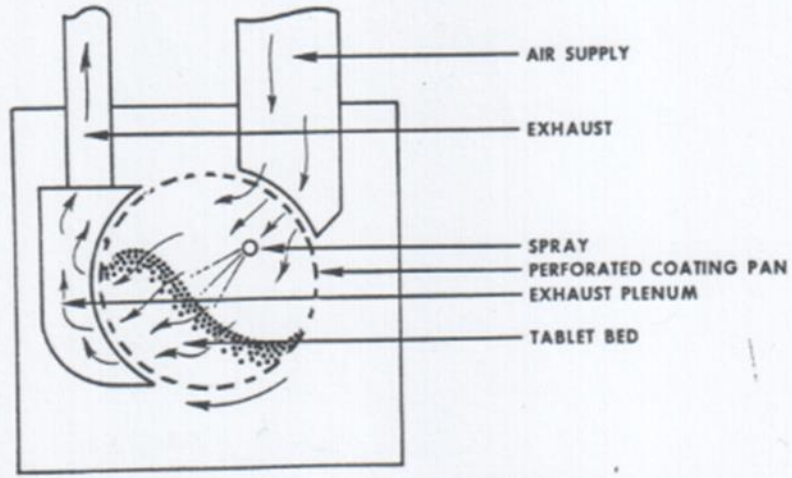


FIG. 12-9. *Simplified diagram of Accela-Cota system.*

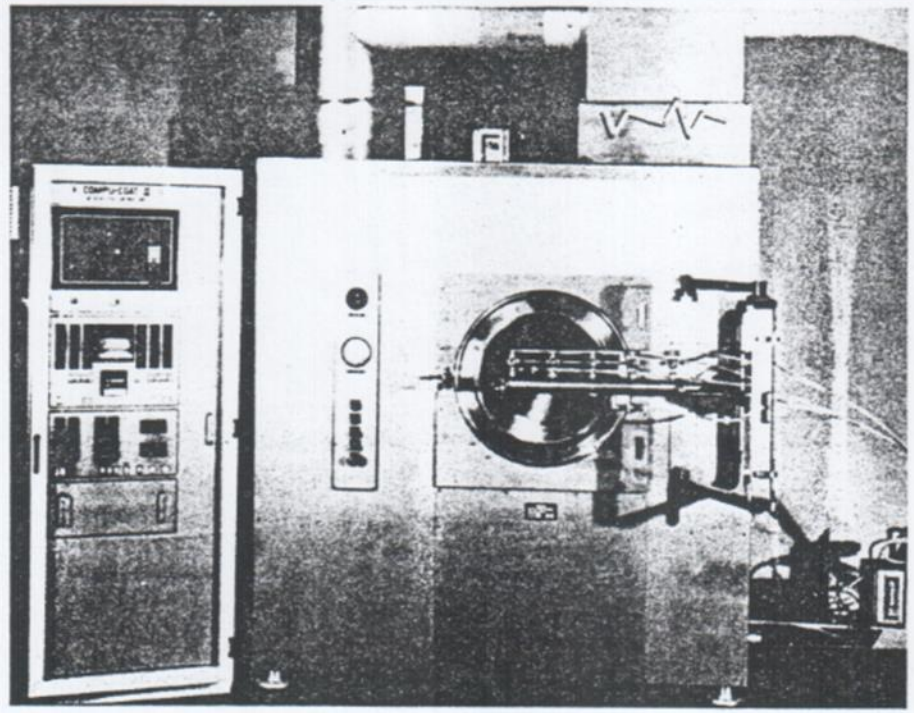
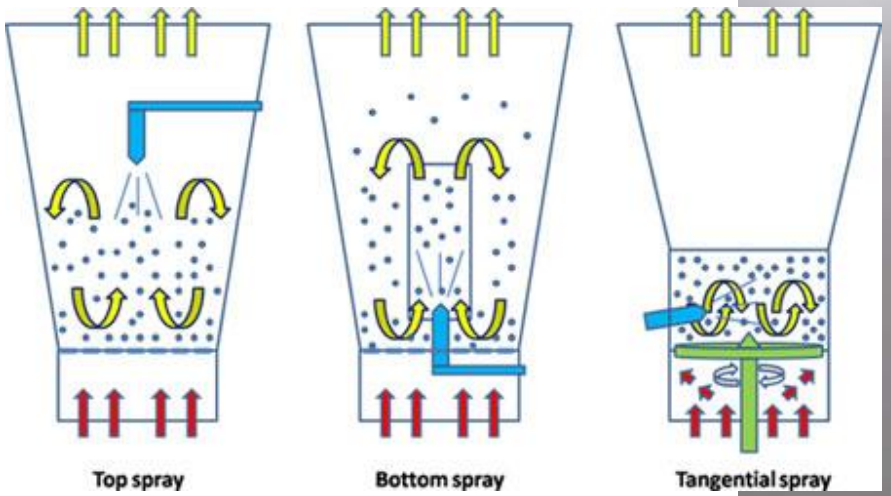


Figure 17 Illustration of Accela-Cota coating equipment. (Courtesy of Thomas Engineering, Hoffman Estates, Illinois.)

Akışkan yatak (fluid bed) sistemi



Tablet sınıfları ve tipleri

(A) Oral tablet for ingestion

1. Uncoated tablets
2. Multiple compressed tablets
3. Delayed action tablets (gastro-resistant)
4. Modified release tablets
4. Sugar coated
5. Film coated tablets
6. Chewable tablets

(B) Tablet used in oral cavity

1. Buccal tablets
2. Sublingual tablets
3. Troches and Lozenges
4. Orodispersible tablets
4. Dental cones

(B-C) Oral lyophilisates

(C Tablets used to prepare solution or dispersion

1. Effervescent tablets
2. Soluble tablets
3. Dispersible tablets
4. Tablet triturates

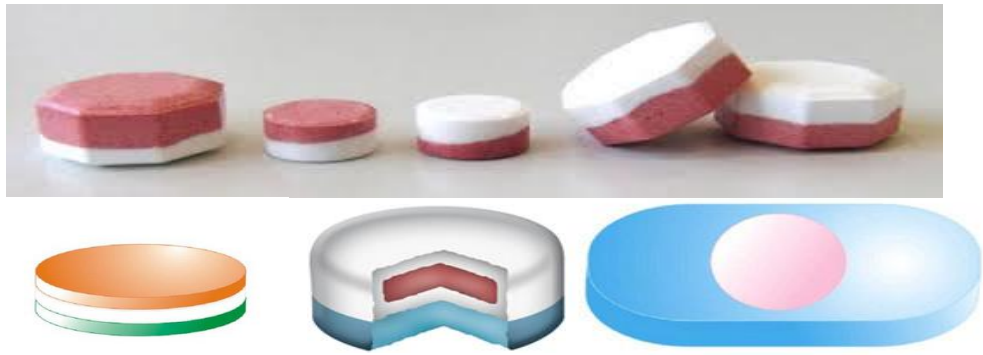
Oral

5. Hypodermic tablets
4. Dispensing tablets

(C) Tablet administered by other routes

1. Implantation tablets
2. Vaginal tablets

Multiple compressed tablets



Chewable tablets

Honey-tab: It is formed by drying the honey.

Mola-tab: It is formed by drying the syrup formed during the purification of the sugar.

CrystaFlo: It is formed by co-crystallization of caramel and syrup.

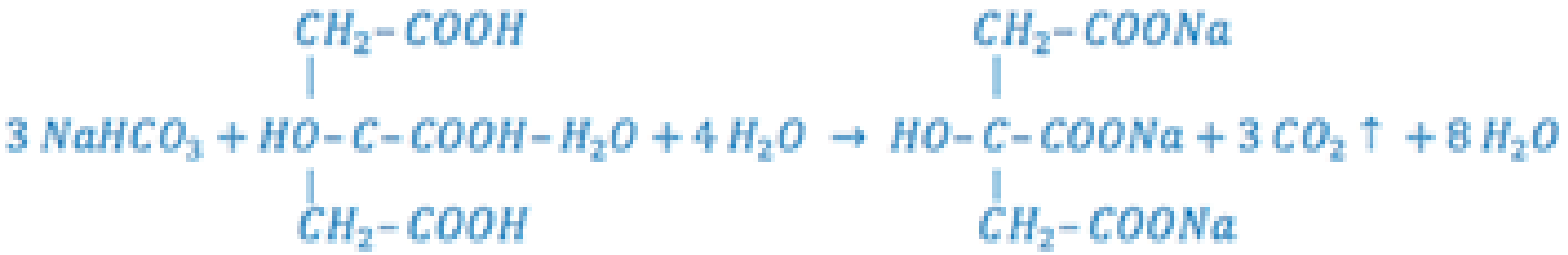
Di-Pac, NuTab: They are compressible sucrose.

Mannitab, Sorb-Tab: They are the compressible forms of mannitol and sorbitol.

Artificial sweeteners: They are used if necessary. Saccharin, aspartame, cyclamate and semisentetic glycyrrhizin (Magna sweet) can be used.

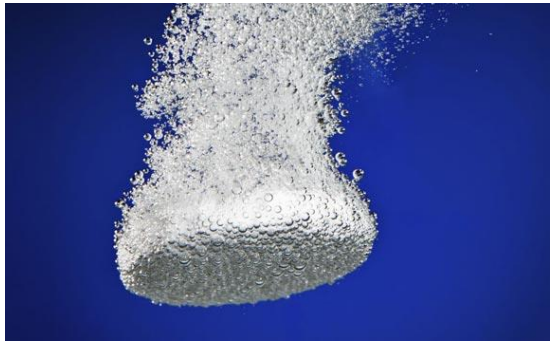
Flavoring agents: Fruit flavors, chocolate, cream and vanilla etc. are used.s

Effervescent Tablets



Citric acid

Tartaric acid



EFERVESCENT TABLETS

Acid sources:

- ✓ Acids occured in nature and used as food additives: citric acid, tartaric acid, malic acid, fumaric acid, adipic and succinic acids.
- ✓ Acid anhydrides: When mixed with water, they are hydrolyzed to the corresponding acid, which can react with the carbonate source such as succinic anhydride, citric anhydride.
- ✓ Acid salts: NaH2PO4, Na2HPO4, NaH2-citrate.

Carbonate sources: : $NaHCO_3$, Na_2CO_3, $KHCO_3$, K_2CO_3, Na-sesquicarbonate (Na_2CO_3 + $NaHCO_3$, equal weight), Na-glycine-CO_3 (aminoacetic acid + Na_2CO_3 complex), L-Lysine-CO_3.

Binders

Fillers

Lubricants

Sweeteners, flavoring agents,coloring agents

Granulation methods