

# PREPARATION OF SUPPOSITORIES

- **Suppositories are prepared by three methods:**
- **(a) molding from a melt,**
- **(b) compression, and**
- **(c) hand rolling and shaping.**

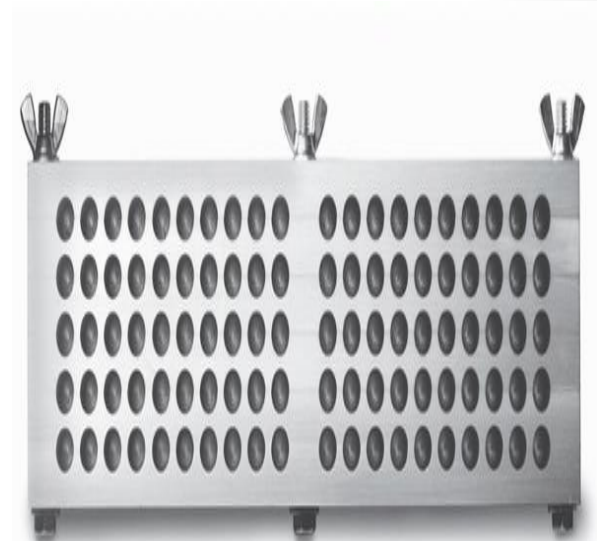
**The method most frequently employed both on a small scale and on an industrial scale is **molding**.**

# PREPARATION BY MOLDING

- **The steps in molding include**
- **(a) melting the base,**
- **(b) incorporating any required medicaments,**
- **(c) pouring the melt into molds,**
- **(d) allowing the melt to cool and congeal into suppositories,**
- **(e) removing the formed suppositories from the mold.**
- **Cocoa butter, glycerinated gelatin, polyethylene glycol, and most other bases are suitable for preparation by molding.**

# Suppository Molds

- Molds in common use today are made from **stainless steel, aluminum, brass, or plastic.**
- The molds, which separate into sections, generally longitudinally, are opened for cleaning before and after preparation of a batch of suppositories, closed when the melt is poured, and opened again to remove the cold, molded suppositories.
- Care must be exercised in cleaning the molds, as any scratches on the molding surfaces will take away from the desired smoothness of the suppositories. Plastic molds are especially prone to scratching.



# Lubrication of the Mold

- Depending on the formulation, suppository molds may require lubrication before the melt is poured to facilitate clean and easy removal of the molded suppositories.
- Lubrication is **seldom necessary** when the base is **cocoa butter (lubrication of mold by glycerin or polyethylene glycol)**, as these materials contract sufficiently on cooling to separate from the inner surfaces and allow easy removal.
- Lubrication is usually necessary with **glycerinated gelatin**. A thin coating of mineral oil applied with the finger to the molding surfaces usually suffices.
- However, **no material that might irritate** the mucous membranes should be employed as a **mold lubricant**.

# Preparing and Pouring the Melt

- 1-Using the least possible heat, the weighed suppository base material is melted, generally over a water bath, because not a great deal of heat is required. **A porcelain casserole**, that is, **a dish with a pouring lip and a handle**, is perhaps the best utensil, because it later permits **convenient pouring** of the melt into the cavities of the mold.
- 2-Usually, medicinal substances are incorporated into a portion of the melted base by mixing on a glass or porcelain tile with a spatula.
- 3- After incorporation, this material is stirred into the remaining base, which has been allowed to cool almost to its **congealing point**. **Any volatile materials or heat-labile substances should be incorporated at this point with thorough stirring**

# Molding from the melt

- 3-The melt is poured carefully and continuously into each cavity of the mold, which has been previously equilibrated to room temperature.
- If any un-dissolved or suspended materials in the mixture are denser than the base, so that they have a tendency to settle, constant stirring, even during pouring, is required, else the last filled cavity will contain a disproportionate share of the un-dissolved materials.
- The solid materials remain suspended if the pouring is performed just above the congealing point and not when the base is too fluid. If the melt is not near the congealing point when poured, the solids may settle within each cavity of the mold to reside at the tips of the suppositories, with the result that the suppositories may be broken when removed from the mold.
- Alternatively, a small quantity of silica gel (about 25 mg per suppository) can be incorporated into the formula to aid in keeping the active drug suspended.

# Molding from the melt



- **4-To ensure a completely filled mold upon congealing, the melt is poured excessively over each opening, actually rising above the level of the mold.** The excessive material may form a continuous ribbon along the top of the mold above the cavities. This use of extra suppository material **prevents formation of recessed dips in the ends of the suppositories and justifies preparation of extra melt.** When solidified, the excess material is evenly **scraped off of the top of the mold with a spatula warmed by dipping into a beaker of warm water;** this will make a smooth surface on the back of the suppository during trimming.
- The mold is usually placed in the refrigerator to hasten hardening.
- **5-When the suppositories are hard, the mold is removed from the refrigerator and allowed to come to room temperature. Then the sections of the mold are separated, and the suppositories are dislodged, with pressure being exerted principally on their ends and only if needed on the tips.** Generally, little or no pressure is required, and the suppositories simply fall out of the mold when it is opened.

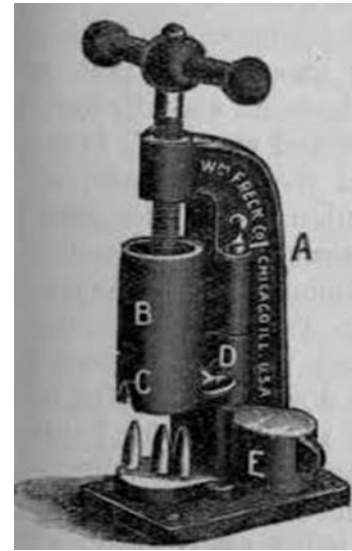
# PREPARATION BY COMPRESSION

- Suppositories may be prepared **by forcing the mixed mass of the base and the medicaments into special molds using suppository-making machines.** In preparation for compression into the molds, the base and the other formula ingredients are combined by thorough mixing, **the friction of the process softening the base into a paste-like consistency.**
- **On a small scale, a mortar and pestle may be used.** **Heating the mortar in warm water** (then drying it) greatly facilitates the softening of the base and the mixing.
- **On a large scale, a similar process may be used, employing mechanical kneading mixers and a warm mixing vessel**



# Compression

- Compression is especially suited for making suppositories that contain **heat-labile medicinal substances or a great deal of substances that are insoluble in the base.**
- In contrast to the molding method, compression **permits no likelihood of insoluble matter settling during manufacture.**
- The disadvantage to compression is that the **special suppository machine** is required and there is some limitation as to the shapes of suppositories that can be made



# Compression

- In preparing suppositories with the compression machine, the **suppository mass is placed in a cylinder**; the cylinder is closed; **pressure is applied from one end**, mechanically or by turning a wheel; and **the mass is forced out of the other end into the mold or die**. When the die is filled with the mass, **a movable end plate at the back of the die is removed**, and when additional pressure is applied to the mass in the cylinder, the formed suppositories are **ejected**.
- The end plate is returned and the process is repeated until all of the mass has been used. Various sizes and shapes of dies are available.
- It is possible to prepare suppositories of uniform circumference **by extrusion through a perforated plate and by cutting the extruded mass to the desired length**.

# **PREPARATION BY HAND ROLLING AND SHAPING**

- **It is the oldest and simplest method of supp. preparation**
- **With ready availability of suppository molds of accommodating shapes and sizes, there is little requirement for today's pharmacist to shape suppositories by hand.**
- **Hand rolling and shaping is a historic part of the art of the pharmacist ( it requires considerable practice and skill).**

# Calibration of the Mold

- Each individual mold is capable of holding a specific volume of material in each of its openings. Because of the difference in the densities of the materials, if the base is cocoa butter, **(density =1)** the weight of the suppositories will differ from the weight of suppositories prepared in the same mold with a base of polyethylene glycols or glycerinated gelat. **(density =1.2)**
- Similarly, any **added medicinal agent alters the density of the base**, and **the weight of the resulting suppository differs from that of those prepared with base material alone.**
- The pharmacist should calibrate each suppository mold for the usual base (generally cocoa butter and a polyethylene glycol base) so as to prepare medicated suppositories each having the proper quantity of medicaments.

# Calibration of the mold

- The first step in calibration of a mold is to
  - prepare molded **suppositories from base material alone.**
  - After removal from the mold,
  - the suppositories are weighed and the total weight and average weight of each suppository are recorded (for the particular base used).
  - To determine **the volume of the mold, the suppositories are carefully melted in a calibrated beaker,** and the **volume of the melt is determined for the total number as well as for the average of one suppository.**

# Determination of the Amount of Base Required

- Calculate the amounts of materials needed for the preparation of one or two more suppositories than the number prescribed to compensate for the inevitable loss of some material and to ensure having enough material (**prepare an extra 1 or 2 supp.**)
- **Verify the required amount of drug is provided in each suppository.** Because the volume of the mold is known ( from mold calibration the determined volume of the melted suppositories formed from the base),
- the volume of the drug substances subtracted from the total volume of the mold will give the volume of base required.
- **The total volume of these materials is subtracted from the volume of the mold,**
- and the appropriate amount of base is added.

**Because the bases are solid at room temperature, the volume of base may be converted to weight from the density of the material**

# Medicated suppositories

- If the added amounts of medicaments are **slight**, they may be considered to be negligible, and **no deduction from the total volume of base may be deemed necessary**. In preparation of suppositories, it is generally assumed that if the quantity of active drug is **less than 100 mg,/ 2-g suppository weight then the volume occupied by the powder is insignificant** and need not be considered
- Obviously, if a suppository **mold of less than 2 g** is used, the powder volume may need to be **considered**.
- However, if considerable quantities of other substances are to be used, the volumes of these materials are important and should be used to calculate the amount of base actually required to fill the mold.

# Example

- For example, if **12 mL of cocoa** butter is required to fill a suppository mold and if the medicaments in the formula have a collective volume of **2.8 mL**, **9.2 mL of cocoa butter** will be required. By **multiplying 9.2 mL times the density of cocoa butter, 0.86 g/ mL**, it may be **calculated that 7.9 g** of cocoa butter will be required. After adjusting for the preparation of an extra suppository or two, the calculated amount is weighed.

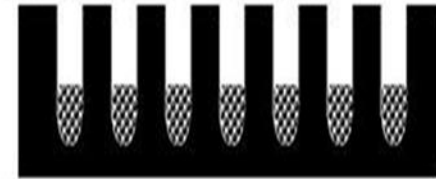


# Other calibration method

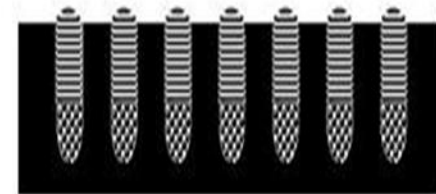
- Another method for determination of the amount of base is called the **double pour method** in the preparation of **medicated suppositories** requires the following steps:
- (a) **weigh the active ingredient** for the preparation of a **single** suppository;
- (b) dissolve it or mix it (depending on its solubility in the base) with **a portion of melted base insufficient to fill one cavity of the mold, and add the mixture to a cavity;**
- (c) add additional melted base to the cavity to fill it completely;
- (d) **allow the suppository to congeal and harden;** and
- (e) **remove the suppos. from the mold and weigh it.**
- **The weight of the active ingredients subtracted from the weight of the suppository yields the weight of the base.**
- This amount of base multiplied by the number of suppositories to be prepared in the mold is the total amount of base required

## Double Pour Method

- Mix drug & fraction of base



- QS with base



- Scrape off excess & remelt/mix



***THANK YOU***