

Suppositories

التحذية

Introduction

- Suppositories are solid dosage forms intended for insertion into body orifices where they melt, soften, or dissolve and exert local or systemic effects.
- Rectal suppositories are inserted with the fingers, but certain vaginal suppositories may be inserted high in the tract with the aid of an appliance.
نستعمل جهاز دمتا
- اسم آخر Vaginal suppositories, also called pessaries,
- اسم آخر Urethral suppositories, also called bougies

Rectal Route

- Advantages of rectal route:

- For patient with ^{رِسْقَانًا} nausea and vomiting

- ^{مرِيضًا غَيْرَ وَاوِيٍّ} For unconscious patient

- ^{أَعْمَالِيَّةً وَالْأَطْفَالَ الصَّغِيرَ} Infants and small children

- ^{لَا طَعْمَ لَهُ} No taste limitations

- ^{يُجْرَى لَهَا عَطْفَاءُ أُرْفَتِ قَبْلَ بَدْءِ فِعْلِيَّةِ الدَّوَاءِ} Partial avoidance of hepatic first-pass metabolism

- Drugs avoid gastric fluid and enzymes

^{الْأَدْوِيَّةُ تَتَجَنَّبُ التَّحَلُّمَ نَتِيجَةَ الْإِنْزِيْمَاتِ}

Rectal Route

- Disadvantage of this route:

- Absorption may be interrupted by defecation

الإسهال ربما يعيق الإحصاء

- Has small surface area for passive absorption (Drug absorption is less extensive and slower than after oral administration: SA of rectal mucosa is 1 / 10,000 the SA of small intestine)

surface Area

السوائل
القليلة

- Small rectal fluid content may cause problems with drug dissolution and absorption

تسبب مشاكل

غير صريح

- Inconvenient

- Rectal absorption of most drugs frequently is erratic and unpredictable

متغير

غير متوقع

- Some suppositories “leak” or are expelled after insertion

ينزح

بعض الأدوية - تنفصل وتخرج بعضه وتخرج البعض الآخر

بعض الأدوية - تنفصل وتخرج بعضه وتخرج البعض الآخر

Rectal Route

- Most commercially prepared rectal are torpedo-shaped
- 20 mm in length and weigh about 2 gm
- Infant rectal suppositories are half the size of adult suppositories
- The maximum amount of solid material that can be incorporated into a suppository is about 30% of the blank weight
- Thus, doses greater than 500 mg cannot be delivered with rectal suppositories but can be administered easily with vaginal suppositories

توربيدو

المرضى

10 mm - 1 gm

بالمرضى

الحد الأقصى لكمية المواد الصلبة داخل التحميلة

Rectal Route

- The factors that affect rectal absorption of a drug may be divided into two main groups:

عوامل وظيفية في الجسم

- (a) *physiologic factors and*

عوامل

داخل الدواء
نفسه

- (b) *physicochemical factors of the drug and the base.*

كوامل جسدية

Physiologic Factors

محتوى القولون

- Colonic Content

- Circulation Route

مسار الدورة

تقصير القدرة على الحفاظ على السوائل الشرجية

- pH and Lack of Buffering Capacity of the Rectal

Fluids: Because rectal fluids are essentially neutral in pH and have no effective buffer capacity, the form in which the drug is administered will not generally be chemically changed by the environment.

لا تغير pH

يعني ما رح تتغير تركيبة الدواء

physicochemical factors of the drug and the base

ذاتية الدواء في الماء أو الدهون والزيوت

- relative solubility of the drug in lipid and in water
- and the particle size of a dispersed drug.
- Physicochemical factors of the base include its ability to melt, soften, or dissolve at body temperature, its ability to release the drug substance, and its hydrophilic or hydrophobic character
- The rate limiting step is the drug partitioning and diffusing out of the base material in rectal lumen

حجم جسيمات الدواء

fat
wax

لازم يصير امتصاص وينتقل الدم

Vaginal Route of Administration:

Advantages:

لا يوجد انزيمات

- Generally there is less drug degradation via this route of administration compared to oral administration
- The dose can be retrieved if necessary
- Potential of long term drug administration with various intrauterine device (IUDs)

Disadvantages:

يمكن أن يتغير الامتصاص لأن الحوض ديناميكي من الناحية الفسيولوجية

- Absorption can be variable because vagina is a physiologically and anatomically dynamic organ
- Retention of some delivery systems during menstruation could dispose the patient to toxic shock syndrome
- Can interface with sexual activity
- Can be expelled

انحباس بجفت النظامة التوسيلة أثناء الدورة

قد يؤدي إلى الإصابة بمتلازمة

الصدمة السامة

Vaginal Route of administration

- Vaginal suppositories are employed as: contraceptives, feminine hygiene antiseptics, antibiotics
- Vaginal suppositories = pessaries
- ^{کروی} Globular or ^{بیضی} oviform or ^{مخروطی} cone-shaped and weigh 3-5 gm
- Inserted high in the tract with the aid of a special applicator
- Patient should be instructed to dip the suppository quickly in water before insertion ^{لازم بر طبق اتحاشه قبل از استفاده}
- Women should wear a sanitary napkin to protect nightwear and bed linens

Urethral Route of Administration

- Bougies
- Antibacterial, local preparative anesthetics
- Urethral suppositories are not specifically described in the USP 24/NF19 either by weight or dimension.
- Traditionally, they are cylindrical in shape (3 - 6 mm in diameter) and vary in length according to gender.
- Female urethral suppositories can be 25 - 70 mm in length while male urethral suppositories can be about 50 - 125 mm in length.
- The one commercially available urethral suppository is actually marketed as a "pellet," and is 1.4 mm in diameter and 3 or 6 mm in length depending on strength.
- Urethral suppositories are unusual and may not be encountered in a compounding practice.

Suppository Bases:

- Classified by composition and physical properties:

- Oleaginous (fatty) bases *melting*
- Water soluble or miscible bases *dissolving*



- Ideal properties:

- Nontoxic
- Nonirritating

جدي
اليد
(اليد)

Inert

- Compatible with the drug

اليد
اليد

Easily pliable into the desired shape

- it should remain solid at room temperature but soften, melt, or dissolve readily at body temperature so that the drug is fully available soon after insertion

- Should dissolve or melt in the presence of mucous secretions at body temperature and allow release of the drug

Oleaginous bases

- Mild and nonirritating action on the rectal mucosa
- Have a tendency to melt in 3 to 7 minutes so the drug can be released quickly from the formulation
- Have a lower melting points than the water miscible bases → must be kept in controlled room temperature environments or refrigerated in warmer climates
- e.g. Cocoa butter (Theobroma oil) and synthetic triglyceride mixtures.

مهمّة

إذا لم يذوب خلال هذه
المدّة يلزم إخراجّه

أقل

بالتلجّة

مثال

Cocoa Butter (Theobroma Oil)

- Cocoa Butter, NF, is defined as the fat obtained from the roasted seed of

Theobroma cacao.

- At room temperature, it is a yellowish-white solid having a faint, agreeable chocolate-like odor.

- **Theobroma Oil** or **cocoa butter** is used as a suppository base because, in large measure, it fulfills the requirements of an ideal base.

رطابته المصابير المطبوخة

مثالي
در طباقه جميع المصابير



Cocoa Butter (Theobroma Oil)

- At ordinary room temperatures of 15° to 25°C (59° to 77°F), it is a hard, amorphous solid, but at 30° to 36°C it melts to a bland, nonirritating oil. Thus in warm climates, theobroma oil suppositories should be refrigerated.

الخزنة أفضل من 30 لذا نأخرم حفظه بالثلاجة

- Thus it melts just below body temperature and yet maintaining its solidity at usual room temperatures

Cocoa Butter (Theobroma Oil)

- Particular attention must be given to two factors when preparing suppositories with cocoa butter base:

First, this base must not be heated above 35°C (95°F) because cocoa butter is a polymorphic compound with four structural forms and if overheated will convert to a metastable structure (alpha crystals) that melts in the 25° to 30°C (77° to 86°F) range. Thus, the finished suppositories would melt at room temperature and not be usable.

ممنوع
ترفع درجة
حرارته عن
35 قبل
استخدامه
بأنه يتغير
شكله وتركيبه
و يذوب
25-30
فيذا غير مناسب
للبيع

alpha crystals

- The second factor is the change in melting point caused by adding certain drugs to cocoa butter suppositories. For example, chloral hydrate and phenol tend to lower the melting point. It may be necessary to add **spermaceti or beeswax** as a hardening or solidifying agents to raise the melting point of finished suppositories back to the desired range.

انخفاض
النقطة
الذوبان
لأنه
مما
لأنه
تسببه
أنه
يمكن
تقل
درجة
الذوبان

بأنه
اضاعته

للحفاظ
على
درجة
الذوبان

Cocoa Butter (Theobroma Oil)

الطريقة الصحيحة لتحضيرها • The proper method of melting cocoa butter is to use a hotplate or water bath (just warm water) at about 55°C and melt the base carefully

• Correctly melted cocoa butter should have an opalescent, creamy appearance لازم يكون مظهره كريهه لامع

• Cocoa butter that has been overheated will change to clear golden liquid and should not be used ما بدى اياه لياك

alpha crystals

Synthetic triglycerides

- **Synthetic triglycerides** consist of **hydrogenated vegetable oils**.
- Their advantage over cocoa butter is that they do not exhibit polymorphism. They are, however, more expensive. صا بهمني
درجة الحرارة
- Some of the bases are single entity formulations. Some of the names may denote a series of bases. In a series, the bases are varied to give a range of melting points.
- For example, **Fattibase®** is a single entity base that consists of triglycerides from palm, palm kernel, and coconut oils. **Wecobee®** is a series of bases. Wecobee FS, M, R, and S are all made from triglycerides of coconut oil. But FS has a melting point range of 39.4 to 40.5°C, M has a range of 33.3 to 36.0°C, R has a range of 33.9 to 35.0°C, and S has a range of 38.0 to 40.5°C.
- Other triglyceride type bases include **Dehydag®**, **Hydrokote®**, **Suppocire®**, and **Witepsol®**.

Water Soluble/Water Miscible Bases

- Water soluble/water miscible bases are those containing glycerinated gelatin or the polyethylene glycol (PEG) polymers.
- These bases dissolve in rectal mucosal fluids in contrast to triglycerides which melt at body temperature. Therefore the problems of handling, storage, and shipping are simplified.
- The glycerinated gelatin base is slower to soften and mix with the physiologic fluids than is cocoa butter and therefore provides a slower release.

they dissolve
not melt

لأننا نخاف
من الرطوبة

Glycerinated Gelatin

- Because glycerinated gelatin-based suppositories have a tendency to absorb moisture as a result of the **hygroscopic** nature of glycerin, they must be protected from atmospheric moisture and ~~must be kept in well-closed containers in a cool place since they will absorb and dissolve in atmospheric moisture.~~

- As a result of the hygroscopicity of the glycerin, the suppository may also have a dehydrating effect and irritate the tissues upon insertion.

لا يمتص الماء الموجود بالجسم

تذوق الجلوسرين بالهلي قبل وضعه واستخدمه حتى

مكان
جفاف

يجب ان الاما زيفهوا الاما

Glycerinated Gelatin

- Thus glycerin contributes to the laxative effect of the suppository by drawing water from the intestine and from its irritant action on the mucous lining *منه*
- The water in the formula for the suppositories minimizes this action; however, if necessary, the suppositories may be moistened with water prior to insertion to reduce the initial tendency of the base to draw water from the mucous membranes and irritate the tissues.

Glycerinated Gelatin

مفضل وأكثر لـ vaginal

- is a useful suppository base, particularly for vaginal suppositories.
- It is suitable for use with a wide range of medicaments including alkaloids, boric acid, and zinc oxide.
- ^{في صاء} ^{يعني} ^{لازم} In addition, those intended for extended shelf-life should have a ^{preservative} preservative added, such as methylparaben or propylparaben, or a suitable combination of the two.
- Glycerinated gelatin suppositories are translucent, resilient, gelatinous solids that tend to dissolve or disperse slowly in mucous secretions to provide prolonged release of active ingredients.

Glycerinated Gelatin التركيبة

- Glycerinated gelatin suppositories may be prepared by dissolving granular gelatin (20%) in glycerin (70%) and adding water or a solution or suspension of the medication (10%)
gelatin 20% glycerin 70% water 10%
- The glycerin and water are mixed and heated (steam bath or a boiling water bath). Then the gelatin is added slowly with gentle mixing so air is not entrapped in the mixture



Polyethylene Glycol Polymers

- They are chemically stable, nonirritating, miscible with water and mucous secretions, and can be formulated, either by molding or compression, in a wide range of hardness and melting point.
- Certain polyethylene glycol polymers may be used singly as suppository bases but, more commonly, formulas call for compounds of two or more molecular weights mixed in various proportions as needed to yield a finished product of satisfactory hardness and dissolution time.
- Since the water miscible suppositories dissolve in body fluids and need not be formulated to melt at body temperature, they can be formulated with much higher melting points and thus may be safely stored at room temperature.

تشكيله

مضيق بالماله

تقدر تستخدم

لحاله

لكن غالباً

نمزجه مع

عدة مكونات

لتحصل على

مركب

يتفك بالصلابه

المرفقيه

Polyethylene Glycol Polymers

molds



- Polyethylene glycols are polymers of ethylene oxide and water prepared to various chain lengths, molecular weights, and physical states.
- They are available in a number of molecular weight ranges, the most commonly used being polyethylene glycol 300, 400, 600, 1,000, 1,500, 1,540, 3,350, 4,000, 6,000, and 8,000.
molecular weight
كلما زاد الوزن زاد اللزوجة
viscosity
- The numeric designations refer to the average molecular weight of each of the polymers.
- Polyethylene glycols having average molecular weights of 300, 400, and 600 are clear, colorless liquids.
300, 400, 600 clear and colorless liquids
- Those having average molecular weights of greater than 1,000 are waxlike white solids whose hardness increases with an increase in the molecular weight.

Polyethylene Glycol Polymers

- Disadvantages of PEG bases:

- Produce stinging or a burning sensation

يُسبب بالحساس بالدمع أو الحرق

- and may cause a defecating reflex when used rectally (minimized by adding water to PEG base and moistening with water before insertion)

يُسبب بحدود فعل غير مرغوبة (مثل التبرز)

تقللها من خلال إضافة الماء لـ PEG

- Polyethylene glycol suppositories that do not contain at least 20% water should be dipped in water just before use to avoid irritation of the mucous membranes after insertion. This procedure prevents moisture being drawn from the tissues after insertion and the stinging sensation.

- Incompatible with large number of drugs (i.e. aspirin...)

لا يتوافق مع الحديد من الأدوية

- Should not be stored in polystyrene vials because PEG reacts with the polystyrene

لا يخزن في البوليسترين لأنه يتفاعل معه

Similarities between glycerinated gelatin and PEG bases

1. They both dissolve in about 30 to 50 minutes, providing a more prolonged release of drug than cocoa butter
2. Both should be moistened with water before insertion
3. They do not melt in the fingers while being inserted
4. They do not leak from body orifices

لا يخرج الدواء الجسم

Methods of Preparation of Suppositories:

1. Hand Rolling

- is the oldest and simplest method of suppository preparation and may be used when only a few suppositories are to be prepared in a cocoa butter base.
- It has the advantage of avoiding the necessity of heating the cocoa butter.
- A plastic-like mass is prepared by triturating grated cocoa butter and active ingredients in a mortar. The mass is formed into a ball in the palm of the hands, then rolled into a uniform cylinder with a large spatula or small flat board on a pill tile. The cylinder is then cut into the appropriate number of pieces which are rolled on one end to produce a conical shape.



Methods of Preparation of Suppositories:

2. Compression

قالب

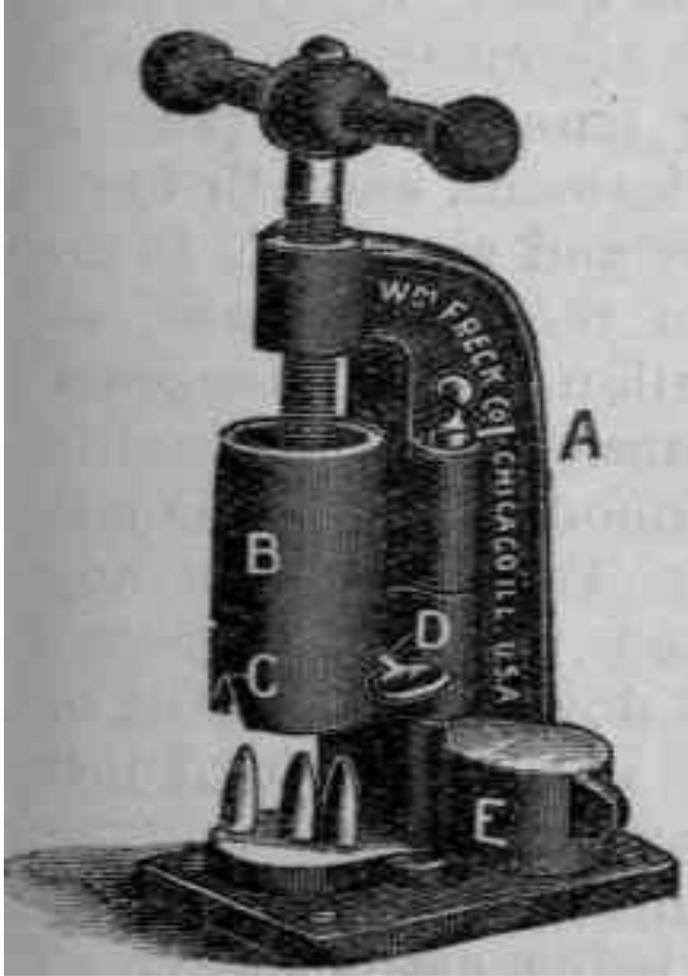
نستخدم القوالب هنا
مع الضغط

- is a method of preparing suppositories from a mixed mass of grated suppository base and medicaments which is forced into a special compression mold.
- 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.

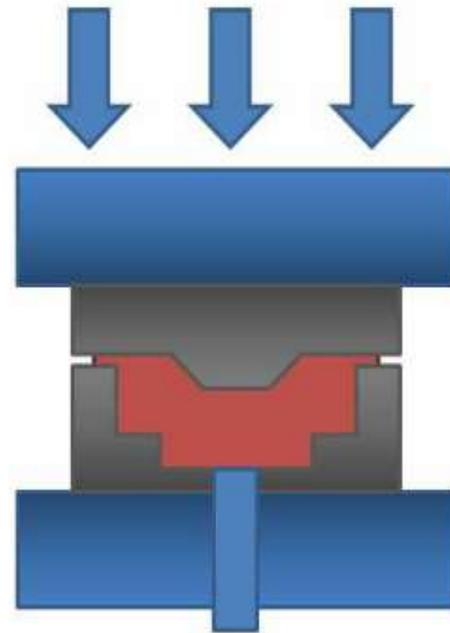
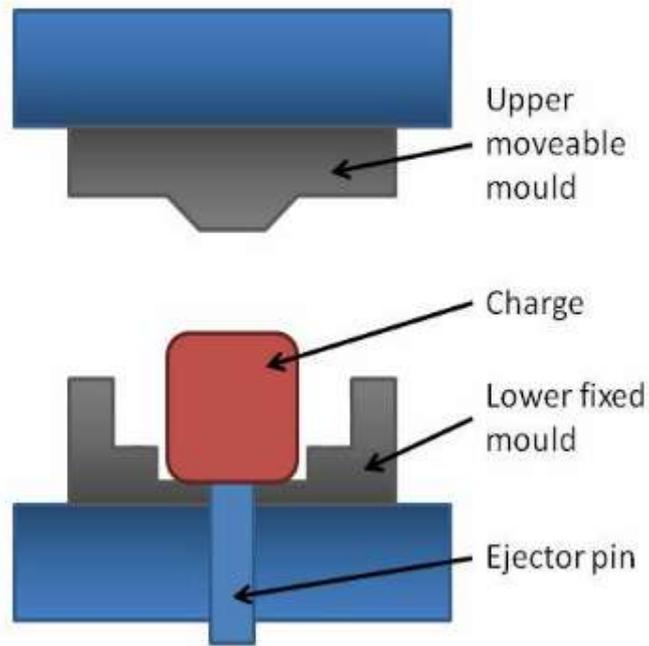
لا تتعرض المواد الصلبة هنا

بإلزام وجود آلة
لصنعها

د يوجد حدود للأدوية التي تصنع بهذه الطريقة



Compression Moulding



Methods of Preparation of Suppositories:

3. Fusion or molding

الأكثر شيوعاً
الأقدم

- Cocoa butter, glycerinated gelatin, polyethylene glycol, and most other bases are suitable for preparation by molding.

نظرات التصنيع

- 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, and (e) removing the formed suppositories from the mold..

Methods of Preparation of Suppositories:

3. Fusion or molding

- Lubrication is seldom necessary when the base is cocoa butter 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.

Methods of Preparation of Suppositories:

3. Fusion

Suppository molds:

Industrial molds:

produces hundreds of suppository in a single batch



- Small hand-held molds:

Are made of:

Stainless steel

Aluminum

Brass

Plastic

Rubber



● Density factors

Methods of Preparation of Suppositories:

3. Fusion or molding

- Suppositories are generally made from solid ingredients and drugs which are measured by weight.

تقاس
بالمكيلة

- When they are mixed, melted, and poured into suppository mold cavities, they occupy a volume – the volume of the mold cavity.

لكن عند
الترج
نحامل
حينها مع
حجم القالب

- Since the components are measured by weight but compounded by volume, density calculations and mold calibrations are required to provide accurate doses.

بجسم

نأخذها رجيب الإمبر

Density Factors

- When a drug is placed in a suppository base, it will displace an amount of base as a function of its density.
- If the drug has the same density as the base, it will displace an equivalent weight of the base.
- If the density of the drug is greater than that of the base, it will displace a proportionally smaller weight of the base.
- Density factors for common drugs in cocoa butter are available in standard reference texts.

مثال
0
آفل من
الشكل

Density Factors:

- The density factor is used to determine how much of a base will be displaced by a drug. The relationship is:

$$\text{Density Factor} = \frac{\text{Weight of drug}}{\text{Weight of base displaced}}$$

- For example: Aspirin has a density factor in cocoa butter of 1.3. If a suppository is to contain 0.3 g of aspirin, it will replace $0.3 \text{ g} \div 1.3$ or 0.23 g of cocoa butter. If the blank suppository

(suppository without the drug) weighed 2 g, then $2 \text{ g} - 0.23 \text{ g}$ or

1.77 g of cocoa butter will be needed for each suppository, and the suppository will weigh $1.77 \text{ g} + 0.3 \text{ g} = 2.07 \text{ g}$. So if a pharmacist was making 12 aspirin suppositories using cocoa butter as the base, he would weigh $1.77 \text{ g} \times 12$ or 21.24 g of cocoa butter and $0.3 \text{ g} \times 12$ or 3.6 g of aspirin.

وزن التحصيلة

1.3

0.3

W.C.B displaced

كتابة أقل
لهذا استوقع

كم يحتاج
Base to

Density Factors:

- Some example density factors of drugs in cocoa butter are shown in the table below (*see Remington's*) also see Table 17.4 pg 138

Aspirin	1.3
Barbital	1.2
Bismuth salicylate	4.5
Chloral hydrate	1.3
Cocaine hydrochloride	1.3
Codeine phosphate	1.1
Diphenhydramine hydrochloride	1.3
Morphine hydrochloride	1.6
Phenobarbital	1.2
Zinc Oxide	4.0

When the Density Factor is Not Known

Base المستخدم
cocoa butter

- When bases other than cocoa butter are used, or when the density factor for a drug in cocoa butter is not known, then the density factor can be **estimated by calculation** or **experimentally determined by the double casting technique**.
(طريقة (1))
(طريقة (2))
- The weight of the blank suppository is easily determined. A portion of the suppository base is melted, poured into the suppository mold and allowed to congeal. The suppositories are removed from the mold, and the total weight of the suppositories is determined. The average weight of the blank suppository is determined by dividing the total weight by the number of suppositories.

When the Density Factor is Not Known:

A. Estimation by Calculation

- One method to determine the density factor of a drug in a base other than cocoa butter requires the use of the ratio of a blank suppository of the non-cocoa butter base to a blank suppository of the cocoa butter base. This information is generally obtained by calibrating the mold first with one base and then the other base.
- As an example of the method, a mold was calibrated with the PEG base and the average blank suppository weighed 2.24 grams. The same mold was calibrated with cocoa butter and those blank suppositories weighed 1.87 grams on average. Therefore, the ratio of the two weights was:

$$\frac{\text{weight of } \overset{\text{Polyethylene Glycol}}{\text{PEG}} \text{ suppositories } 2.24 \text{ g}}{\text{weight of cocoa butter suppositories } 1.87 \text{ g}} = 1.20$$

3
EX

When the Density Factor is Not Known:

A. Estimation by Calculation

- If 200 mg of aspirin is to be incorporated into each PEG suppository, it is necessary to determine how much PEG base will be displaced by the aspirin. That displacement amount can be calculated as follows:

- density factor of aspirin in cocoa butter = 1.3 (from reference sources)

- density of PEG base relative to cocoa butter = 1.20 (the ratio obtained from the calibrations)

- 0.2 g of aspirin will displace $\frac{0.2 \text{ g}}{1.3} \times 1.20 = 0.18 \text{ g}$ of PEG base

وزن الدواء \times النسبة المئوية

density factor. C.B

- For each PEG suppository to be formulated, 0.2 g of aspirin and 2.06 g (2.24 g - 0.18 g = 2.06 g) of the PEG base will be needed

PEG التي لازم اوزنه

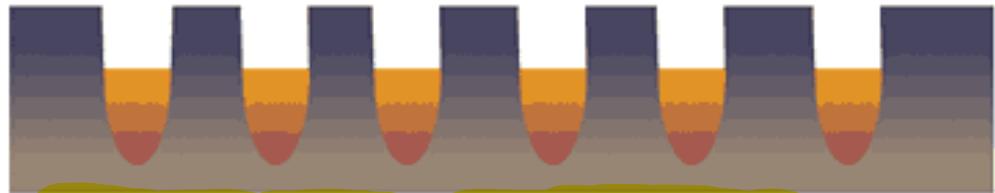
When the Density Factor is Not Known:

A. Double Casting Technique

- By determining the weights of suppositories at the various steps the density factor can be calculated.

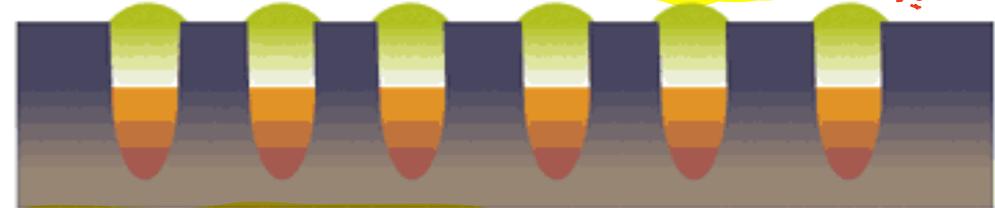
- The double casting techniques can be used to determine the density factor of any drug in any base

Double Casting Method of Suppository Preparation



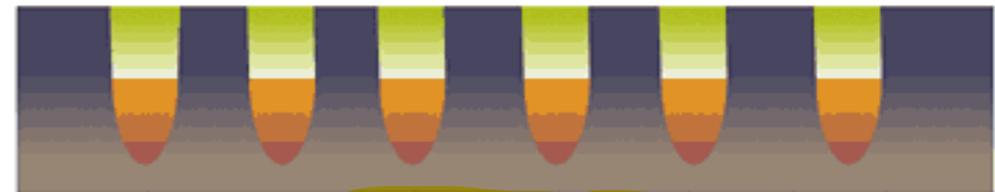
1. Mix all of the drug with a portion of the base and use the mixture to partially fill each of the suppository mold cavities.

ليرة جالدي
تقريباً من Base



2. Use plain base to overfill each cavity.

تفلة Base



3. Let cool, then remove excess base from top of mold. Remove suppositories, remelt, and recast to evenly distribute the drug.

لذوبهم مرة أخرى

من غير حساب تضمنت حصولنا
على تحميلة كل تحميلة تحتوي كمية

الدواء المناسبة مع Base

When the Density Factor is Not Known:

A. Double Casting Technique

- Using a particular mold, the average weight of a plain cocoa butter suppository was found to be 2.0 g. Using the same mold, cocoa butter suppositories, each containing 300 mg of drug A, were found to weigh 2.1 g each. So,

- weight of suppository of cocoa butter = 2.0 g
weight of drug in each medicated suppository = 0.3 g
weight of suppository with drug and cocoa butter = 2.1 g
weight of base in medicated suppository = 2.1 g - 0.3 g =

1.8 g

weight of base displaced = 2.0 g - 1.8 g = 0.2 g

Therefore, density factor of drug A = $0.3 \text{ g} \div 0.2 \text{ g} = 1.5$

density

$$\frac{0.3}{0.2}$$

$$= 1.5$$

- Homework?

Using the density factor determined above, how much cocoa butter and drug A are needed to make 10 cocoa butter suppositories each containing 0.3 gm of drug?

1.5

18g

Packaging and Storage

- Because suppositories are adversely affected by heat, it is necessary to maintain them in a cool place.

- Cocoa butter suppositories must be stored below 30°C (86°F), and preferably in a refrigerator (2°C to 8°C, or 36°F to 46°F).

- Glycerinated gelatin suppositories can be stored at controlled room temperature (20°C to 25°C, or 68°F to 77°F).

- Suppositories made from a base of polyethylene glycol may be stored at usual room temperatures.

Packaging and storage

إذا تم تخزينها في التلاجة كـ لازم ندفئها حتى
تصل حرارة
الخرقة

قبل الإبتخدام

- If they must be stored in the refrigerator, suppositories should be allowed to warm to room temperature before insertion.
- The patient should be advised to rub cocoa butter suppositories gently with the fingers to melt the surface to provide lubrication for insertion.
- Glycerinated gelatin or polyethylene glycol suppositories should be moistened with water to enhance lubrication.

لازم نضيف ماء لهدول
الوعيت

Packaging and Storage

- Glycerin suppositories and glycerinated gelatin suppositories are packaged in tightly closed glass containers to prevent a change in moisture content
- Suppositories stored in high humidity may absorb moisture and tend to become spongy, whereas suppositories stored in places of extreme dryness may lose moisture and become brittle.

Observing formulations for evidence of instability

- Should be stored protected from heat, and may be stored under refrigeration but not frozen
- Glycerin and PEG base suppositories should be kept in airtight containers because they are hygroscopic
- Suppositories should be observed for:
 - excessive softening
 - Drying out
 - Harden or shrivel
 - Oil staining on the packaging

VAGINAL INSERTS

- Vaginal tablets are more widely used nowadays than are commercial vaginal suppositories
- Vaginal tablets, frequently referred to synonymously as *vaginal inserts*, are usually ovoid and are accompanied in their packaging with a plastic inserter, a device for easy placement of the tablet within the vagina.
- They are prepared by tablet compression and are commonly formulated to contain lactose as the base or filler, a disintegrating agent such as starch, a dispersing agent such as polyvinylpyrrolidone, and a tablet lubricant such as magnesium stearate.
- The tablets are intended to disintegrate within the vagina, releasing their medication

Vaginal inserts

- Some vaginal inserts are capsules of gelatin containing medication to be released intravaginally.

