

Experiment 5

Liquid dosage forms: (Dispersed Systems) Emulsions and Gels

Emulsion

is a dispersion system consisting of two immiscible liquids, one of which (the disperse phase) is distributed throughout the other (the continuous phase) with the help of emulsifying agents.

Pharmaceutical emulsions are prepared for: Oral, external, parenteral and ophthalmic use as liquids or semisolids.

Emulsions are generally divided into two types:

- (1) Oil in water (o/w)
- (2) Water in oil (w/o)
- (3) Also there is a third type called multiple emulsion which available both as w/o/w or o/w/o.

The factors affecting the type of emulsion produced include the relative proportion of the two phases present and the type of emulsifying agent selected.

Emulsions are prepared by dry gum method, wet gum method, or Forbes (bottle) method.

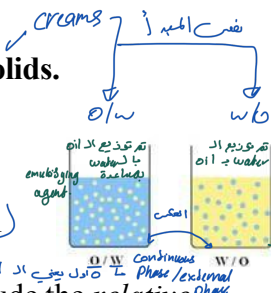
Differences between O/W and W/O emulsions

	Oil in water emulsion (o/w)	Water in oil emulsion (w/o)
1	Water is the dispersion medium and oil is the dispersed phase	Oil is the dispersion medium and water is the dispersed phase
2	They are non-greasy and easily removable from the skin surface	They are greasy and not water washable
3	They are used externally to provide cooling effect, e.g. vanishing cream	They are used externally to prevent evaporation of moisture from the surface of skin e.g. Cold cream
4	Water soluble drugs are more quickly released from o/w emulsions	Oil soluble drugs are more quickly released from w/o emulsions
5	Can be used for internal formulation especially for bitter taste drugs.	They are preferred for formulations meant for external use like creams.
6	O/W emulsions give a positive conductivity test as water is the external phase which is a good conductor of electricity.	W/O emulsions do not give a positive conductivity test as oil is the external phase which is a poor conductor of electricity.

المى معروفة إنها موصلة للكهرباء electrically conductive, طيب لما يكون الـ water هو الـ continuous phase, بهالحالة زي oil in water, إذا بسهولة الكهرباء راح تمر بهذا الـ dispersion, لأنه الماء conductive

ما هو سهل كهربيا

عنا
المتغير
العوامل التي تؤثر على نوع المستحلب (emulsion) النتائج تشمل:
1. النسبة بين الطورين الموجودين (الزيت والماء)
2. نوع المادة المُستحلبة (emulsifying agent) المستخدمة

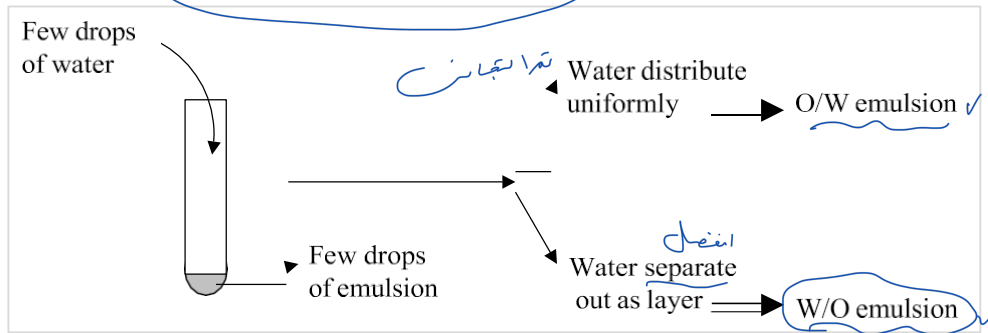


زي مثال على liquid emulsion بالصيديات اللي هو castor oil emulsion, زيت الخروع طعمه ثقيل، فينحضره كـ emulsion, وين بده يكون الـ oil phase, فراح يكون الـ castor oil phase لكن المحصلة كلها طعمه مائي، الطعم المر

طيب water in oil emulsion, عادة طبيعة توزيع الأدوية بالـ emulsion إذا كان الدواء دهني بنحطه بالـ oily phase, وإذا طبيعة الدواء water soluble أو hydrophilic بنحطه بالـ water. بهالحالة الدواء لما يكون water soluble بالـ water راح يكون موجود بالـ water, إذا هو سهل يصير له عملية release لأنه وين؟ بالـ external أو بالـ continuous phase. إذا الـ hydrophobic drug بيكون بالـ oil, أما الـ hydrophilic drug بالـ water soluble بيكون بالـ water, فهو موجود في الطبقة الخارجية في الـ external أو الـ continuous phase, إذا سهل للـ water soluble drugs to be quickly released

Determine the type of the prepared emulsion using Dilution test:

Oil in water emulsion can easily be diluted with an aqueous solvent whereas water in oil emulsion can be diluted with oily liquids.



Packaging, Labeling and Storage of Emulsions

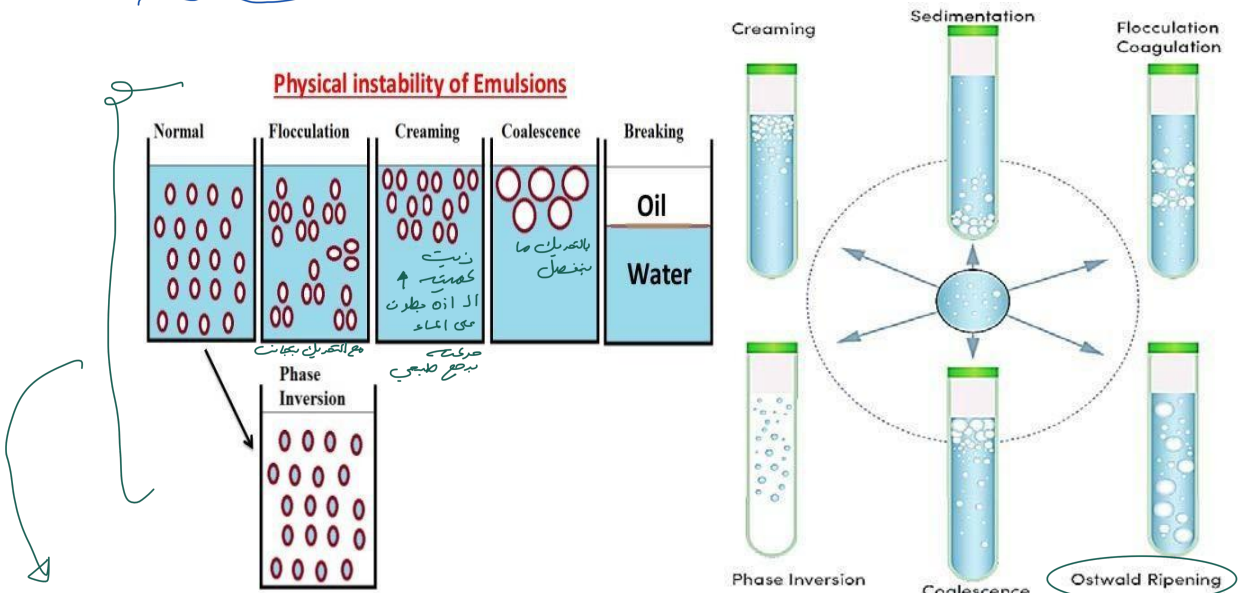
- Depending on the use, emulsions should be packed in suitable containers. Emulsions meant for oral use are usually packed in well filled bottles having an air tight closure. Light sensitive products are packed in amber colored bottles. For viscous emulsions, wide mouth bottles should be used.

- The label on the emulsion should mention that these products have to be shaken thoroughly before use. External use products should clearly mention on their label that they are meant for external use only. Emulsions should be stored in a cool place and freezing should be avoided as it can adversely affect the stability of preparation.

*Do not freeze

أنتم UNstable system ويتأثرها بالحرارة

Self-reading: (Emulsion stability)



ال emulsion الطبيعي شكله زي الحليب، ممكن يصير:
 Flocculation → تجمع droplets
 Creaming → تجمع الزيت للأعلى
 Coalescence → التحام القطرات
 Breaking (phase separation) → انفصال كامل
 إذا وصلنا ل flocculation أو creaming مقبول، مع shaking بيرجع.
 لكن إذا صار breaking ما يرجع.
 في حالة اسمها phase inversion، تتحول من oil in water إلى water in oil بسبب تغيير النسب أو خلل بال emulsifying agent

بالتصغير بالفتحات
 انطوائيه من التقذير
 العكس ات الكبير بتكسر
 والتصغير بتكسر

Oral emulsion preparation: dry gum and wet gum methods

Emulsions for oral use

- Acacia gum is usually used when making extemporaneous o/w emulsions for oral use, unless otherwise specified.
- If using acacia, (a primary emulsion should be prepared first.) This is a thick stable emulsion prepared by using optimal proportions of the ingredients. These proportions vary with the nature of the oil.

Emulsions for oral use Quantities for primary emulsions

Type of oil	Examples	Oil	water	Gum (acacia)
		Parts by volume (ml)		Parts by weight (g)
Fixed	Almond, arachis, cod liver, castor	4	2	1
Mineral (hydrocarbon)	Liquid paraffin	4	2	1

يعني له الزيت 30ml الذي له 15ml
والغذاء 7.5g

Continental (Dry Gum, or 4:2:1) Method

Dry Gum Method / Continental Method

لأنه يخلط به مواد ما فيها جزيئات

بال dry gum
نخلط oil + gum أول، بعدين نضيف water مرة واحدة مع vigorous mixing باتجاه واحد لحد ما نسمع cracking sound.
لازم الأدوات تكون ناشفة تماماً

طوبه اول
"4:2:1" Method

4 parts (volumes) of oils
2 parts of water
1 part of gum

بالطرق النسب طابعه ابي يختلف
صيف نضيف اول؟

In dry gum method the oil is first trituated with gum & then water is added.

- The continental method is used to prepare the initial or primary emulsion from oil, water, and a hydrocolloid or "gum" type emulsifier (usually acacia). (The primary emulsion) or emulsion nucleus, is formed from 4 parts oil, 2 parts water, and 1 part emulsifier.
- In a mortar, the 1 part gum is levigated with the 4 parts oil until the powder is thoroughly wetted; then the 2 parts water are added **all at once**, and the mixture is vigorously and continually triturated until the primary emulsion formed is creamy white and produces a "cracking" sound as it is triturated (usually 3-4 minutes). Make sure that the mortar and pestle are completely dry in the dry gum method. If the mortar is not dry, acacia will not be wetted well by the oil, and, probably, the primary emulsion will fail to form.
- Additional water or aqueous solutions may be incorporated after the primary emulsion is formed.
- Solid substances (e.g., active ingredients, preservatives, color, flavors) are generally dissolved with water and added as a solution to the primary emulsion.
- Oil soluble substance, in small amounts, may be incorporated directly into the primary emulsion.

- Any substance which might reduce the physical stability of the emulsion, such as alcohol (which may precipitate the gum) should be added as near to the end of the process as possible to avoid breaking the emulsion.
- When all agents have been incorporated, the emulsion should be transferred to a calibrated vessel, brought to final volume with water, then homogenized or blended to ensure uniform distribution of ingredients.

الحول الاصح للطلب
مع قوتلن صتا

English (Wet Gum) Method

Wet Gum Method / English Method

	4 parts (volumes) of oil
بال wet gum :	2 parts of water
نخلط water + gum أول (mucilage), بعدين نضيف oil	1 part of gum
تدرجياً مع mixing	
	In wet gum method first gum triturated with water to form a mucilage & then oil added in small quantities.

- In this method, the proportions of oil, water, and emulsifier are the same (4:2:1), but **the order and techniques of mixing are different.**
- The 1 part gum is triturated with 2 parts water to form a mucilage; then the 4 parts oil is **added slowly** (in portions, while triturating). After all the oil is added, the mixture is triturated for several minutes to form the primary emulsion. Then other ingredients may be added as in the continental method.
- Generally speaking, the English method is **more difficult** to perform successfully, especially with more viscous oils, but may result in a **more stable emulsion.**

كما اجمع صوت
الصلل احرك ل 3-4
min

Difference Between Both Methods

Dry gum method	Wet gum method
Oil and water are added at once	Water is added to dissolve the gum then oil is added dropwise
If primary emulsion isn't formed, can't be corrected, therefore discard	If ropy appearance, stop oil addition and add few drops of water to maintain the emulsion

لازم قوتلن قوي
ديكون مايف

Gels ^{بنصتاج لـ} gelling agent

Gel:

Is a transparent, translucent, non-greasy, semisolid preparation, applied externally.

- Gels are considered colloidal dispersion because they contain particles of colloidal dimension (1 micron -100 microns)
^{ان تروا جزيئاته الصلبة}
- They are composed of small inorganic particles or large organic molecules in which the particles restrict movement of the dispersing medium by forming an interlacing three dimensional network of particles or solvated macromolecules
- Gels are made by using substances called gelling agent
- (Gelling agent) undergo extensive unfolding and enlargement when dissolved or dispersed in the dispersing medium
^{لما يتعرض للماء يبصير وييعمل network}
- This unfolding increases the viscosity of the dispersing medium and also restricts its movement *Thick* ^{يصير الامتداد جبير}
- Gels are useful as liquid formulations in oral, ophthalmic, nasal, topical, vaginal, and rectal administration
- By weight, gels are mostly liquid, yet they behave like solids due to a three-dimensional network within the liquid.
- It is the (unfolding within the fluid) that gives a gel its structure (hardness) and contributes to the adhesive stick.

^{بس يتعرض لبي طاقه جبير ويخل بعضه ويصير زي قطعة رصدة}

Formula (2):

Rx. 25 gm Clindamycin Gel

Ingredients	Master formula	Scaled formula
Clindamycin	1 gm	
Glycerol	20gm	
Isopropyl alcohol	20 ml	
Carbomer	0.8gm	
Triethanolamine(TEA)	0.8 ml	-----drops
Water	q.s. 100gm	q.s. 25 gm

Procedure:

1. Weight ----- gm of clindamycin and dissolve it in -----ml of water.
2. Weigh-----g carbomer and add to the solution in step 2 in a portion wise. Mix until having a uniform dispersion.
3. Add isopropyl alcohol and mix
4. Add glycerin and mix
5. Add TEA drops and mix gently to avoid air bubbles.

Use of ingredients:

- (1) **Clindamycin:** antibacterial,
- (2) **Glycerin :** Humectant (emollient)
- (3) **Isopropanol:** preservative, co solvent, cleansing agent (organic solvent dissolve waxy layer on skin).
- (4) **Carbomer:** gelling agent, acidic and should be neutralized by a base (i.e. TEA)
- (5) **Triethanolamine (TEA):** neutralizing agent
- (6) **Water:** vehicle

Labeling:

- Main Label:
- Auxiliary label:
For external use only.

Storage:

Store in a cool place. Store in a wide-mouthed container or in proper tube.
Thirty days if stored in a cool and dry place.

Use of preparation:

For treatment of acne.

اضر دقتی من الفیدیو تقریباً مراجعتی بریعتی لا هیاء اندکت

