تفريغ حساب وتركيب الأشكال الصيدلانية

اسم الموضوع: Supp, calculations' part

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لجان الدُّفعات

Displacement value

- **How to determine the required amount of the base and ensure that the required amount of the drug is incorporated in each suppository?**

- The displacement value of a drug is the number of parts by weight of drug which displaces (occupies the same volume of) 1 part by weight of the base.

بحال كان عنا دواء داخل base، التحاميل، بكم محتاجين نطرح من وزن وقيمة التحاميل بدون دواء عشان تستبدل هاد الجزء بالدواء.

- Displacement values refer to values for theobroma oil. These values can also be used for other fatty bases.

water-soluble base

- With glycerol-gelatin suppository base approximately 1.2g occupies the same volume as 1g of theobroma oil.

Table 21.2 Displacement values with respect to fatty bases

Medicament	Displacement value
Aspirin	1.1
Bismuth subgallate	2.7
Chloral hydrate	1.4
Cinchocaine hydrochloride	1.0
Codeine phosphate	1.1
Hamamelis dry extract	1.5
Hydrocortisone	1.5
Ichthammol	1.0
Liquids	1.0
Metronidazole	1.7
Morphine hydrochloride	1.6
Paracetamol	1.5
Pethidine hydrochloride	1.6
Phenobarbital	1.1
Zinc oxide	4.7

قانون displacement value

$$= \frac{d}{a - c}$$

d: weight of drug

a: weight of pure base

c: weight of the weight of the base in the medicated supp

سبحان الله وبحمده ، سبحان الله العظيم

Displacement value

To calculate the displacement value of a drug:

base without medications

Weight of six unmedicated suppositories = 6 g.

Weight of six suppositories containing 40% drug = 8.8 g.

Weight of base is then = 60% = 60/100 x 8.8 = 5.28 g.

Weight of drug in suppositories = 40% = 40/100 x 8.8 = 3.52.

Weight of base displaced by drug = 6 - 5.28 = 0.72 g.

If 0.72 g of base is displaced by 3.52 g of drug, then

1g of base will be displaced by 3.52/0.72g= 4.88 g.

Therefore displacement value of drug = 4.9 (rounded to one decimal place).

طريقة أسهل :-

a = 6g = وزن التحاميل دون دواء

d = $\frac{40}{100} * 8.8 = 3.52g$ ← 8.8g = 40% = وزن الدواء

C = $\frac{60}{100} * 8.8 = 5.28g$ ← 40% - 100% = 60% base وزن

displacement value = $\frac{d}{a-c} = \frac{3.52}{6-5.28} =$ **4.88**

Displacement value

0.25 g → وزنة الدواء = d

Q) Prepare six suppositories each containing 250 mg bismuth subgallate.

8 supp

** **Quantities are calculated for an excess of TWO suppositories.** (to compensate for the inevitable loss of some material and to ensure having enough material.)

- Therefore calculate for eight suppositories.
- DV of bismuth subgallate = 2.7 = Displacement value
- A 1 g mould will be used with mould calibration = 0.94. → a

To calculate the amount of base required, a simple equation is used:

Amount of base = (N x y) – (N x D/ DV)

Where N is the number of suppositories to be made, y is the mould calibration, D is the dose in one suppository, DV is the displacement value.

N=8 y = 0.94 D = 250 mg = 0.25 g DV = 2.7

Amount of base required = (8 x 0.94) –((8x0.25)/2.7) = 7.52-0.741 = 6.779 g= 6.78 g

الحل ⇒ الأسهل

$2.7 = \frac{0.25}{(0.94 - c)}$ → $2.538 - 2.7c = 0.25$

$c = 0.847$ for one supp, but for 8 → $0.847 * 8 = 6.77$ g

Displacement value

Calculations for more than one drug:

Calculate the quantities required to make 15 suppositories each containing 150 mg hamamelis dry extract and 560 mg of zinc oxide. A 2g mould, with mould calibration of 2.04, will be used. DV of hamamelis dry extract = 1 .5, DV of zinc oxide = 4.7.

*Calculate for 17 suppositories (2 excess).

Weight of hamamelis dry extract = 17 x 0.15 = 2.55 g.

Weight of zinc oxide = 17 x 0.56 = 9.52 g.

Weight of base = 17 x 2.04- (2.55/1.5 + 9.52/4.7) = 34.68- (1.7 + 2.03) = 30.95 g.

d_1 = weight of hamamelies dry = $17 * 0.15 = 2.55g$

d_2 = weight of zinc oxide = $17 * 0.56 = 9.52g$

$a = 2.04 * 17 = 34.68$

$DV_1 = 1.5$ $\quad$ $DV_2 = 4.7$

$$DV = \frac{d}{a-c} \qquad a-c = \frac{d}{DV} \qquad (a-c) = \frac{d_1}{DV_1} + \frac{d_2}{DV_2} + \dots$$

$$34.68 - c = \frac{2.55}{1.5} + \frac{9.52}{4.7}$$

$c = 30.954$ = amount of base

Example Rx1:

- Bismuth subgallate 300 mg
- Cocoa butter q.s.
- Ft. supp.
- **M.ft. 6 supp. using 1 g mold**
- **Calculations :**
- To allow for unavoidable wastage , we calculate for eight suppositories.
- DV of bismuth subgalallate = 2.7 (i.e. 2.7 g)
- bismuth subgallate = 8*300 mg = 2.4 g
- 2.4/2.7 = 0.89 g displaced base
- The weight of base required to prepare eight unmedicated suppositories= 1*8 = 8 g
- Therefore , the weight of base required for medicated suppositories = 8 – 0.89 = 7.21 g

Example 2:

- **calculate the DV of the drug in cocoa butter (base) containing 40% of drug and prepared in 1 g mold**
- **(wight of 6 supp is 8.8) :**

- A **batch of unmedicated suppositories is prepared and the products are weighed.**
- **A batch of medicated suppositories containing a known concentration of the required drug is prepared and the products are weighed .**

Answer

- Weight of six unmedicated suppositories = 6 g (since the mould is fixed (1gm each)
- Weight of six medicated suppositories containing 40% drug = 8.8 g **(from the question)**
- Weight of the **base** in the suppositories = 60%

  (60/100)*8.8 = 5.28 g
- Weight of the **drug** in the suppositories = 40 %

  (40/100)*8.8 **= 3.52 g**
- **Weight of the base displaced by the drug = 6 -5.28 = 0.72 g**
- If the **0.72** g of the base is displaced by **3.52g** of the drug then 1 g of the base is displaced by 3.52/0.72 = 4.88 g
- **Therefore displacement value of the drug is 4.9**

لا حول ولا قوة إلا بالله