



Calculations in the dosage form preparation

Concentrations

- mass ($\text{kg}\cdot\text{m}^{-3}$, g/l)
- molar ($\text{mol}\cdot\text{m}^{-3}$, mol/l)
- percentual
 - Weight percents (m/m)
 - Volume percents (V/V)
 - Weight-volume percents (m/V)
 - Not allowed by Ph.Eur.
 - Volume-weight percents (V/m)
 - Not allowed by Ph.Eur.

Calculations of several quantity

- Density
 - $\rho = m/V$; $m = \rho \cdot V$; $V = m/\rho$
- Amount of substance (mol)
 - $n = m/M_r$
- Molar concentration (mol/l)
 - $c = n/V$

Dosage

- 1 ml of water = 20 drops
 - 1 drop of water solution = 0,05 ml
- 1 tea spoon = 5 ml
- 1 table spoon = 15 ml

- Doses:
 - maximal – single and daily
 - therapeutic – single and daily

Rule of three

- In what amount of 50% solution will be 5 grams of active substance?

$$\begin{array}{ccc} 50 \text{ g} & \text{-----} & 100 \text{ g} \\ 5 \text{ g} & \text{-----} & x \text{ g} \end{array}$$

$$x = \frac{5 \times 100}{50} = 10 \text{ g}$$

Mixing equation

- Molar concentration (mol/l)

- $C_{\text{mol}1} \cdot V_1 + C_{\text{mol}2} \cdot V_2 + \dots = C_{\text{mol}x} \cdot V_x$

- Percentual (weight) concentration

- $w_{\%1} \cdot m_1 + w_{\%2} \cdot m_2 + \dots = w_{\%x} \cdot m_x$

Exercise 1

Paste is composed of 15 g ZnO, 15 g of starch and 50 g of vaseline. What is the ZnO concentration?



Exercise 2

30 g of ointment contains 10 % of sulphur and 2 % of acetylic acid. How many grams of drugs the ointment contains?



Exercise 3

How many mg of drug is needed for creation of 200 g 0.2% solution?



Exercise 4

During preparation 20 g of drug and 150 grams of water were used. What is the concentration of solution in %?



Exercise 5

How many grams of 0.9% NaCl solution will be prepared from 20 g NaCl?



Exercise 6

What amount of water we must add to 5 g of drug to create 2.5% solution?



Exercise 7

50 g of ointment contains 2 g of salicylic acid.
How many a) salicylic acid or b) 20% ointment
is required to obtain 5% ointment?



Exercise 8

What concentration will be created after mixing 400 g 2.5% and 600 g 5% ointment with ZnO?

..... How many ZnO is needed for preparation of 15% ointment from the previously created product?

.....



Exercise 9

25 ml of injection solution contains 4 mg of drug. How many ml of solution you need for dose of 200 micrograms of drug?



Exercise 10

Child weighing 9.5 kg is supposed to use Zinnat 125 mg/5 ml. Usually, the dose is 10 mg/kg twice a day. How many ml will the child get in one dose?



Exercise 11

Child weighing 5.5 kg is supposed to use Amoksiklav 125 mg/31.25mg/5 ml. Usual dose is 20mg/5mg per 1 kg three times a day. How many ml will child get in daily dose?



Exercise 12

Patient was prescribed 4 grams of doxycycline per day, divided into four doses . Only 100 mg capsules are available. How many capsules patient uses in a single dose?



Exercise 13

You are about to prepare Nystatin suspension in glycerol. Formula says that for the preparation you need 3.000.000 IU of nystatin. At your disposal, you have 10 gram bottle package of nystatin with declared content of 5614 IU/mg. How many mg of nystatin you need to weigh for your preparation?