



Alligation Used for dilution and concentration

Objectives:

Students should be able to calculate the necessary quantities needed from different concentrated solutions or preparations in order to prepare a final dosage form with a required concentration. The students should be able to utilize both Alligation Medial and Alligation Alternate methods

Reading

In addition to the section below, the students are responsible for the following pages from the Ansel Pharmaceutical Calculations book

287 (triturations)-294

Why dilution and concentration?

Preparation of individualized doses (to fulfill the need of different dosage forms &/or strengths from an available product.

Altering of the strength of a dosage form.

Amount of Drug

Quantity of solute = Concentration x quantity of the preparation

How many milliliters of solute are in

- 6.6 L of 1:3000 v/v solution?
- 400 mL of 6% v/v solution?

Dilution

If a pharmacist wants to prepare a 30 grams 5% ZnO cream using 20% ZnO cream and white ointment, the pharmacist can use the following equation

CQ equation:

Concentration 1 x quantity 1 = Concentration 2 x quantity 2 (can also be written as

$C_1V_1=C_2V_2$)

$Q_2= 30\text{grams}$

$C_2 5\%$

$C_1=20\%$

$Q_1 ?$

Remember that $Q_2 = Q_1 + Q_{\text{white ointment base}}$

1-A pharmacist needs to prepare 45 grams 10% sulfur in petrolatum using 1: 5 w/w sulfur and petrolatum. How much of each does the pharmacist need?

2- A surgeon needs 15 mL of diluted solution of H₂O₂ 1:40 v/v. How many mL of water and 20% H₂O₂ should be used?

Combining dosage forms with different concentrations

Alligation Medial also called Mass Balance Equation

Alligation Alternate method

Alligation Medial (Mass Balance Equation)

$$C_1Q_1 + C_2Q_2 = C_fQ_f$$

Remember $Q_1 + Q_2 = Q_f$, (in most cases)

C_1Q_1 Concentration and quantity of solution or dosage form 1

C_2Q_2 Concentration and quantity of solution or dosage form 2

C_fQ_f Concentration & quantity of the final solution or dosage form

- Hint: is easier to use when you have more than two sources of medication or ingredient of interest $C_1Q_1 + C_2Q_2 + C_nQ_n = C_fQ_f$

3- What is the final concentration of an alcohol mixture made by combining 50 mL of alcohol 70% and 60 mL of alcohol 95%?

$$C_1Q_1 + C_2Q_2 = C_fQ_f$$

$$50 \text{ ml} \times 70\% + 60 \text{ ml} \times 5\% = (50 \text{ ml} + 60 \text{ mL}) \times C_f$$

4- How many mL of 15% w/v boric acid and 2.5% w/v boric acid solutions are required to prepare 200 mL of 5% w/v boric acid solution?

$$Q_1 + Q_2 = 200 \text{ mL}$$

5- A pharmacist needs to prepare 28 grams of 10% ZnO cream using 2% and 20% ZnO creams. How much of each cream should be used?

6-How many mL of syrup 80% w/v sucrose should be mixed with 300 mL of syrup 50% w/v sucrose to prepare 70% w/v syrup ?

Alligation Alternate method (read from the book)

Use 5% and 15 % of drug A creams to prepare 12 % of drug A cream.

15		7 parts of 15%
	12	
5		3 parts of 5%
		Total 10 parts

So mixing 15% and 5 % creams with 7 :3 ratio will provide us with 12% cream.

7- How many mL of 2% solution should we mixed with water to prepare 500 mL of solution contains 4 mg/ mL?

- Hint: **first step make sure 2% and 4 mg/mL are in the same units.**

8-How much of alcohol 50% should be mixed with alcohol 10 % to prepare 40 mL of alcohol 5%? Choose the correct answer

1. 5 parts of alcohol 50% and 45 parts of alcohol 10%.
2. 5 parts of alcohol 50% and 40 parts of alcohol 5%.
3. This concentration cannot be achieved

9-What is the ratio of alcohol 90% : alcohol 25% needed to prepare alcohol 60%?

1. 35:30
2. 54%
3. 35:65
4. Both answers #1 and 2
5. None of the above

