Practical Pharmaceutical calculation
1st stage
College of Pharmacy

Lab.5: Reducing and Enlarging Prescription Contents

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Reducing and Enlarging Prescription Contents

Reducing and enlarging prescription contents refers to the process of:

- **Reducing**: Decreasing the quantities of all ingredients in a prescription
- **Enlarging**: Increasing the quantities of all ingredients

while maintaining the **same ratio between components**.

- This process is essential in:
  - Hospital pharmacies
  - Compounding pharmacies
  - Industrial batch preparation

Principle of Proportionality

- This process is based on the mathematical concept of **direct proportionality** (Direct Proportionality), where:
  - If one quantity changes, the others change in the same ratio
  - The relationship between ingredients remains constant

This ensures that:

- **Drug concentration remains unchanged**
- **Safety and efficacy are preserved**

- Calculations to reduce or enlarge formulas may be performed by a *two-step* process:
  - ***Step 1***. Using the following equation, determine the *factor* that defines the multiple or the decimal fraction of the amount of formula to be prepared:

$$\frac{\text{Quantity of formula desired}}{\text{Quantity of formula given}} = \text{Factor}$$

- If factor $< 1 \rightarrow$ **Reduction**
- If factor $> 1 \rightarrow$ **Enlargement**

  - ***Step 2***. Multiply the quantity of each ingredient in the formula by the factor to determine the amount of each ingredient required in the reduced or enlarged formula.

Types of Quantities in Prescriptions

❑ Fixed Quantities

- Exact amounts (e.g., 5 g, 10 mL)
- Must be scaled proportionally

❑ Quantity Sufficient (q.s.)

- Means "**quantity sufficient**"
- Used mainly for solvents or vehicles
- Adjusted to reach final required volume or weight

- **Key Terms**
  - **q.s. (quantum satis)** → Quantity sufficient
  - **q.s. ad** → Quantity sufficient to make up to a final volume or weight
  - **Vehicle** → Inactive substance used as a medium
  - **Active ingredient** → Therapeutic substance

Example 1: From the following formula for 40 sertraline capsules,[4] calculate the factor that would be used if a pharmacist wished to prepare 250 capsules.

Sertraline Hydrochloride …… 300 mg

Silica Gel …… 6 g

Calcium Citrate …… 4 g

$$\frac{\text{Quantity of formula desired}}{\text{Quantity of formula given}} = \text{Factor}$$

250 capsules / 40 capsules = 6.25

Example 2: From the following formula, calculate the quantity of each ingredient required to make 240 mL of calamine lotion.

Calamine ..... 80 g
Zinc Oxide ..... 80 g
Glycerin ..... 20 g
Bentonite Magma ..... 250 mL
Calcium Hydroxide Topical Solution, to make ..... 1000 mL

$$\frac{240\,\text{mL}}{1000\,\text{mL}} = 0.24\,(\text{factor})$$

Using the factor 0.24, the quantity of each ingredient is calculated as follows:

Calamine = 80 g × 0.24 = 19.2 g
Zinc Oxide = 80 g × 0.24 = 19.2 g
Glycerin = 20 g × 0.24 = 4.8 mL
Bentonite Magma = 250 g × 0.24 = 60 mL
Calcium Hydroxide Topical Solution, to make 240 mL, answers.

Example 3: From the following formula for an estradiol vaginal gel, calculate the quantity of each ingredient required to prepare 1 lb. of gel.

Rx

Estradiol	200 g
Polysorbate 80	1 g
Methylcellulose Gel, 2%	95 g ?

1 lb = 454 g

Formula weight = 200 g + 1 g + 95 g = 296 g

454 g / 296 g = 1.534 (factor)

Using the factor 1.534, the quantity of each ingredient is calculated as follows:

Estradiol = 200 g X 1.534 = 306.8 g

Polysorbate 80 = 1 g X 1.534 = 1.534 g

Methylcellulose Gel, 2% = 95 g X 1.534 = 145.73 g, answers.

Experimental work : Enlarging a Prescription

Given Prescription:

Prepare 50 g ointment:

- Zinc oxide → 10 g
- Vaseline → 40 g

🎯 **Task:**

Prepare **150 g**

Calculations

$$\frac{\text{Quantity of formula desired}}{\text{Quantity of formula given}} = \text{Factor}$$

- Factor=150/50=3
- Zinc oxide:

  10×3=30 g
- Vaseline:

  40×3=120 g

Procedure

1. Weigh **30 g Zinc oxide**
2. Weigh **120 g Vaseline**
3. Mix using spatulation or levigation
4. Ensure uniform consistency
5. Transfer to container