



Compounding and Manufacturing

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Course Objective



- Use balance accurately
- Choose the proper instrument or device e.g. cylinder, pipette glass or porcelain mortar etc.
- Basic methods for preparation of liquid, solid and semisolid preparations as well as use of their additives e.g. suspending agents, coloring agents.
- Know about the dilution methods and calculation procedures e.g. Alcohol, H_2O_2 and maintain assigned work areas like cleaning.
- Check and remove expired preparation from compounding and manufacturing area.
- Maintain appropriate records of manufacturing activities and appropriate stock levels of chemicals and products.
- Use appropriate preservatives for each preparation.
- Choose appropriate label for each preparation.



References



a. Remington's Pharmaceutical Sciences.

This text is published by the Mack Publishing Company. The reference deals with the theory and practice of the art of compounding. Remington's contains useful information on the many dosage forms of medications present in the pharmacy. Moreover, Remington's contains specific information on the compounding of commonly used pharmaceutical products.



b. The United States Pharmacopeia and The British National Formulary.

These references contain specific standards and tests for the strength, purity, quality, packaging, and labeling of drugs in the United States. These references are now published together under one cover. The texts are revised every five years. Supplements to the main texts are supplied.

c. Pharmaceutical Calculations.

This text was written by Mitchell J. Stoklosa. If you frequently review calculations, you will maintain your ability to perform various types of calculations required in pharmaceutical compounding.

Definition of the compounding

- Pharmacy compounding is the art and science of preparing personalized medications for patients.
- It includes the preparation, mixing, assembling, packaging or labeling of a drug in response to a prescription written by a licensed practitioner.
- Compounded medications are “made from scratch” – individual ingredients are mixed together in the exact strength and dosage form required by the patient. This method allows the compounding pharmacist to work with the patient and the prescriber to customize a medication to meet the patient’s specific needs.

Types of Pharmaceutical Preparations

- Pharmaceutical preparations are:
 1. Manufactured (fully standardized, assayed, and approved).
 2. Compounded individually (Famous in folk medicine and old school medical doctors).



Reason of Compounding

- Some preparations includes whole natural products which are not easily to be standardized.
- Some Manufactured preparations are not sufficient for treating some diseases (for compounding purposes).
- Some Manufactured preparations are not available such as the dosage, strength or route of administration.
- Dilution of manufactured preparations for pediatric dosage.
- Some Manufactured preparations causes sensitive reactions for patients due to inactive ingredients.
- Some active constituents are not still approved for treating some diseases.
- Some active constituents are not easily to be manufactured.

Compounding



Properties of Compounded medications

- **Single-Patient-Patch** medications
- Not well described for its physical and chemical properties.
- Difficult to be standardized.
- Less Expensive for selling and for compounding.
- Less costive.
- High profit.
- It is generally agreed that pharmaceutical products should be prepared with a low percentage of error. The Official Compendium allows a tolerance of plus or minus 5 percent for most formulas.

Equipment for Compounding

- Glass or Porcelain Mortar and Pestle
- Graduated Glass Cylinder
- Weighing Balance



Equipment for Compounding

- Dropper
- Labels
- Spatula
- Bottles



Basics for pharmaceutical Compounding

1. Area should be clean and appropriate.
2. Reading should be at the level of the eye for graduated measurements.
3. For liquids: Liquids such as Solutions and Suspensions , are the most common form of compounded medications. A solution is a clear liquid in where the drug is completely dissolved. A suspension is a liquid preparation that contains fine drug particles that are distributed uniformly throughout the solution. The reconstitution of an antibiotic such as Amoxicillin would be an example of a suspension. **Suspensions always require shaking before use.**

Basics for pharmaceutical Compounding

4. When solids are required in solution, it is important to reduce the particle size of the solid by using the mortar and pestle (trituration). In some cases, the incorporation of other agents are needed to ensure finer particle size and in the case of suspensions, to ensure even distribution of particles.
5. A **dilute solution** contains a very small amount of particles or solute in solution. A **concentrated solution** contains large quantities of solute in solution and a saturated solution contains the maximum amount of solute that can be dissolved in a solvent or at a given temperature or pressure.

Basics for pharmaceutical Compounding

6. Ointments and Creams are semisolid dosage forms used for externally. They are often used when the prescribing physician requires the combination of two or more ointments or creams in a specified ratio or the incorporation of a drug into an ointment or cream base. Ointments are characteristically oil based, while creams are water based. Because the direct mixing of ingredients is not always workable, the incorporation of other agents such as a wetting agent or levigating agent is needed to ensure finer particle size.

Wetting Agents: displaces air from particles and allows them to mix better

Example: Alcohol

Levigating Agents: reduces particle size

Example: Mineral Oil, Glycerin

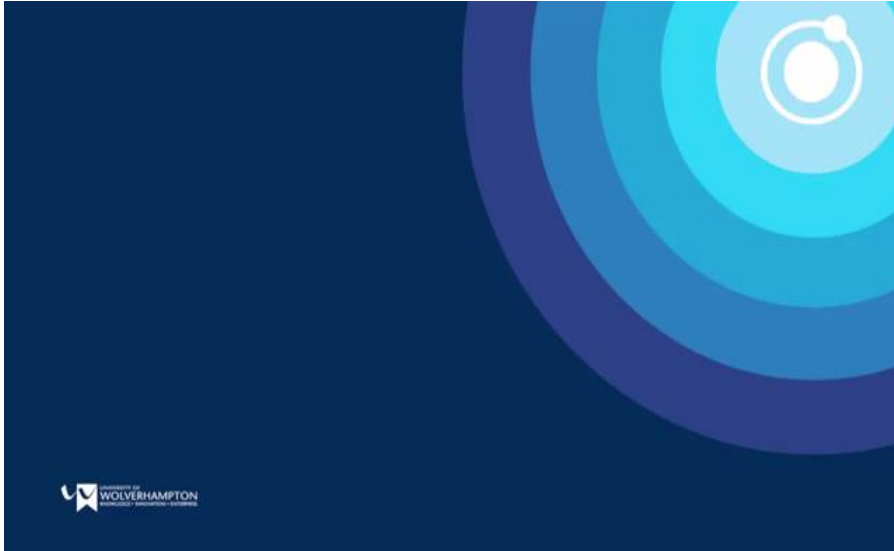
Suspending Agents: a thickening agent that gives some structure to a suspension. Allows easy dispersion of particles.

Example: Carboxymethylcellulose, Tragacanth

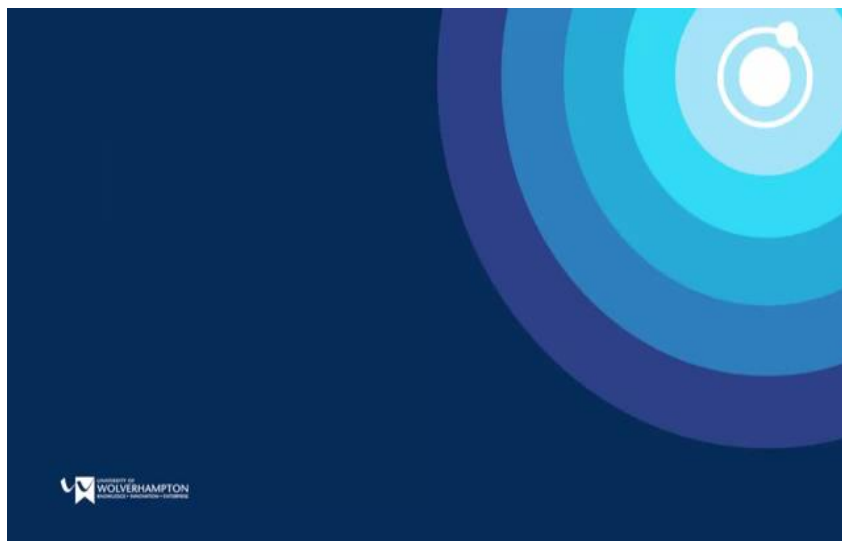
Basics for pharmaceutical Compounding

7. Geometric Dilution is the process by which a homogenous mixture or even distribution of two or more substances is achieved. When using this method, the smallest quantity of active ingredient is mixed thoroughly with an equal volume of the diluent or base on the ointment slab. More diluent (base) is added in amounts equal to the volume of the mixture on the ointment slab. This process is repeated until all of the diluent (base) is incorporated in the mixture. This method, though time consuming, will create a homogenous mixture or smooth dispersion of the drug in the ointment/cream base.

Compounding a cream



Compounding a Suppository



Basics for pharmaceutical Compounding

8. Coloring agent: Can be divided into (dyes or pigments).
Dyes are either organic soluble, water soluble or disperse dyes. Pigments are either one dimensional, two dimensional or multidimensional pigments.
Azo dyes (dangerous for Aspirin-sensitive patients), Aluminum stearate, Zinc Stearate, CI 1006, etc). They are most likely used for improving the appearance.
9. Preservative: mostly used in liquid preparations. Such as Para-amino benzoic acids adsorbed inside a surfactant. It must be broad spectrum, less toxic, non adsorbed to the container and does not alter the pH of the preparation.
10. Antioxidants: Vitamin E (oil-soluble) or Ascorbic acid (water-soluble)

Basics for pharmaceutical Compounding

11. Calculation method:
- Knowledge of the metric system, ratio, and concentration conversions.
 - Mostly we dilute stock solution, cream and suspension.
 - We use the following law for dilution:
 - $C_1 * V_1 = C_2 * V_2$
 - Where C_1 and C_2 are the concentrations before and after dilution respectively and V_1 and V_2 are the concentrations before and after the dilution respectively.

Good Compounding Practice

1. Keep the bench area clean.
2. Label the preparation clearly and the manufactured date and the expiration date.
3. Renew the stock solutions from time to time to avoid using old stocks.
4. Keep the stock solutions in a well closed containers and keep the volume of it constant.
5. Maintain appropriate records of manufacturing activities and appropriate stock levels of chemicals and products.
6. Use appropriate preservatives for each preparation.
7. Choose appropriate label for each preparation

*Thank
You*