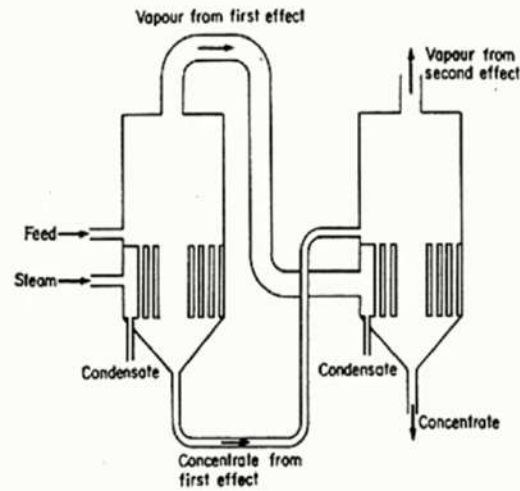


# Industrial Pharmacy(I)



Batch



Separatory funnel

Continuous:

single-stage

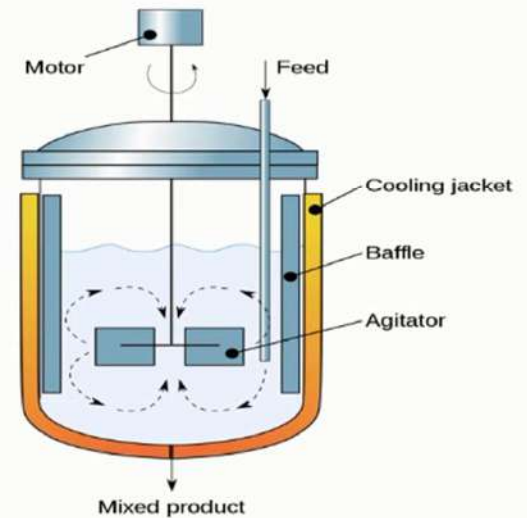


mixer-settler

column



rotating-disk contactor  
a. agitator; b. stator disk



**Prepare by:  
Dr: RIAD K. AL-QEDRA**

# **Course Description of Industrial Pharmacy I**

- 1) Introduction to Industrial Pharmacy**
- 2) Mixing Process**
- 3) Homogenization and Emulsification Process**
- 4) Heat, Heat Transfer and Heating Process**
- 5) Evaporation Process**
- 6) Crystallization Process**
- 7) Drying Process**

# **Course Description of Industrial Pharmacy I I**

- 1) Extraction process**
- 2) Filtration Process**
- 3) Centrifugation Process**
- 4) Distillation Process**
- 5) Particle Technology including**
  - a- Particle Size Reduction**
  - b- Particle Size Enlargement**
- 7) Mass Transfer**
- 8) Good Manufacturing practice (GMP) Concept**

# References:

- 1. Theory and practice of Industrial Pharmacy  
(Lashman).**
- 2. Aulton : Pharmaceutics 5th edition**
- 3. Ansel : Pharmaceutical Dosage Forms and  
Drug Delivery System**

# Introduction to Industrial Pharmacy

## Definition 1:

Industrial pharmacy may be defined as the science and technology of producing pharmaceuticals (medicinal substances and their dosages)

- 1- Efficiently and
- 2- Economically on the commercial scale in industry.



# Industrial Pharmacy

❖ **Industrial pharmacy** is a discipline which includes manufacturing, development, marketing and distribution of drug products including quality assurance of these activities

➤ The reasons for the increasing of large scale manufacturing

**1- Economic:-** As the scale of manufacturing batches increases so, proportionally, does the cost of production decreases

**2- Accuracy:-** The larger the quantities of materials involved so, proportionally, is the accuracy of measurements increased

# Classification of Industrial Pharmacy

**Industrial pharmacy may be classified into the following areas:**

- 1- Pharmaceutical Engineering including:
  - a- Unit Operations
  - b - Unit Processes
- 2- Pharmaceutical Product Development
- 3- Pharmaceutical Administration
- 4- Pharmaceutical Sales
- 5- Pharmaceutical Packaging.

# 1- Pharmaceutical engineering

❖ Is that branch of engineering concerning the application of engineering and pharmaceutical sciences to the design, construction and operation of plants for production of pharmaceuticals.

## ❖ It is concerned with

1- The evaluation of pharmaceutical machinery and equipment

2- The development of processes in which:

➤ Materials undergo chemical changes (Unit processes) or

➤ Certain physical changes (unit operation).



## **2- Pharmaceutical Product Development**

Pharmaceutical Product Development is subdivided in 3 sections:

- I. Research and development (R&D)
- II. Quality Control (Q.C.) or Quality Assurance (Q.A.)
- III. Production Area (P.A.)

## **i. Research and development (R&D)**

**It is consider as the back bone of industry and performs three main functions:**

- 1- Research the difficulties of the product in day to day problems.
- 2- Develop the order products, devices and equipment's .
- 3- Coming up of new Equipment's, products and devices .

In Research and development a pharmacist can start his career as:

• Usually P.h.D. and M.S. are employed as:

1- Junior research officer → 2- Senior research officer →

3- Head of particular section → 4- Manager → 5- Asst.

Director → 6- Director → 7- M.D.

## ii- Quality Control (Q.C.) or Quality Assurance (Q.A.)

- A new term was used for Quality Control (Q.C.) as Quality assurance (Q.A.)
- Here preventive measures are taken to control the Quality of the product.
- **“Assurance”** to ascertain that proper Quality of the product is obtained .it is vary essential process and includes testing starting from the 1<sup>st</sup> step of manufacturing and up to the last step .

## **Quality Control (Q.C.) or Quality Assurance (Q.A.)**

A pharmacist holds following responsibilities:

1. His major responsibility is to analyze the drug.
2. Developing new analytical Procedures.
3. Improve Quality control ,Quality assurance or Standard of the products.



# Quality Control (Q.C.) or Quality Assurance (Q.A.)

**A Pharmacist can start his career as:**

1- Junior Analyst → 2- Senior Analyst → 3- Chief Analyst → 4- Head of particular section ( Physical, chemical , Biological section ) → 5- Asst. manager → 6- Manager → 7- Asst. Director → 8- Director → 9- Board of directors member → 10- M.D. → 11- Asst. president .

### **iii- Production Area (P.A.)**

It is the reaction where actual production takes place and is classified in two major sub reactions:

- 1- Sterile area
- 2- Non Sterile area

#### **1- Sterile area:**

Is one where Preparation is sterilized and pathogenic wings organisms are removed.

**Sterilization is particularly required in the following dosage forms:**

A- Injections (Parenteral)

B- Eye Preparations (Ophthalmic) as creams, lotions, drops, ointments, etc.

C- Penicillin Productions area, it is recently introduced

## 2- Non Sterile area

Includes all other Preparations except the mentioned three types in the sterile area.

**Non Sterile area is divided in 3 sub reactions:**

**I. Solid Dosage forms:**

**e.g.,** Tablets, Capsules, Granules

**ii. Semi Solid Dosage forms:**

**e.g.,** Oils, Creams, Pastes, Ointments, Jellies,..... Etc

**iii. Liquid Dosage forms:**

**e.g.,** Syrups, solutions, Emulsions, Suspensions,..... etc.

## iii- Production Area (P.A)

**Here a Person can start his career as the following:**

- 1- Junior manufacturing Pharmacist (J.M.P.) →
- 2- Senior manufacturing Pharmacist (S.M.P.) →
- 3- Chief M.P. → 4- Head of particular section  
(Sterile area, Non Sterile area) → 5- Asst. Production  
Manager → 6- Production Manager →
- 7- Plant Manager → 8- Asst. Director → 9- Director →
- 10- Board of Directors



## 3- Pharmaceutical Administration

**In administration department a pharmacist join an a clerical level but in U.S.A. he is termed:**

1- Executive → 2- Manager → 3- G.M. → 4- West Director →  
5- Director → 6- Managing Director (M.D.)



## 4- Pharmaceutical Sales

❑ It is the work of Medical representative or sale man who goes from person to person for selling of the product:

❑ In Pharm. Sale, a Pharmacist can start his career as:

1- Medical rep. → 2- Senior medical rep. → 3- supervisor →

4- Area Manager → 5- Sales Manager → 6- Director of Sales Division