PHA 389 PHARMACEUTICAL TECHNOLOGY- I

1st week

Introduction to Pharmaceutical Technology

What is Pharmaceutical Technology?

“All of the technologies that involve the development and use of drugs”

- Preparation, production, control of drug forms
- Properties of active substance release, interactions with human body
- Production, control of biotechnological, radiopharmaceutical, cosmetic and cosmeceutical productions

Pharmaceutical Technology,

is a science that encompasses all the processes for turning an active pharmaceutical ingredient into a medicine that can be used safely and effectively by patients.

Some historical steps in pharmacy

- **Primitive tribes**

***treatment with plants**

- **China**

***opium, anise, sulfur, mercury, ephedra species**
***asthma, shortness of breath and cough treatment**

- **Indian (B.C. 3500)**

***ginger, sandalwood, aloe, mercury, gold,**
***elixir, pomade, decoction, patch production**

- **Mesopotamia**

***opium, benzoe, licorice,**
***pomade, liniment, decoction, infusion production**

- **Egypt**

***castor oil, aloe, opium, some minerals (Ar, Hg, S, Zn, Pb)**
***porridge, mouthwash, pat etc. production**
***usage of mortar, sieve, mill, glass measuring cups**

Some historical steps in pharmacy

- **Baghdad**

***The first pharmacy was founded in 760**

- **Hippocrates**

***Father of medicine and pharmacy**
***Medicine was saved using magic**

- **Dioscorides**

***Author of Materia Medica**
***Book includes pharmaceutical raw materials, preparations and uses**

- **Cladius Galenus**

***Laid the foundation for pharmaceutical technology knowledge**
***The name «Galenic pharmacy» comes from his name**
***Drugs are grouped as specific drugs, poisons and antidotes according to their effects,**
***The first method of writing a prescription**

Some historical steps in pharmacy

- Ibn Sina turned pharmacy into a profession

- 16th century

Paracelsus used mercury salts to treat syphilis

- 17th century

Homopathy emerged

- 18th century

Liquor d.Hoffman and Dover powder (T.K. 1954)

- 1806

Morphine production from opium

- 1827

*The foundation of the pharmaceutical industry was laid in pharmacy laboratories

*Emanuel Merck begins production of large quantities of alkaloid in his laboratory

Merck Pharmacy- Darmstadt,

Riedel and Schering pharmacy-Berlin

• Fenni İspençiyari	Ottoman
• Materia Medica	Rome
• Galenic Pharmacy	Europe
• Pharmaceutics	Anglo-Saxon

Pharmaceutics definition covers the issues of

- **General pharmaceutical technology,**
- **Clinical pharmacology ,**
- **Biopharmaceutics and pharmacokinetics,**
- **Pharmacy applications**
- **Cosmetics**

Industrial Pharmaceutical Technology

involves the areas given below:

- drug product preparation,
- methods of application of scientific bases to industry,
- the scientific basis of the instruments and machines

used in the operations,

- pharmaceutical engineering and
- Effects of fabrication on drugs

Codex and Pharmacopoeia

Codex

is a manuscript, official and antique book containing a list of chemical and medical items

Pharmacopoeia

They are official books containing the pharmaceutical active substances and the necessary properties for the preparation of medicinal forms prepared therefore for the protection of life and for therapeutic purposes.

Pharmakon + Poiein = Pharmacopoeia

Pharmacopoeias

The therapeutically effective amount of the active ingredients, the dosage forms prepared therefrom, the excipients used are given in pharmacopoeias.

They contain;

- Physical, chemical and physicochemical properties,
- Control and Identification reactions,
- Quantity assignments,
- Storage conditions,
- Some formulations

- They are prepared and printed by the authorities assigned by each country. This ensures a legal standard.

History of Pharmacopoeias

50-70 Materia Medica (Dioscorides)
1498 First pharmacopoeia in Florence
1820 First pharmacopoeia in USA (USP)
1969 First pharmacopoeia in Europe (EP)

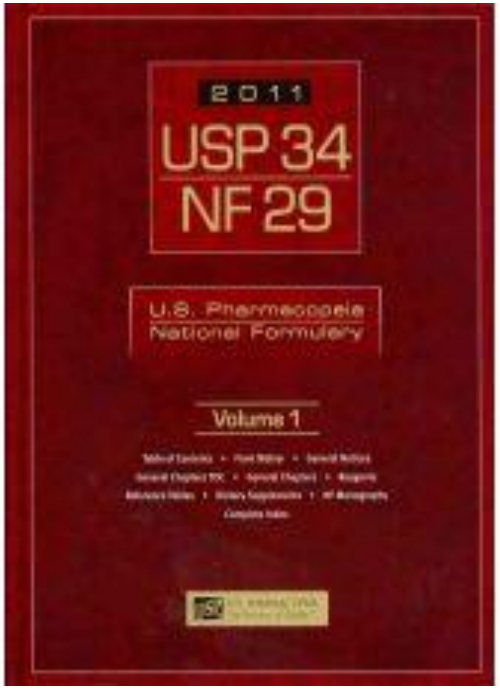
1930 First Turkish Codex in Republic of Turkey
1948 T.K. 1948 is the extended version of T.K.1930
1974 First pharmacopoeia of Turkey (T.F. 1974)
1994 European Pharmacopeia Commission membership acceptance
2004 Adaptation of the European Pharmacopoeia Volume 1 was published

Formulary:

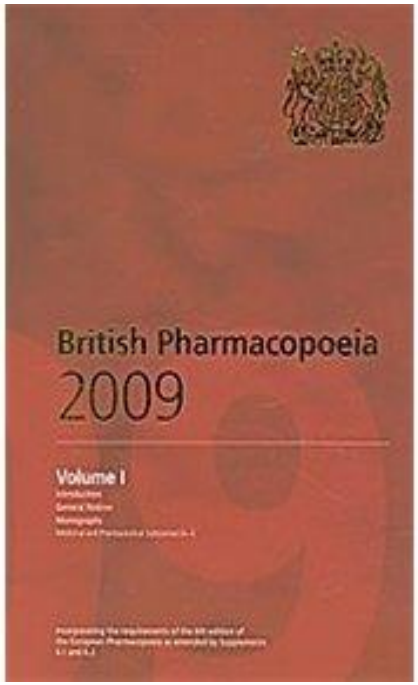
These are the active substances and dosage forms which are not important enough to enter the pharmacopoeia.

National Formulary (N.F.)
British National Formulary (B.N.F.)


Avrupa Farmakopesi
Adaptasyonu


2011
USP 34
NF 29
U.S. Pharmacopeia
National Formulary
Volume 1


EUROPEAN
PHARMACOPOEIA
7.0


British Pharmacopoeia
2009
Volume I

Examples;

- **Turkish Pharmacopoeia 2004 (TF 2004)**
  (The newest one is (TF 2018)
- **European Pharmacopoeia 6.0 (EP 6.0)**
  (The newest one is EP 9.0)
- **American Pharmacopoeia 27 (USP 27)**
  (The newest one is USP 34)

- ✓**Turkish Codex 1954 (T.K.)**
- ✓**American National Formulary (N.F.)**
- ✓**British Pharmaceutical Codex (B.P.C.)**

Drug or pharmaceutical product ?

Drug can be defined as:

the medicine or other substance which has a physiological effect when ingested or otherwise introduced into the body.

Under the «Health Topics» title, WHO (World Health Organization) defines drugs under two different subtitles;

- essential medicines,

- pharmaceutical products,

which the latter is commonly called as drug or medicine.

Medicines are the products, used in different ways for;

- **protecting the living from disease,**
- **Used with the aim of diagnosing and treating the diseases,**
- **Contain one (or more) active ingredient,**
- **Designed to be easily received by the patient,**
- **Prepared in the form of a formula (auxiliary substances) which will be effected according to the desired purpose and duration.**

Pharmaceutical products:

More commonly known as medicines or drugs – are a fundamental component of both modern and traditional medicine. It is essential that such products are safe, effective, and of good quality, and are prescribed and used rationally.

Pharmaceutical products can be categorized as:

- **Magistral:**

This is the common name of medicines prepared by a pharmacist according to a prescription written by a doctor, veterinary doctor or a dentist.

- **Officinal :**

Pharmacist usually prepares this kind of medicines according to the formulations given in codex or pharmacopoeia. They are prepared as stock formulations.

- **Pharmaceutical preparations:**

These are the pharmaceutical products prepared in a factory after licenced by the health authority of the country TURKISH MEDICINES AND MEDICAL DEVICES AGENCY (TMMDA; TİTCK) is the authority in our country. These medicines can be over the counter (OTC) or can be given with a prescription.

Structure of the pharmaceutical product

- They can be classified human and veterinary according to the organism applied to

- They contain - Active substance
  - Auxiliary substances / vehicles

Active substance (drug): is an organic / inorganic substance that provides the therapeutic and diagnostic purpose of the drug.

Excipient (vehicle): is the inert substance used in the formulation of the active substance and used according to the dosage form to be formulated.

Active agent, active substance, drug

According to their structure they can be classified as

- Natural
- Semisynthetic
- Synthetic

They can also be classified as,

➢ Simple:
Pharmaceutical product contains only one drug

➢ Composed :
Pharmaceutical product contains more than one drug

Excipient, vehicle

Excipient term is used for semisolids while vehicle term is generally used for solid dosage forms.

when the active ingredient is formulated with a suitable excipient as a pharmaceutical product:

- It can be easily taken by the patient,
- Dose is precisely adjusted,
- It is well absorbed,
- Its stays long-lasting

Classification of pharmaceutical products

can be done according to the

- structure of drug
- application site of product
- organs they are applied
- formulation and preparation techniques
- amount of active ingredient they contain
- prescription

Classification of pharmaceutical products

- application area of product
  - Internal (oral)
  - External
  - parenteral

Oral use:

Syrups, capsules, tablets, efervescent powders, granules, suspensions etc..

External use:

Eye/ear preparations, creams, semisolids, suppositories, lotions, etc…

Parenteral use:

Enjectable preparations, solutions packaged in ampules or vials, serum solutions, dialysis solutions implants,etc..

Classification of pharmaceutical products

- organs they are applied
  - Ophtalmic
  - Nasal
  - Otic
  - Rectal –vaginal
  - Transdermal

- amount of active ingredient they contain
  - Adult dose
  - Pediatric dose (for children)

Classification of pharmaceutical products

- Formulation and preparation techniques

  - Solutions
    (syrups, elixirs etc)

  - Disperse systems
    (colloidal preparations, suspensions, emulsions etc)

  - Semisolid dosage forms
    (ointments, creams, suppositories, ovules etc)

  - Solid dosage forms
    (tablets, granules, powders, capsules etc)

Pharmaceutical products can be prepared in

- Pharmacy
- Hospital pharmacy
- Industry

Thus, pharmaceutical products can also be categorized as:

- Magistral
- Officinal
- Pharmaceutical preparations

Remember that !

Classification can also be done as;

- Human or veterinary products
- Natural, Semisynthetic, Synthetic according to the structure of drug
- Simple or composed pharmaceutical products due to they containone or more than one drug.