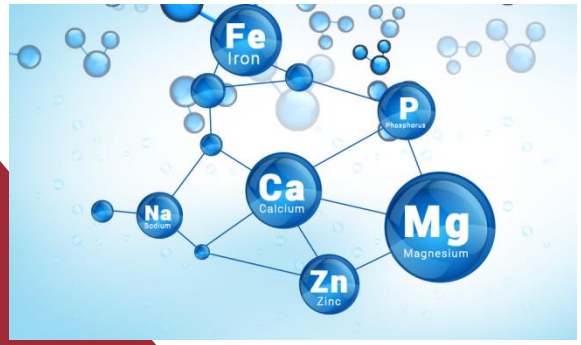
INTRODUCTION TO PHARMACEUTICAL INORGANIC CHEMISTRY



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TOPICS COVERED :

1. INTRODUCTION TO PHARMACEUTICAL INORGANIC CHEMISTRY,
2. DIFFERENT PHARMACOPOEIA AND CONTENTS OF INDIVIDUAL MONOGRAPHS.
3. INDIAN PHARMACOPOEIA – HISTORY AND DETAIL STUDY OF DIFFERENT VOLUMES ALONG WITH GENERAL NOTICES,
4. NEW INCLUSION/EXCLUSION OF COMPOUND MONOGRAPH.

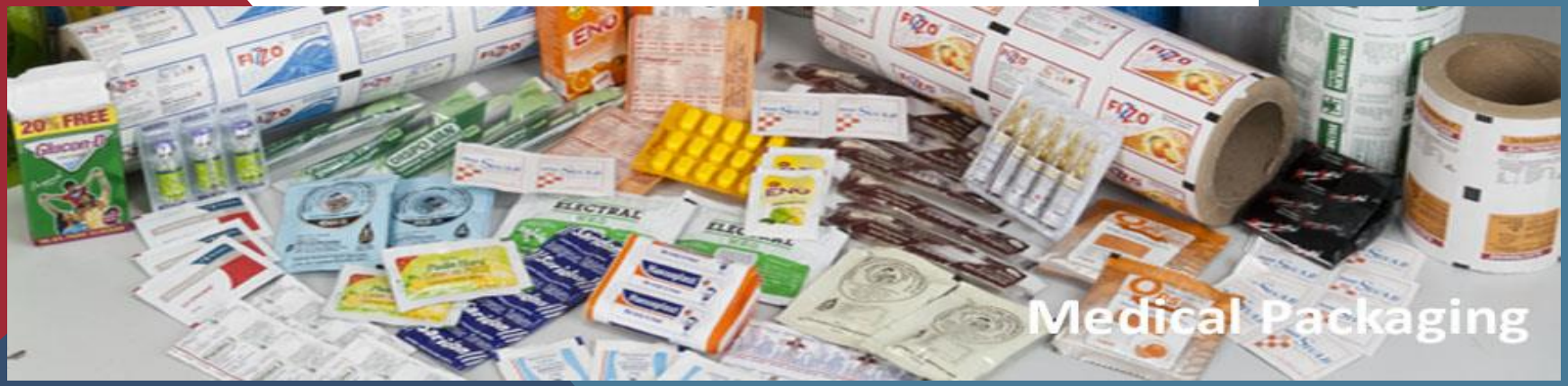
INORGANIC CHEMISTRY:

- Chemistry Of Mineral
- Chemistry Of Non- Carbon Compound

PHARMACY:

- Pharmacy is the science and technique of preparing and dispensing drugs. It is a health profession that links health sciences with chemical sciences and aims to ensure the safe and effective use of pharmaceutical drugs.

- "PHARMACY" word come from "*PHARMAKON-(DRUG)"* a greek word.



History of Pharmacopoeia

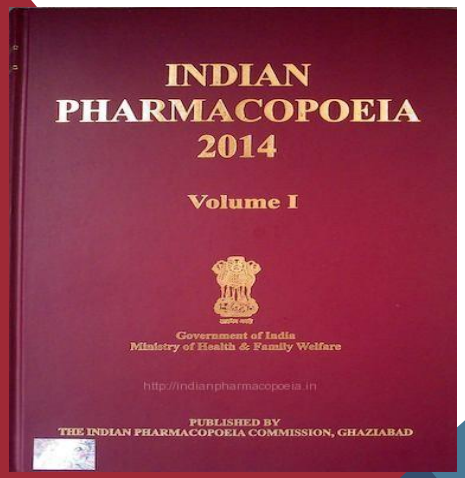
- *United state Pharmacopoeia (USP)*
- *British Pharmacopoeia*
- *European Pharmacopoeia*
- *Japanese Pharmacopoeia* Etc….

Pharmacopoeia: an official publication of respective country that deals with regulation of drug and its formulation for human use.

Indian Pharmacopoeia (IP) is an official document meant for overall Quality Control and Assurance of Pharmaceutical products marketed in India by way of contributing on their safety, efficacy and affordability.

IP contains a collection of authoritative procedures of analysis and specifications for Drugs.

The IP, or any part of it, has got legal status under the Second Schedule of the Drugs & Cosmetics Act, 1940 and Rules 1945 there under.



1885- British Pharmacopoeia was made official in India

1927 - A drug Enquiry Committee appointed by the government

1948 - After independence, the Indian Pharmacopoeia Committee was constituted for publication of IP as its main function.

First pharmacopoeia- London pharmacopoeia (1618)

Word wide accepted pharmacopoeia- British pharmacopoeia (1864)

***East India company-* Bengal Pharmacopoeia and General Conspectus of Medicinal Plants (1844)**

YEAR	EDITION	CHAIRMAN
1955 Supplement. 1960	FIRST	Dr. B.N. GHOSH
1966 Supplement. 1975	SECOND	Dr. B. MUKHARJI
1985 I st Supplement/addendum 1989 II nd Supplement/addendum 1991	THIRD	Dr. NITYA ANAND
1996 III rd Supplement/addendum 2000 IV th Supplement/addendum 2002	FOURTH	Dr. NITYA ANAND
2007	FIFTH	Dr. NITYA ANAND
2010	SIXTH	Dr. NITYA ANAND
2014 V th Supplement/addendum 2015	SEVENTH	Dr. G.N.SINGH

Salient features: INDIAN PHARMACOPOEIA-2014

- ✓ IP 2014 is effective from 1st January, 2014
- ✓ Total monographs 2548
- ✓ 577 New Monographs included in this edition
- ✓ 19 New Radiopharmaceutical Monographs and 1 General chapter is first time being included in this edition.
- ✓ Presented in 4 hard bound volumes with DVD
- ✓ Veterinary products monographs are the integral part of this edition
- ✓ Use of chromatographic methods has been greatly extended
- ✓ Classical chemicals tests for identification of an article have been almost eliminated and more specific IP and UV Spectrophotometer tests have been introduced
- ✓ Test for pyrogen virtually eliminated
- ✓ Obsolete monographs have been omitted
- ✓ More herbal drugs monographs has been added
- ✓ Contains several new monographs not included in any other major pharmacopoeias of the world

Monograph:

Written document that gives information of drug in relation to…

***1.* Physicochemical test..**

(Nature, Color, Description, Chemical name, Chemical formula, Category, Dose etc)

***2.* Identification test**

(Limits for- Cl, S, Ar, Pb, Heavy metal, TLC and HPLC methods, Assay)

A monograph is a written document, or standard, that describes an item (e.g., a finished drug, a drug ingredient, or food chemical).

A monograph published in any USP compendium (in a book, CD-ROM, or on line) provides: the name of a substance; its definition; package, storage, and labeling requirements; and information on tests needed to ensure the substance is of the appropriate strength, quality, and purity

❖ **Physico-chemical parameter:**

1. Title: Indicate the official name of drug
2. Chemical name: it include the IUPAC, CAS of drug
3. Molecular formula: represents the element present in compound
4. Molecular weight. Gives its weight
5. Category : represents its pharmacological effect

***6.* Solubility: represents the standards for drug to be categories as follows**

***7.* Storage: Specific direction given with temperature or without temperature.**

- Store in a dry, well-ventilated place at a temperature not exceeding 30°
- Store in a refrigerator (2° to 8°). Do not freeze
- Store in a freezer (-2° to -18°)
- Store in a deep freezer (Below -18°)

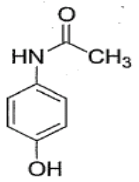
Storage conditions not related to temperature are indicated in the following terms:

- Store protected from light
- Store protected from light and moisture

Descriptive term	Parts of Solvent required for Part of Solute
Very soluble	Less than 1
Freely soluble	From 1 to 10
Soluble	From 10 to 30
Sparingly soluble	From 30 to 100
Slightly soluble	From 100 to 1000
Very slightly soluble	From 1000 to 10,000
Practically insoluble, or Insoluble	10,000 or more

Paracetamol

Acetaminophen



$C_8H_9NO_2$ Mol. Wt. 151.2

Paracetamol is 4-hydroxyacetanilide.

Paracetamol contains not less than 99.0 per cent and not more than 101.0 per cent of $C_8H_9NO_2$, calculated on the dried basis.

Category. Analgesic; antipyretic.

Dose. 500 mg to 1 g every 4 to 6 hours, upto 4 g daily, in divided doses

Description. White crystals or a white, crystalline powder.

Identification

Test A may be omitted if tests B C and D are carried out. Tests B, C and D may be omitted if test A is carried out.

A. Determine by infrared absorption spectrophotometry (2.4.6). Compare the spectrum with that obtained with *paracetamol RS* or with the reference spectrum of paracetamol.

B. Dissolve 50 mg in sufficient *methanol* to produce 100 ml. To 1 ml of this solution add 0.5 ml of *0.1 M hydrochloric acid* and dilute to 100 ml with *methanol*. Protect the resulting solution from bright light and immediately measure the absorbance at the maximum at about 249 nm; absorbance at 249 nm, about 0.44 (2.4.7).

C. Boil 0.1 g in 1 ml of *hydrochloric acid* for 3 minutes, add 10 ml of *water* and cool; no precipitate is produced. Add 0.05 ml of *0.0167 M potassium dichromate*; a violet colour develops which does not turn red.

D. Gives the reaction of acetyl groups (2.3.1).

Tests

4-Aminophenol. Dissolve 0.5 g in sufficient *methanol (50 per cent)* to produce 10 ml. Add 0.2 ml of freshly prepared *alkaline sodium nitroprusside solution*, mix and allow to stand for 30 minutes. Any blue colour in the solution is not more intense than that in 10 ml of a solution prepared at the same time and in the same manner containing 0.5 g of *4-aminophenol-free paracetamol* and 0.5 ml of a 0.005 per cent w/v solution of *4-aminophenol* in *methanol (50 per cent)* (50 ppm).

Related substances. Determine by liquid chromatography (2.4.14).

Note—Prepare the solutions immediately before use.

Test solution. Dissolve 0.2 g of the substance under examination in 2.5 ml of *methanol* containing 0.46 per cent w/v of *tetrabutylammonium hydroxide solution* (40 per cent w/v) and dilute to 10.0 ml with the solution containing equal volumes of 1.79 per cent w/v of *disodium hydrogen phosphate* and 0.78 per cent w/v of *sodium dihydrogen phosphate*.

Reference solution (a). Dilute 1.0 ml of the test solution to 50.0 ml with the mobile phase. Dilute 5.0 ml of this solution to 100.0 ml with the mobile phase.

Reference solution (b). Dilute 1.0 ml of reference solution (a) to 10.0 ml with the mobile phase.

Reference solution (c). A solution containing 0.025 per cent w/v each of *4-aminophenol*, *paracetamol RS* and *chloroacetanilide* in *methanol*. Dilute 1.0 ml of this solution to 250.0 ml with the mobile phase.

Reference solution (d). Dissolve 20 mg of *4-nitrophenol* in 50.0 ml of *methanol*. Dilute 1.0 ml of this solution to 20.0 ml with the mobile phase.

Chromatographic system

- a stainless steel column 25 cm x 4.0 mm, packed with octylsilane bonded to porous silica (5 µm),
- column temperature. 35°,
- mobile phase: a mixture of 37.5 volumes of a 1.79 per cent w/v solution of *disodium hydrogen phosphate* , 37.5 volumes of a 0.78 per cent w/v solution of *sodium dihydrogen phosphate* and 25 volumes of *methanol* containing 0.46 per cent v/v of *tetrabutylammonium hydroxide solution (40 per cent w/v)*,
- flow rate. 1.5 ml per minute,
- spectrophotometer set at 245 nm,
- injection volume. 20 µl.

Inject reference solution (c). The test is not valid unless the resolution between the peaks due to 4-aminophenol (paracetamol impurity K) and paracetamol is not less than 4.0 and the signal-to-noise ratio of the peak due to chloroacetanilide (paracetamol imputity J) is not less than 50. The relative retention time with reference to paracetamol for paracetamol impurity K is about 0.8, for 4-nitrophenol (paracetamol impurity F) is about 3.0 and for paracetamol impurity J is about 7.0.

Inject the test solution, reference solution (a), (b) and (c). Run the chromatogram 12 times the retention time of the principal peak. In the chromatogram obtained with the test solution the area of the peak due to paracetamol impurity J is not more than 0.2 times the area of the corresponding peak in the chromatogram obtained with reference solution (c) (10 ppm) and the area of the peak due to paracetamol impurity K is not more than the area of the corresponding peak in the chromatogram obtained with reference solution (c) (50 ppm). The area of any other secondary peak is not more than 0.5 times the area of the principal peak in the chromatogram obtained with reference solution (a) (0.05 per cent). The sum of areas of other secondary peaks is not more than the area of the principal peak in the chromatogram obtained with reference solution (a) (0.1 per cent). Ignore any peak with an area less than 0.5 times the area of the principal peak in the chromatogram obtained with reference solution (b) (0.01 per cent).

Heavy metals (2.3.13). 2.0 g complies with the limit test for heavy metals, Method B (10 ppm).

Sulphated ash (2.3.18). Not more than 0.1 per cent.

Loss on drying (2.4.19). Not more than 0.5 per cent, determined on 1.0 g by drying in an oven at 105°.

Assay. Weigh accurately about 0.5 g, dissolve in a mixture of 10 ml of *water* and 50 ml of *1 M sulphuric acid*. Boil under a reflux condenser for 1 hour, cool and dilute to 100.0 ml with *water*. To 20.0 ml of the solution add 40 ml of *water*, 40 g of *water* in the form of ice, 15 ml of *2 M hydrochloric acid* and 0.1 ml of *ferroin solution* and titrate with *0.1 M ceric ammonium sulphate* until a yellow colour is produced. Carry out a blank titration.

1 ml of *0.1 M ceric ammonium sulphate* is equivalent to 0.00756 g of $C_8H_9No_2$.

Storage. Store protected from light and moisture.

Thank You