Chapter III

Instruments Employed & Brief profile of Selected Drugs
INSTRUMENTS EMPLOYED IN PRESENT INVESTIGATION

1. UV-Visible Spectrophotometer:

ELICO UV-Visible double beam spectrophotometer manufactured by M/S ELICO Private Limited, Hyderabad, India is used for all Spectrophotometric studies. The instrument provides a unique monochromatic design and a variety of micro process controlled features to give fast and accurate Spectrophotometric measurements.

Operational principle and constructional features

UV-160 A is a double-beam microprocessor based spectrophotometer designed for the quantitative analysis. Its main features are

1. Wave length scanning system by CPU control without using sine bar to realize high speed wave length scan.

2. All in one type of spectrophotometer with CRT and printer incorporated.

3. Back up mode parameters are provided so as to enable single action operation.

4. Easy data processing, since the obtained spectrum is available by the conversation with CRO.
### Specifications of UV-160 A Spectrophotomer

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring wave length</td>
<td>200 – 1100 nm</td>
</tr>
<tr>
<td>Spectral band width</td>
<td>2 nm</td>
</tr>
<tr>
<td>Wave length readability</td>
<td>0.1 nm increment</td>
</tr>
<tr>
<td>Wave length scanning speed</td>
<td>Monochromator setting speed is nearly 3600 nm/min. Fast- nearly 2400 nm/min. Medium-nearly 1500 nm/min. Slow nearly 480 nm/min.</td>
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<tr>
<td>Wave length accuracy</td>
<td>± 0.5 nm with automatic Wavelength correction.</td>
</tr>
<tr>
<td>Light source switching</td>
<td>Automatic switching according to Wavelength can be selected between 295 nm and 364 nm.</td>
</tr>
<tr>
<td>Photo metric system</td>
<td>Double beam system.</td>
</tr>
<tr>
<td>Recording mode</td>
<td>Printout of measured data and calculated results.</td>
</tr>
<tr>
<td>Multicomponent</td>
<td>Mixed samples upto eight Components can be determined. Mixed samples can be used as standards. Standards sample data can be stored in the back up memory (up to 16 standards).</td>
</tr>
<tr>
<td>Light sources</td>
<td>50 W long life halogen lamp (2000 hrs) and socket type deuterium lamp (500hrs) with automatic control of maximum sensitivity, Monochromator.</td>
</tr>
<tr>
<td>Recorder</td>
<td>Computer controlled thermal graphic printer.</td>
</tr>
<tr>
<td>CRT</td>
<td>9- inch with graphic function 240 X 320 dots.</td>
</tr>
<tr>
<td>Sample compartment</td>
<td>Inner size: 1100 nm wide.</td>
</tr>
<tr>
<td>Power requirements</td>
<td>With line voltage selector for 100</td>
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<tr>
<td>Weight</td>
<td>42 Kgs.</td>
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</table>
2. ELICO digital pH meter:

ELICO digital pH meter manufactured by M/S ELICO Private Limited, Hyderabad, India is used for measuring the pH of buffer solutions. The instrument has a temperature components arrangement. The reproducibility of measurement is within ±0.01pH

Section (ii): Brief profile of selected drugs

(a) Levobunolol (LV):

Levobunolol hydrochloride chemically, 1(2H)-Naphthalenone,5-[3-[(1,1-dimethylethyl)amino]-2-hydroxypropoxy]-3,4-dihydro-,hydrochloride It is freely soluble in methanol.. The structure of levobunolol is given in fig.3.3.1

![Fig.3.3.1: Levobunolol](image)

Uses: Levobunolol is used in the treatment of glaucoma.

Doses: Betagan Eye-DPS 5 mg/ml is available in different trade names in Pharmaceutical market.

Adverse effects: The most commonly reported side effects with levobunolol are Ocular stinging, burning, decreased BP, decreased heard rate, transient ataxia, dizziness, lethargy, Headache, decreased comeal sensitivity and pruritus.

(b). Chloroquine(CQ):

Chloroquine,chemically,7-chloro-4-(4-diethylamino-1-methylbutylamino) quinoline, was originally synthesised in 1934 in Germany as Resochin. As the diphosphate and renamed chloroquine. It was extensively studied in America. It is soluble in water; but very slightly
soluble in ethanol. It is practically insoluble in chloroform. The structural formula of chloroquine phosphate is as given in Fig.3.3.2.

Fig.3.3.2: Chloroquine

USES: 1. Chloroquine is the drug of choice for clinical cure and suppressive prophylaxis of all types of malaria, except that caused by resistant p. falciparum. It completely cures sensitive falciparum disease, but relapses in vivax and ovale malaria are not prevented, though interval between relapses may be increased. 2. Extraintestinal amoebiasis. 3. Rheumatoid arthritis. 4. Dicoid lupus erythematosus—very effective; less valuable in systemic LE. 5. Lepra reactions. 6. Photogenic reactions. 7. Infectious mononucleosis; affords symptomatic relief.

DOSES: In the suppression of malaria, 500 mg once weekly; in the treatment of malaria, 0.5 to 1.5 g daily. In the treatment of malaria, by intravenous or intramuscular injection; for an adult, the equivalent of 200 to 300 mg of chloroquine base. In the treatment of hypatia amoebiasis, 0.5 to 1.0 g daily in divided doses. Chloroquine phosphate tablet should not be chewed.

Chloroquine base 150 mg 2 tablets BD. RESOCHIN, CLOQUIN, LARIAGO, NIVAQUINP 150 mg and 300 mg, 100 mg per 10 ml in oral susp., 40 mg/ml injections are available in pharmaceutical formulations.

Side effects: Toxicity of chloroquine is low, but side effects are frequent and unpleasant: nausea, vomiting, anorexia, uncontrollable itching, epigastria pain, uneasiness difficulty in
accommodation and headache. Suppressive doses have been safely given for 3 years. Parenteral administration can cause hypotension, cardiac depression, arrhythmias and CNS toxicity including convulsions (more likely in children). Prolonged use of high doses may cause loss of vision due to retinal damage. Corneal deposits may also occur and graying of hair can be reversible on discontinuation.

(c) Amiloride (AMI):

Amiloride chemically, 3,5-diamino-6-chloro-N-(diaminomethylene) pyrazine-2-carboxamide. Mechanism of action. Amiloride works by directly blocking the epithelial sodium channel thereby inhibiting sodium reabsorption in the distal convoluted tubules and collecting ducts in the kidneys (this mechanism is the same for triamterene). This promotes the loss of sodium and water from the body, but without depleting potassium. The drug is often used in conjunction with thiazide (e.g., co-amilozide) or loop diuretics (e.g., co-amilofruse). Due to its potassium-sparing capacities, hyperkalemia (high blood potassium levels) are occasionally observed in patients taking amiloride. The risk is high in concurrent use of ACE inhibitors or spironolactone. It is soluble in methanol. The structure of amiloride is as follows in fig. 3.3.3.

![Amiloride Structure](image)

**Uses:** It is used in the management of hypertension and congestive heart failure.
**Doses**: Amiloride is available in the market as combination drug with furosemide such as Amifru tab, Amimide, Exna-k tab. It is also available in combination with Atenelol & Hydrochlorothiazide namely Beta-Biduret cap, BP-Loride tab, Hipres-Dcap.

**Adverse effects**: Nausea, diarrhea, dizziness, photosensitivity, hypotension, bone marrow depression, fatigue, muscle cramps, raised CPK level

**(d) Aciclovir (ACV):**

Aciclovir chemically 2-amino-9-[(2-hydroxyethoxy)methyl]-1,9-dihydro-6H-purin-6-one. Actively against herpes simplex virus types I and II and varicella-zoster virus is due to intracellular conversion of acyclovir to the monophosphate by viral thymidine kinase with subsequent conversion to the diphosphate and active triphosphate by cellular enzymes. It is soluble in distilled water. The structural formula of aciclovir is shown in fig.3.3.4.

![Aciclovir](image)

**Fig.3.3.4: Aciclovir**

**Uses**: It is used in the treatment of primary herpes simplex infections.

**Doses**: ACIVIR Tab 200mg, Tab 400 mg, Tab 800 mg, AXOVIR, 200mg, Tab 400 mg HERPEX 200mg etc are available in the markets.

**Adverse effects**: Side effects are Nausea, vomiting, headache, rashes, burning, itching, inflammation, phlebitis, extravasation leads to ulceration, increase in Bun and or creatinine. Rarely renal failure
E. Metoprolol:

Metoprolol chemically 2,3-dihydroxybutanedioic acid; 1-[4-(2-methoxyethyl)phenoxy]-3-(propan-2-ylamino)propan-2-ol. The structure of Metoprolol is shown in fig:3.3.5.

![Metoprolol structure](image)

Uses: Metoprolol is a selective adrenergic beta-1-blocking agent with no stimulatory action. Its binding to plasma albumin is weaker than alprenolol and it may be useful in angina pectoris, hypertension, or cardiac arrhythmias.

Doses: Lopressor 50 mg, 100 mg, ACTIBLOK, ASOPROL tab, BETALOC tab, BETAONE-XL tab etc are available in the markets.

(f) Clomipramine(CP):

Clomipramine chemically, 3-(9-chloro-5, 6-dihydrobenzo[b][1] benzazepin-11-yl)-N,N-dimethylpropan-1-amine. A tricyclic antidepressant similar to IMIPRAMINE that selectively inhibits the uptake of serotonin in the brain. It is readily absorbed from the
gastrointestinal tract and demethylated in the liver to form its primary active metabolite, desmethyliclopramine. The structural formula of Clomipramine is given in fig.3.3.6.

![Fig: 3.3.6: Clomipramine](image)

**Uses:** It contains a fused three-ring moiety and are used in the treatment of depression

**Doses:** Clomipramine Hydrochloride Capsules USP (25 mg, 50 mg, and 75 mg) [Mallinckrodt Inc.] Anafranil, (clomipramine hydrochloride capsules USP), is an antiobsessional drug that belongs to the class (dibenzazepine) of pharmacologic agents known as tricyclic antidepressants. Anafranil is available as capsules of 25, 50, and 75 mg.

**Adverse effects:** Dryness of mouth, drowsiness, increased sweating, sexual dysfunction, confusion, headache, tremors, dizziness, weight gain especially in women and palactorrhoea.

**Structure of Dyes**

1) **Wool Fast Blue (WFB):**
2) Bromocresol green (BCG):

Various spectrophotometric, chromatographic and HPLC methods are available in the literature for the estimation of selected drugs. HPLC method and chromatographic methods are time consuming and expensive. These instruments are not within the reach of many laboratories. Usually spectrophotometric technique is simple and less expensive. The selectivity and sensitivity of the spectrophotometric methods depends only on the nature of chemical reactions involved in colour development and not on the sophistications of the experiment.

UV and visible spectrophotometric methods are highly versatile, sensitive and reproducible. The author has therefore intended to develop new spectrophotometric methods for the estimation of selected drugs in pharmaceutical preparations.

Various drugs containing secondary or tertiary aliphatic amino groups are estimated by ion association complex method.

In recent past, extensive attention has been given to a large group of complexes formed by weak interaction of certain classes of Organic compounds functioning as electron donors (Bases) with others which act as electron acceptors (Acids).