Electrochemical behaviour of cefixime has been studied in Britton-Robinson buffer system at composite polymer membrane working electrode and results compared with glassy carbon electrode. A well-defined cathodic diffusion-controlled irreversible peak was observed in entire pH range. The current increases steadily with diffusion scan rate and concentration.

**Keywords:** Cefixime, Composite polymer electrode, Cyclic voltammetry, Glassy carbon electrode

### Introduction

Cefixime (Fig. 1) is effective against bacterial strains and has pharmacokinetic properties. It is applicable to penicillin-allergic patients and active against penicillin resistant microorganisms in some instances and is also used for therapy of variety of infections, which develop in intensive care units. Spectrophotometric, chromatographic and voltammetric techniques have been used for the determination of cefixime in body fluids. Differential pulse polarography and adsorptive stripping voltammetry have been employed for determination of cefixime. Reddy et al. has reported voltammetric behaviour and determination of cefixime at hanging mercury drop electrode (HMDE).

In recent years, conducting polymers (CPs) are finding applications in rechargeable batteries, electrosynthesis, in corrosion protect films, biosensors, modified electrodes and capacitors etc. CPs containing two components can be prepared as copolymers, bilayers and composites. Mechanical properties of two component CP systems may be improved by polymerization of two monomers, on platinum foil electrodes. Electrolysis of two monomers generally gives a copolymer, as in the case of aniline and thiophene. Poly (2-methoxyaniline) – polypyrrole and -pyrrolyl undecanethiol-polypyrrole are examples of such systems.

In present study, CP membrane of polyaniline and pyrrole has been used as an electrode material for the investigation of electrochemical behaviour of cefixime. Voltammetric method has been developed for the determination of cefixime in the pharmaceutical formulation.

### Materials and Methods

#### Materials

Polymer was deposited on platinum foil electrochemically. Voltammetric experiments were performed using an EG & G Princeton Applied Research Modal 273 A potentiostat controlled by the modal 270 / 250 Research Electrochemistry Software 4.30. A three-electrode system made of a CP membrane deposited on platinum foil, saturated calomel electrode as reference electrode and a platinum (Pt) wire as

![Structure of cefixime](image)
auxiliary electrode was used. Platinum foil was washed with dilute HNO₃ and acetone and then coated with polymer to provide a reproducible active surface to be used as CP electrode. For comparative study of cefixime, glassy carbon (GC) was taken as working electrode, which was polished by alumina powder to smoothen exposed surface, and then thoroughly rinsed with methanol and double distilled water and dried with tissue paper. All solutions examined by electrochemical technique were purged for 10 min with purified nitrogen gas. All measurements were made on digital pH meter (Decible, Db-1011) fitted with a glass electrode and saturated calomel electrode as reference, which was standardized with buffers of known pH in acidic and alkaline medium.

Cefixime (Zifi 50 mg tablet) was obtained from FDC, Pharmaceutical company, India. KCl (1 mol l⁻¹) solution, prepared in distilled water, was used as supporting electrolyte. Standard stock solution of cefixime (1 x 10⁻³ mol l⁻¹) was prepared by dissolving an appropriate amount of electroactive species in water and methanol. Standard stock solutions were protected from light throughout the experiment.

Preparation of Composite Polymer (CP) Electrode

Polymer (Fig. 2) was deposited on the platinum foil electrochemically. The working electrode and auxiliary electrode were platinum foil (surface area, 1 cm²). The reference was saturated calomel electrode. Preliminary studies revealed that this platinum foil thickness was suitable to produce a freestanding and durable CP film. Deposition of pyrrole and aniline in a solution (0.02 M pyrrole, 0.1 M aniline and 1.0 M camphor sulphonlic acid) at a potential of -0.6 to 1.8 V was carried out on Pt electrode using cyclic voltammetric (CV) technique. CP film coated electrode was washed with distilled water and dried in vacuum at 40°C.

Results and Discussion

Cyclic Voltammetry

Voltammetric behaviour of cefixime was examined (pH 1.0-5.29) using cyclic voltammetry. Cefixime gave two well-defined peaks in entire buffer system, attributed to the reduction of azomethine and unsaturated C=C bond groups in four and two electron process (Fig. 3).

![Fig. 2 — Structure of polymer (a) polyaniline (b) polypyrrole](image)

![Fig. 3 — Voltammetric behaviour of cefixime](image)