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# STUDIES IN CROMATOGRA PHY

A THESIS  
SUBMITTED TO THE  
UNIVERSITY OF POONA  
FOR THE DEGREE OF  
**OF SCIENCE**  
( IN CHEMISTRY )

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## SUMMARY

This research work is about the high-performance liquid chromatography (HPLC) of ethyl morphine which is one of the major opiate drugs used in the control of coughs. The thesis is divided in to two chapters.

## CHAPTER I

This chapter presents a brief introductory overview of liquid chromatography with special reference to different modes of high-performance liquid chromatography.

## CHAPTER II

This chapter presents the actual research work about HPLC of ethyl morphine. The chapter is sub-divided into three sections.

Section A:

An account of history and socio-economic aspects of opium is presented. This is followed by a critical review on HPLC of gum opium alkaloids involving morphine (the raw material used for the semi-synthesis of ethyl morphine) and other principal alkaloids.

Section B:

A new isocratic HPLC method for an assay of ethyl

morphine with simultaneous separation of the carry over  
 (i.e., morphine, codeine and thebaine) and by-product  
 (i.e. O<sup>6</sup>-diethyl morphine and codeine) impurities is  
 reported. A bonded phenyl stationary phase with a  
 simple and inexpensive mobile phase [methanol-7 mM  
 triethylammonium phosphate buffer (pH 2.8) (39:61)] was  
 used.

### Section C:

A semi-synthesis of O<sup>6</sup>-diethyl morphine, a known  
 by-product impurity in bulk ethyl morphine is described  
 here. The impurity was synthesised by O<sup>6</sup>-ethylation of  
 ethyl morphine with diethyl sulphate in the presence of  
 tetrabutylammonium hydrogen sulphate as the phase-transfer  
 catalyst. The product was characterised by elemental  
 and mass spectrometry, <sup>1</sup>H NMR, <sup>13</sup>C NMR.