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Formulation and evaluation of ofloxacin ointment containing natural wound healing agent *Curcuma longa*

S. Valarmathi*, M.Senthil Kumar, J. Irfana begum¹, K.Monisha¹, K.Ramya¹, B. Mohammed kabeer , K. Janaki Raman.

Associate Professor, Annai Veilankanni's College of pharmacy Saidapet, Chennai, India.

Corresponding Author: S. Valarmathi.

Email: sahanashree2012@gmail.com

ABSTRACT

The present investigation was aimed to formulate and evaluate the wound healing ointment. The combination of wound healing agent *curcuma longa* with ofloxacin is good rational, where *curcuma longa* produces synergistic wound healing effect with ofloxacin. Formulations of ointments containing 0.5% ofloxacin , 0.5% ofloxacin and 5% *curcuma longa*, 5% *curcuma longa* were prepared. To assess the efficacy of formulations viscosity, extrudability, invitro-study (Diffusion study), Stability characteristic were evaluated. The results obtained were encouraging the formulation containing ofloxacin (0.5%) with 5% of *curcuma longa* was found better than other formulations.

Keywords: Ointment, Ofloxacin, *Curcuma Longa*, Wound healing.

INTRODUCTION

Wound is defined as breakdown in the protective function of the skin. The loss of continuity of epithelium, with or without loss of underlying connective tissue. (i.e. muscle, bone, nerves). It is due to the external violence or some mechanical agency rather than disease.

Wound healing is a process that is fundamentally a connective tissue response. Initial stage of process involves an acute inflammatory phase followed by synthesis of collagen and other extracellular macromolecule that are later remodeled to form a scar. In undamaged skin, the

epidermis (surface layer) and dermis (deeper layer) form a protective barrier against the external environment. When the barrier is broken, an orchestrated cascade of biochemical events is set into motion to repair the damage. This process is divided into predictable phases: blood clotting (hemostasis), inflammation, tissue growth (proliferation) and tissue remodeling (maturation). The drug selected for this work was ofloxacin. Which is a synthetic anti-bacterial agent.

It is the fluoro quinolone drug considered to be second generation fluoro quinolone. It is broad spectrum antibiotic that is active against both gram-

positive and gram-negative bacteria. It function by inhibiting DNA gyrase, a type 2 topoisomerase and topoisomerase 4, which is an enzyme necessary to separate (mostly in prokaryotes, in bacteria in particular) replicated DNA, there by inhibiting bacterial cell division. Ofloxacin was selected because it is easily available and its estimation was selected because reasonable accuracy in the condition prevailing in the laboratory. *Curcuma longa* (powder) was used in combination with ofloxacin. *Curcuma longa* is reported to have anti-bacterial and anti-inflammatory activities, which are complementary to wound healing process. The easy availability of curcuma longa, cost effectiveness and reduction of microbial resistance, against ofloxacin, prompted us to formulate topical ofloxacin ointment in combination with curcuma longa. The combination was used to enhance the wound healing activity.

MATERIALS AND METHODS

Materials

Ofloxacin was received as a gift sample from madras laboratories, Chennai, India. Emulsifying wax, white soft paraffin, liquid paraffin and all other chemicals were of analytical grade and used without further purification.

Method of for preparation ointment

Emulsifying wax, white soft paraffin and liquid paraffin were heated to 70-75⁰ C to melt it completely then ofloxacin and curcuma longa were dissolved in it under stirring and then cooled .The composition of emulsifying base in given table 1. The composition of different ointment formulation is given in tablet 2.

TABLE 1: Composition of Emulsifying ointment base

S.NO	INGREDIENTS	QUANTITY (%)
1	Emulsifying wax	30
2	White soft paraffin	50
3	Liquid paraffin	20

TABLE 2: Composition of different ointment formulations

ITEMS	MATERIAL NAME	QUANTITY (%)		
		F1	F2	F3
1.	Ofloxacin	0.5	0.5	---
2.	Curcuma longa	---	5	5
3.	Emulsifying base	q.s	q.s	q.s

EVALUATION OF OINTMENTS

Viscosity

Brookfield digitalis viscometer was used to measure the viscosity (in cps) of the prepared ointment formulations in such that is in semisolid state. The spindle T-D (spindle code s18) was rotated at 10rpm. The reading is near to 100% torque was noted samples were measured at 30⁰C ± 2⁰C 24 hours.

Diffusion study

The cellophane tape as a semipermeable membrane was soaked in the pH 7.4 buffer and kept aside 24hours.The cellophane tape was taken and tied at open end of cylindrical tube. Ofloxacin and curcuma longa ointment was inserted through the stem of the cylinder. This was immersed in a beaker containing a magnetic bead with 100 ml buffer solution pH7.4.

The whole set up was kept on magnetic stirrer and stirrer for a period of 2 hours.5 ml of sample solution were collected at an interval if 30⁰C,

60°C, 90°C, and 120°C mins for ointment prepared. The withdrawn sample was analysed for the absorbance at 293nm for ofloxacin using UV

spectrophotometer and the sample containing curcumin was analysed for the absorbance at 400-430nm using visible spectrophotometer.

$$\text{Percentage drug release} = \frac{\text{sample absorbance}}{\text{standard absorbance}} \times \text{standard dilution} \times \text{sample dilution} \times 100$$

Stability of formulations

The formulated curcuma longa and ofloxacin ointment were filled in the collapsible tubes and stored in different temperature conditions viz. 25°C ± 2°C, 30°C ± 2°C, 40°C ± 2°C for a period of three month.

Infrared spectroscopy

Infrared spectroscopy was conducted using FTIR spectrophotometer and the spectrum was recorded in the region of 500 – 4000 cm⁻¹. The procedure consisted of dispersing a sample (drug and KBr preparation) into disc by applying a pressure of 5 times for 5 minutes in a hydraulic press. The powder was placed in the path and spectrum was obtained.

RESULTS AND DISCUSSION

The aim of the present was to verify the hypothesis that *curcuma longa* by providing tissue formation and ofloxacin by providing protection against microbial invasion would prove a superior

treatment for healing wounds it given concomitantly preferably in one formulation.

The present work aims to evaluate whether combination of *curcuma longa* and antibiotic produces any synergistic effect on wound healing. *Curcuma longa* has been traditionally used as a wound healer in ancient days. *Curcuma longa* wound healing even without any application of antibiotics and its activity is almost parallel to antibiotic. This observation leads to logical reasoning that combination of *curcuma longa* and an antibiotic may provide umbrella during the process of healing. The present work aimed at preparation and evaluation of such formulation. Ointment was the obvious choice of dosage form because that is the most convenient form of topical application. The formulations were evaluated for, viscosity, diffusion study, stability.

From the results it that all formulations showed good viscosity. The viscosity of ointment formulations shown in the table 3

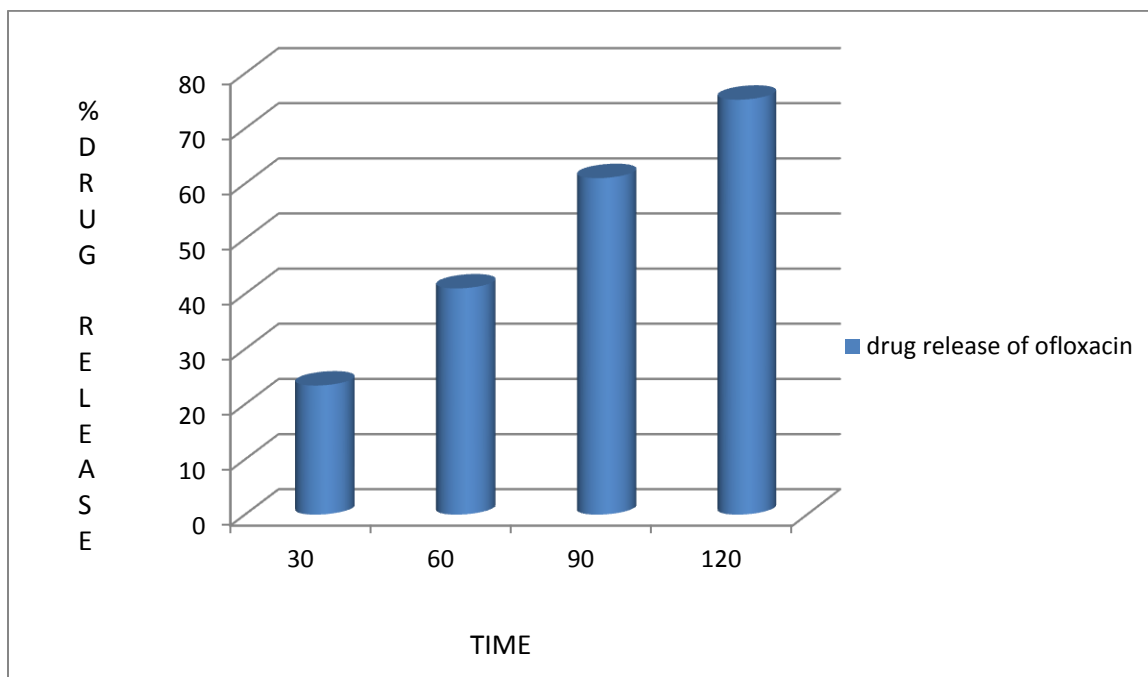
TABLE 3: VISCOSITY OF FORMULATIONS

FORMULATION	VISCOSITY (CENTIPOISE)
F1	261
F2	471
F3	531

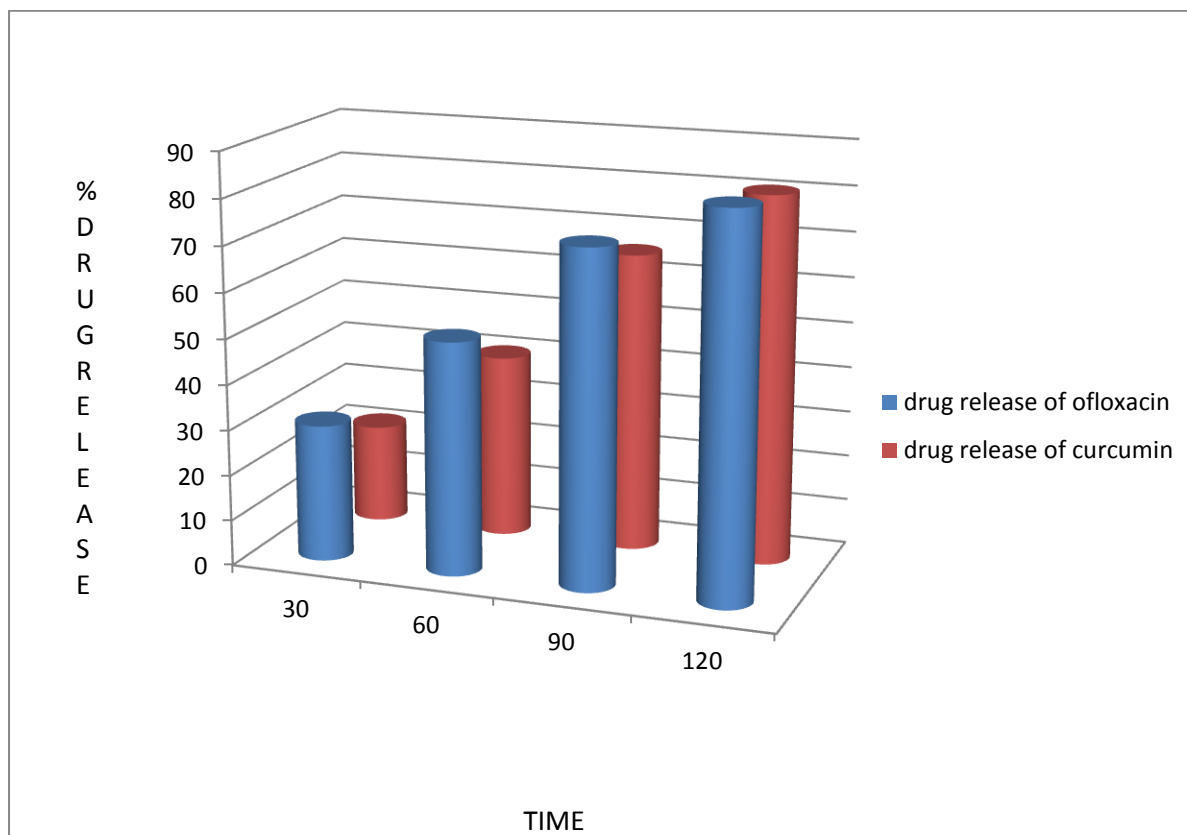
TABLE 4: DIFFUSION STUDY

F1 Ofloxacin		F2 ofloxacin + <i>curcuma longa</i>			F3 <i>Curcuma longa</i>	
Time (min)	%drug release of ofloxacin	Time (min)	% drug release of ofloxacin	%drug release of <i>curcuma longa</i>	Time (min)	%drug release of <i>curcuma longa</i>
30	23.41	30	30.12	21.67	30	24.41
60	41.02	60	51.23	40.44	60	43.87
90	61.02	90	73.56	65.76	90	73.90
120	75.25	120	83.67	80.77	120	77.55

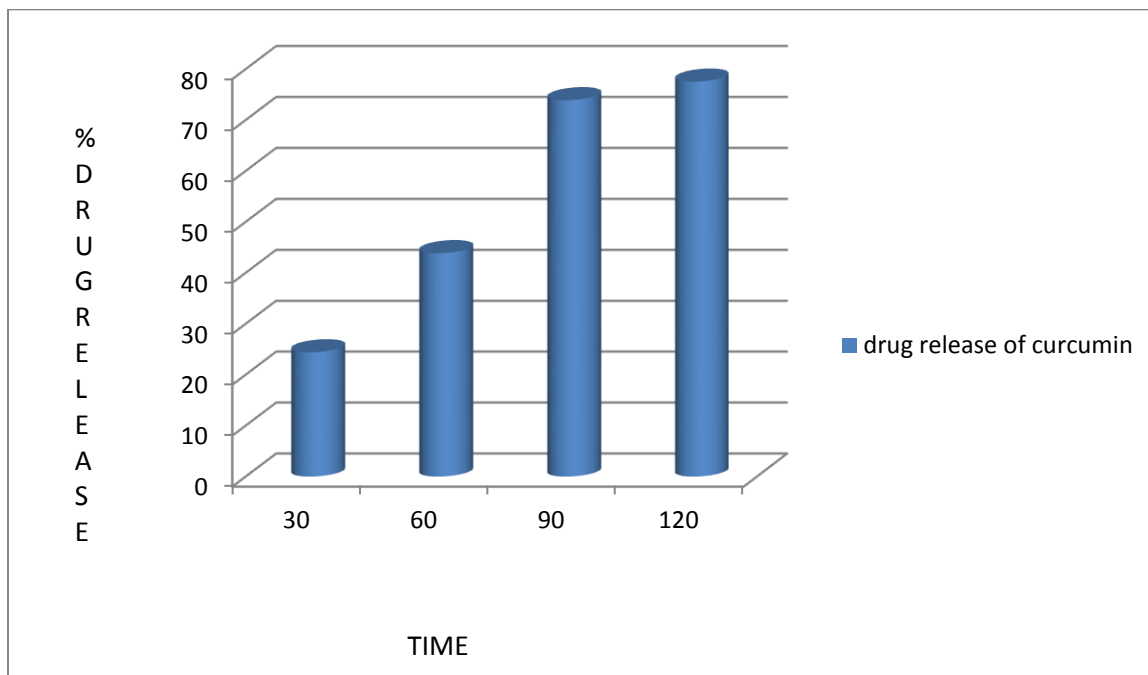
FORMULATION (F1)



FORMULATION (F2)



FORMULATION (F3)

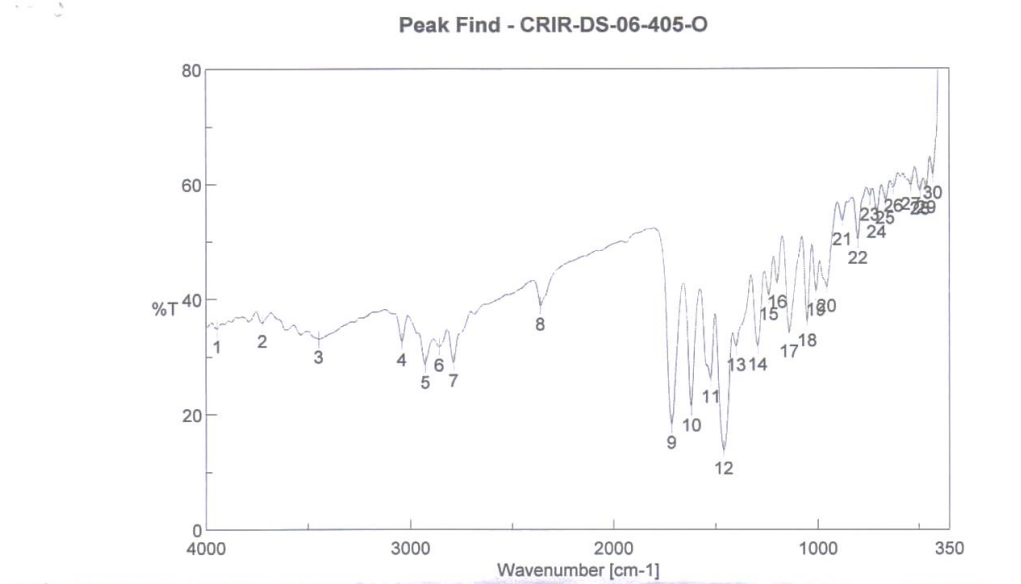


STABILITY STUDIES

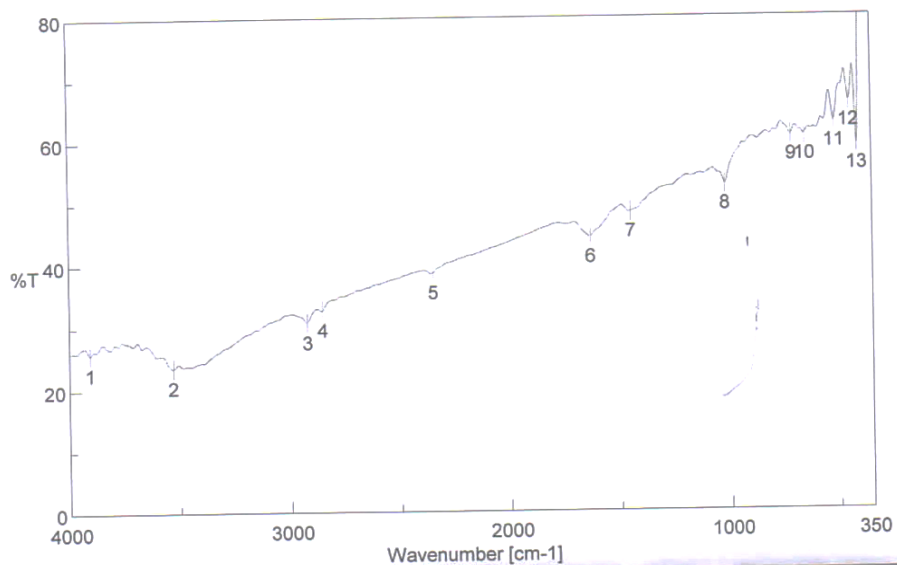
According to ICH guidelines, the formulation F1, F2, F3 are subjected to stability of 1 month at

different temperature 30°C, 25°C, 40°C. Every month the samples are analyzed & there is no significant change.

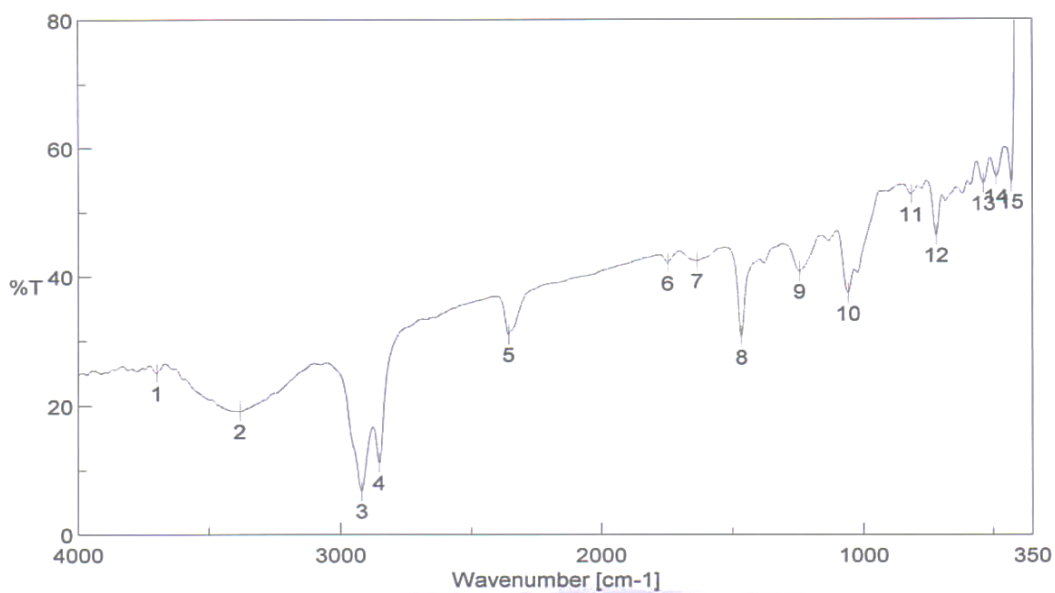
INFRARED SPECTROSCOPY



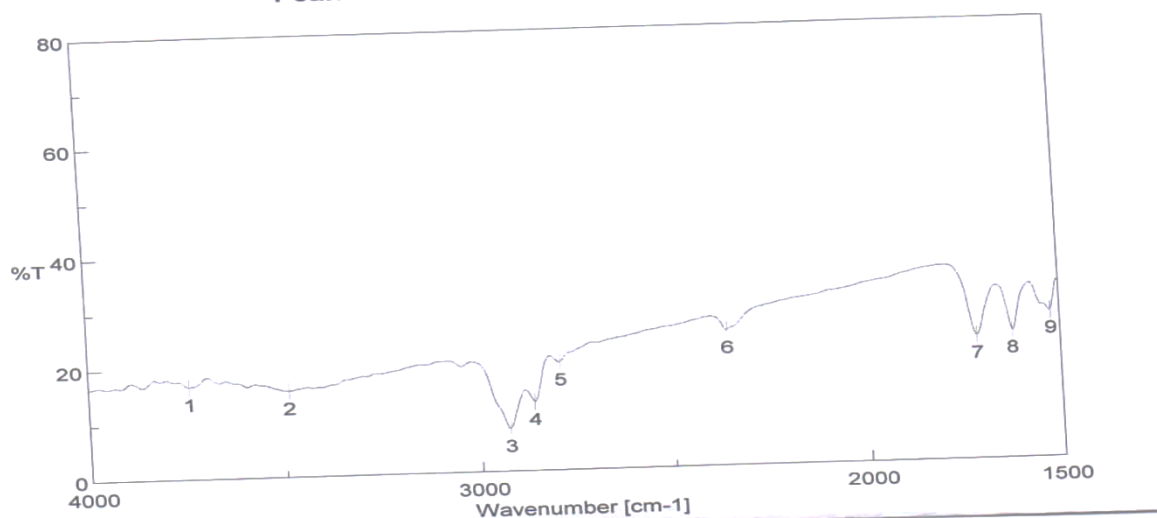
Peak Find - CRIR-DS-06-404-CL



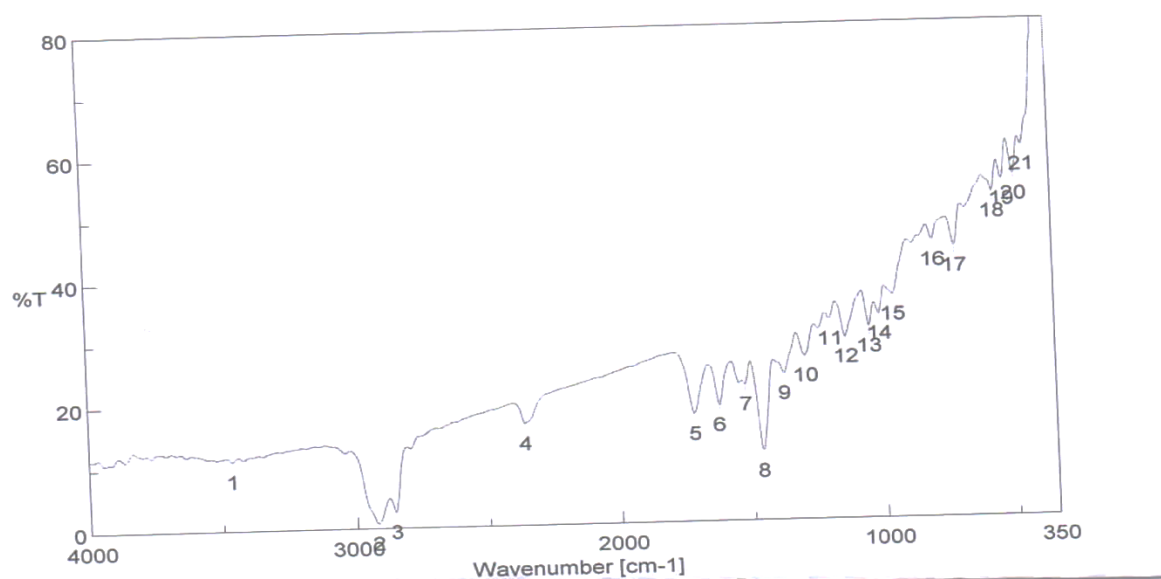
Peak Find - CRIR-DS-06-408-EW

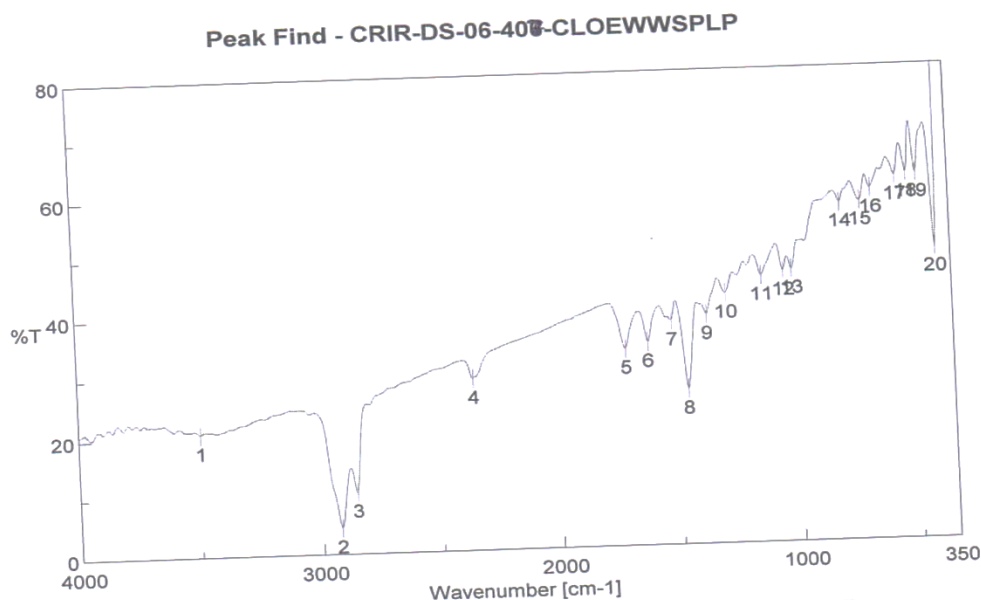


Peak Find - CRIR-DS-06-406-CL-O-LP



Peak Find - CRIR-DS-06-409-CLOWSP





From the graph it's shown that there is no more shift in peak when the drug and bases are combined. So the bases are compatible with drug.

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