Selection of excipients for cefpodoxime floating tablets through drug excipient compatibility testing

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ABSTRACT *Cefpodoximeproxetil is commonly used antibacterial drug.Preformulation is the first step in the rational formulation of an active pharmaceutical ingredient (API). For any formulation interactions studies are very important. When there was no interaction between the choosen drug- excipient or excipient-excipient then the formulation will be a appropriate one. The selection of suitable study method to evaluate the interaction between the drug and the excipients is a prime most achievement in the pre-formulation study. Recently the thermal analytical techniques is applied to study the interaction study. The objective of the study was to study the compatibility of cefpodoxime drug substance with the excipients employed in the formulation of cefpodoximefloating tablets. Based on the FTIR results cefdinir was found to be compatible with excipients Sodium CMC, Hydroxy propyl methyl cellulose k 5M and xantham gum.*

Keywords: *Cefpodoxime, FTIR, Sodium CMC,Hydroxy propyl methyl cellulose k 5M,Xantham gum.*

1.INTRODUCTION

Cefpodoximeproxetil is an orally administered, extended spectrum, semi synthetic antibiotic of the cephalosporin class. Cefpodoxime is a pro drug, its active metabolite is cefpodoxime. Cefpodoximeproxetil, a relatively new broad spectrum third-generation cephalosporin, has very well in vitro activity against Enterobacteriaceae, Hemophilusspp and Moraxella spp, including lactamase producers and many strains resistant to other oral agents. It also has activity against Gram-positive bacteria, especially against Streptococci.[1,2] It is well tolerated and is one of the first third generation cephalosporins to be available in oral form. A drug is most oftenly taken along with other chemical substances known as excipients. [3] Excipients are traditionally thought of as inert but they can have a tremendous impact on the ultimate pharmacological availability of a drug substance when added to a formulation. They may either alter the activity of drug or can slow down the action of drug. The magnitude of drugexcipient interactions will depend on the characteristics of the drug and on the quantity and properties of the excipients.[4,5] Preformulation is an investigation on the physical-chemical properties of the drug substance alone and in combination with excipients. Assessment of the possible incompatibilities between the drug and various excipients is an important part of the preformulation Study of drug –excipient compatibility is an important process in the early development stage of stable dosage forms. [5] The successful formulation of a stable and effective dosage form depends on a careful selection of the excipients. However, no universally accepted protocol is available for evaluating the drug compatibility with different excipients. [6] The aim of this work was to evaluate the compatibility between cefpodoximeand some pharmaceutical excipients, using Fourier Transform Infrared Spectroscopy (FTIR).

2. MATERIALS AND METHOD:

2.1 MATERIALS

Cefpodoximewere gift sample from Dr. Reddy's laboratories, Natural and synthetic polymers were purchased from AR chemicals.

2.2 METHOD

Drug-excipients compatibility study by FTIR [7,8]

The FTIR spectra of sample were recorded on a FTIR equipped with spectrum 11.0.0.0449 software using KBr pellet method. The spectrum for each sample was recorded over than 1000 -3500 cm-1.

3. RESULTS AND DISCUSSION

Drug-excipients compatibility study by FTIR

The infrared (FT-IR) spectra were obtained in a KBr pellets using a Perkinelmer FTIR spectrometer spectrum one at resolution 4cm-1 from 3500 to 500 cm-1. A typical FT-IR spectra of novel Cefdinir showed

absorption at the following wave number in cm-1. 3417.89, 3502.29, 2311.73 and 1512.91. FTIR spectroscopy has been successfully used for exploring the differences in molecular conformations, crystal packing and hydrogen bonding arrangements for different solid state forms of an organic compound. Spectral variations originates due to alteration in bonds that exhibit characteristic vibrational frequencies, leading to frequency shifts and splitting in absorption peaks. The FTIR spectrum of samples showed characteristic absorption bands 10 which were comparable with absorption bands of individual sample. The results illustrated that, there were no chemical instabilities in drug – excipient combinations.

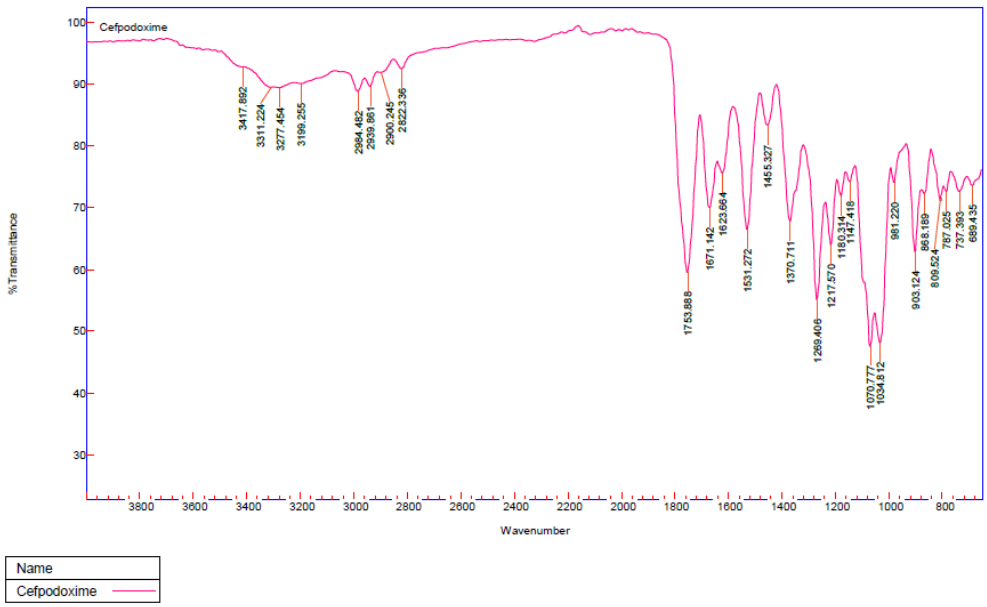

Fig-1: FTIR Studies of Cefpodoxime

Table-1: Characteristic Peaks and frequency of Cefpodoxime

S.No.	Characteristic Peaks	Frequency range (cm-1)	Frequency (cm-1)
1	OH stretching	3000-2800	3417.892
2	OH Bending	3000-2500	3502.29
3	C-H stretching	2000-1500	2311.73
4	C=O stretching	1500-1000	1512.91

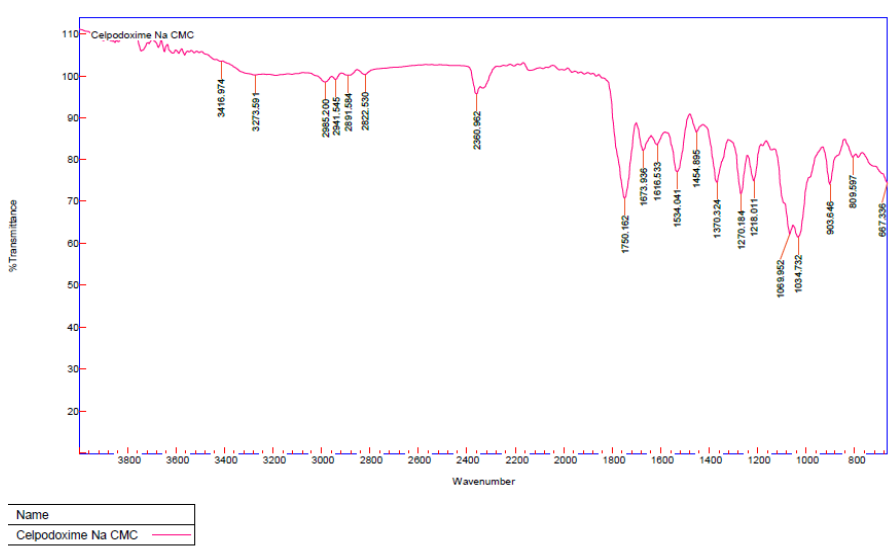

Fig-2: FTIR studies of Cefpodoxime and Na CMC

Table-2: Characteristic Peaks and frequency of Cefpodoxime and Na CMC

S.No.	Characteristic Peaks	Frequency range (cm-1)	Frequency (cm-1)
1	OH stretching	3500-3000	3853.57
2	OH Bending	3000-2500	3770.49
3	C-H stretching	2000-1500	3639.39

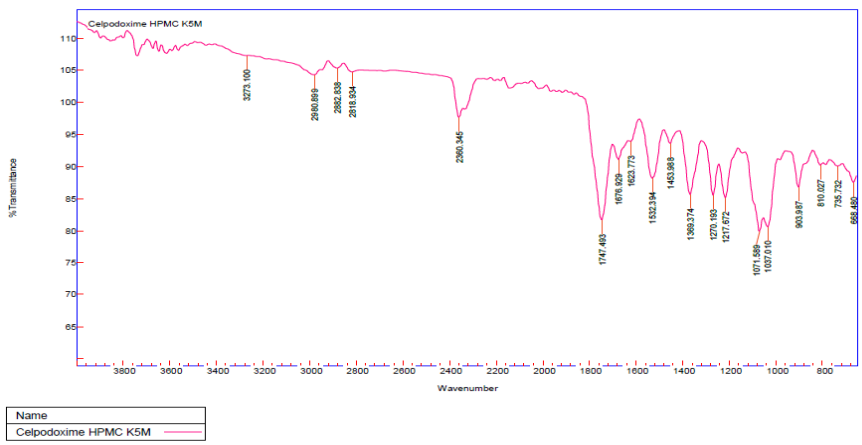

Fig-3: Characteristic Peaks and frequency of Cefpodoxime and HPMC K5M

Table-3: Characteristic Peaks and frequency of Cefpodoxime and HPMC K5M

S.No.	Characteristic Peaks	Frequency range (cm-1)	Frequency (cm-1)
1	OH stretching	3400-3200	3273.100
2	OH Bending	2400-2200	2360.345
3	C-H stretching	1800-1600	1747.490

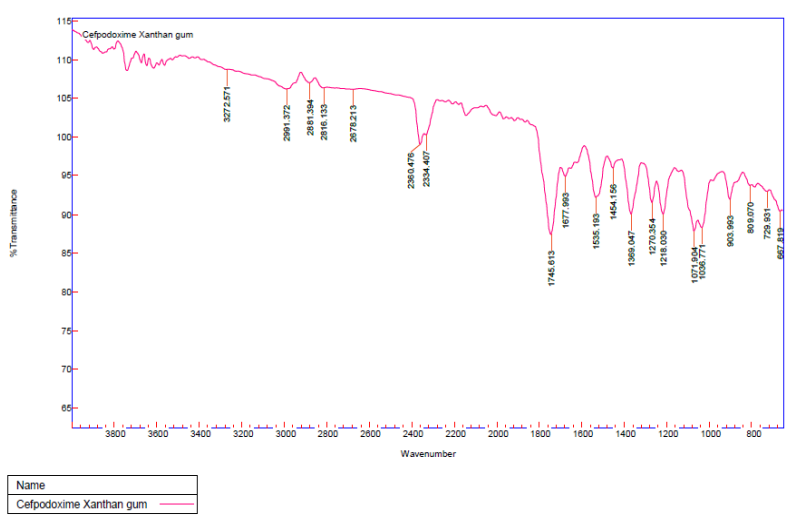

Fig-4: Characteristic Peaks and frequency of Cefpodoxime and Xantham gum

Table-5: Characteristic Peaks and frequency of Cefpodoxime and Xantham gum

S.No.	Characteristic Peaks	Frequency range (cm-1)	Frequency (cm-1)
1	OH stretching	3400-3200	3273.100
2	OH Bending	2400-2200	2360.345
3	C-H stretching	1800-1600	1747.490

4. CONCLUSION

From the results of FTIR studies, it is proven that FTIR as fast screening tools to check compatibility in early stages of a preformulation process. Based on our results, all mentioned excipients were found to be fully compatible with. It is conclude that the selected excipients can be further used for preparing cefpodoxime floating tablets.

5. REFERENCES

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