

Physical Characteristics of the I Type and II Type Crystal of Rifampicin

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In this paper, the physical characteristics of the I type and II of rifampicin are reported. Some analytical methods as were adopted *viz.*, FT-IR, X-ray powder diffraction, DSC, SEM and NIR to characterize the rifampicin crystals.

Key Words: Rifampicin physical characteristic, FI-IR, DSC.

INTRODUCTION

There is no literature on the physical characteristics of the I type and II of rifampicin¹. We adopted different analytical methods on it.

EXPERIMENTAL

All reagents and spectroscopic solvents pure grade employed for test are AR. The I type and II of rifampicin were purchased from sigma company.

The used apparatus was JASCO FT/IR-4100. The reagent was potassium bromide with optically pure. We adopted pressed disc method on it. For X-ray powder diffraction, the adopted apparatus was D8 advance X-ray diffractometer. We

adopted the Cu target as the X-ray tube cathode. The step length was 0.02°. The scan speed was 25. The voltage was 40 KV. The electrical current was 40 mA. The starting angle was 3.00°. The end angle was 40.00°. The 400 mg sample was taken out. We adopted the glass pressure method. SEM was measured by JSM-5610LV. For near infrared, we used apparatus MPA NIR. The software was OPUS5.5. The scan range was 12000-4000 cm⁻¹. The resolution was 8 cm⁻¹.

RESULTS AND DISCUSSION

FT-IR: The obtained FT-IR spectrum was shown at Figs. 1 and 2. There was obvious difference among the 3481 cm⁻¹ and 1726 cm⁻¹ of I type and 3448 cm⁻¹ and 1726 cm⁻¹ of II type.

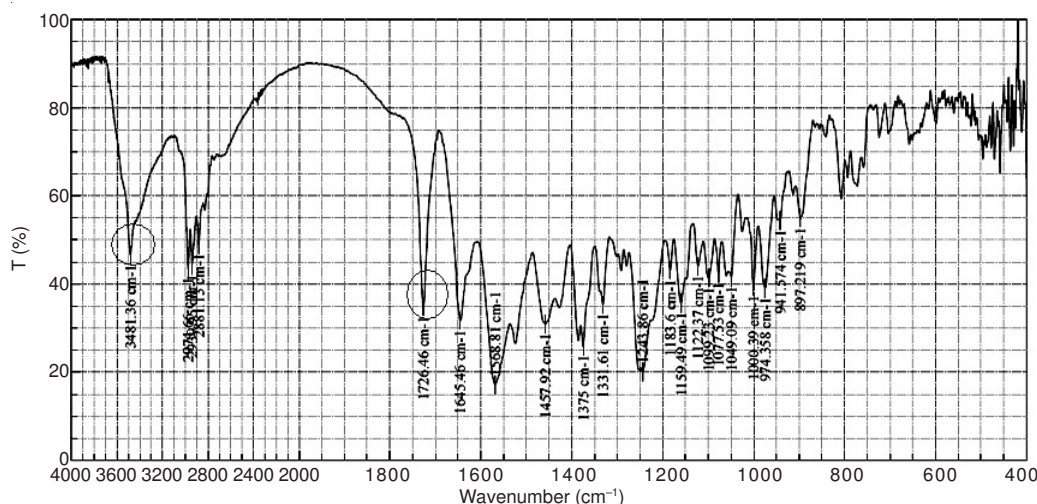


Fig. 1. FT-IR spectrum of I type crystal of rifampicin

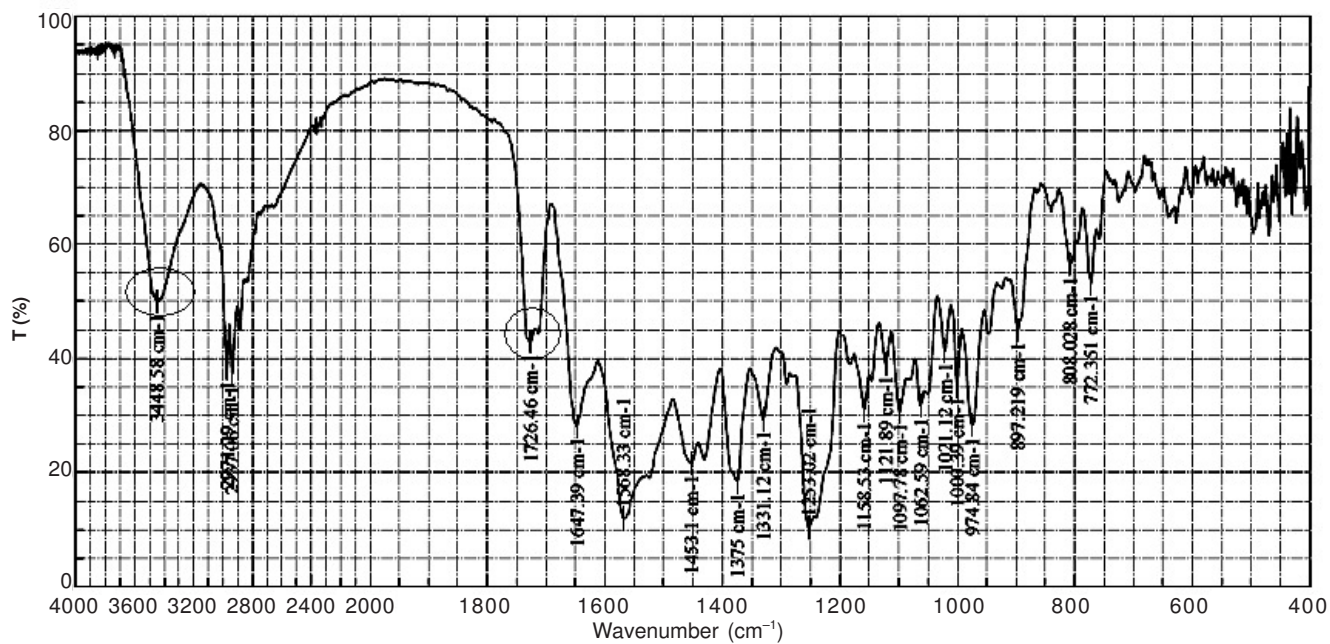


Fig. 2. FT-IR spectrum of II type crystal of rifampicin

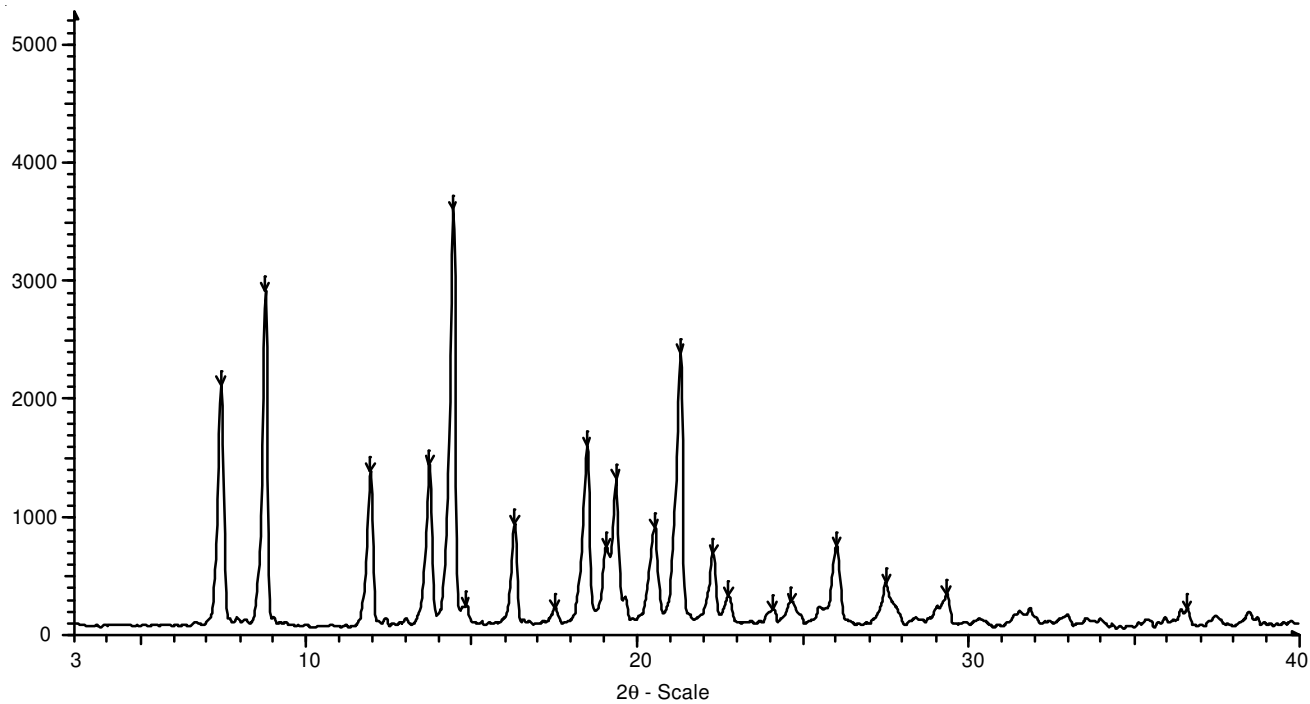


Fig. 3. X-ray powder diffraction drawing of I type crystal of rifampicin

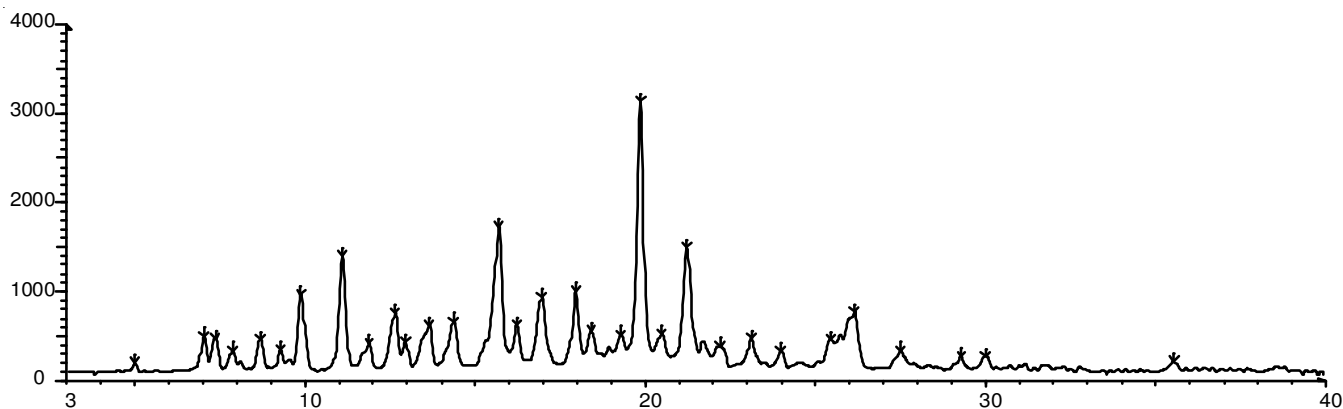


Fig. 4. X-ray powder diffraction drawing of II type crystal of rifampicin

X-Ray powder diffraction: From the obtained X-ray powder diffraction, it is found out that the 2θ angles of the strong characteristic absorption peaks of I type crystal of rifampicin were 8.732° and 11.909° . And the 2θ angles of the strong characteristic absorption peaks of II type crystal of rifampicin were 11.072° and 19.845° (Figs. 3 and 4). The data was given at Table-1.

TABLE-1
COMPARISON OF DATA OF I TYPE CRYSTAL OF RIFAMPICIN AND II TYPE CRYSTAL OF RIFAMPICIN

I Type crystal of rifampicin	II type crystal of rifampicin
$2\theta(^{\circ})$ -I/I0	$2\theta(^{\circ})$ - I/I0
7.14-25.4	4.959-6.1
10.095-2.5	6.993-15.7
11.848-3.0	7.315-14.8
12.638-6.3	7.831-10.5
14.297-48.3	8.646-14.6
14.789-4.4	9.24-10.8
16.75-13.6	9.856-30.8
17.171-100.0	11.072-44.4
17.502-6.4	12.615-23.9
18.235-6.8	12.935-13.4
19.94-15.9	13.614-19.5
20.301-42.7	14.335-20.8
20.675-58.8	15.669-54.8
21.528-84.3	16.203-19.5
22.092-28.6	16.928-29.6
23.581-27.9	17.938-31.9
23.906-50.0	18.391-17.6
25.112-3.8	19.845-100
26.249-6.2	20.466-16.4
27.375-3.2	21.219-47.6
28.854-8.4	26.132-24.2
30.446-10.2	27.505-10.5
30.701-9.3	30.013-8.3
31.743-6.8	35.556-6.7
36.336-5.4	
36.741-3.2	
40.455-3.4	
41.234-3.0	

SEM: The pictures of SEM were shown at Figs. 5 and 6. From these pictures, we found out that the crystal form of I type crystal of rifampicin was more regular than the crystal form of II type crystal of rifampicin. Besides, the volume of I type crystal of rifampicin was bigger than II type crystal of rifampicin.

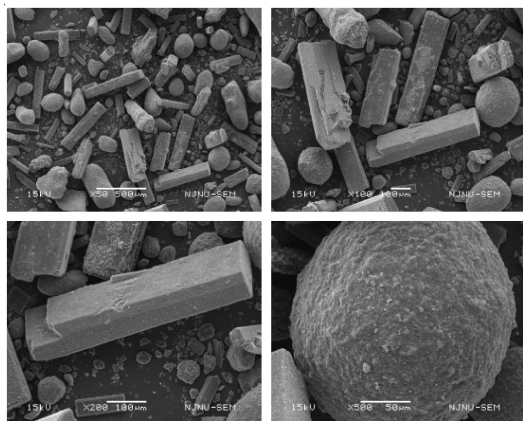


Fig. 5. SEM picture of I type crystal of rifampicin

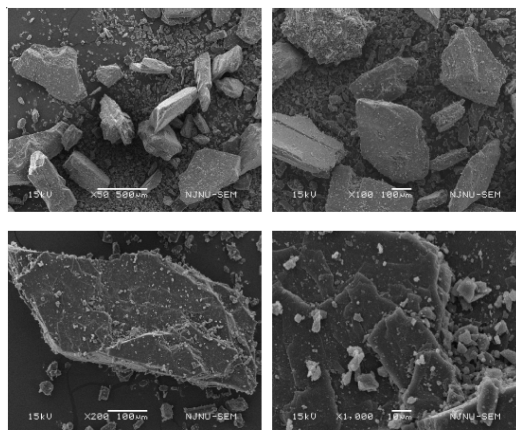


Fig. 6. SEM picture of II type crystal of rifampicin

NIR: The obtained NIR spectrum was shown at Fig. 7. There were obvious differences in wave bands of 7000-6500, 1,6000-5500 and 5000-4500 cm^{-1} .

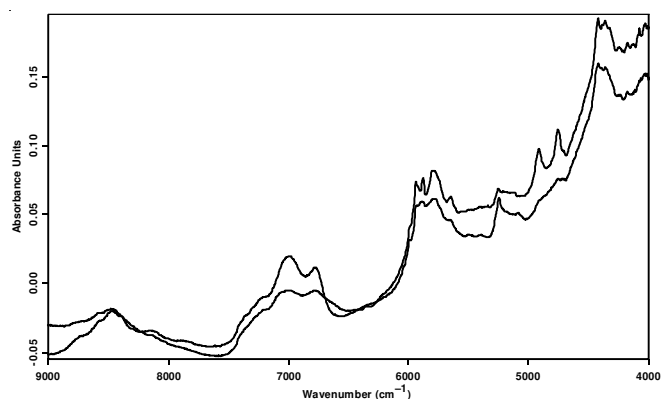


Fig. 7. Comparison of NIR spectrum of I type crystal of rifampicin and II type crystal of rifampicin

Conclusion

We adopted some analytical methods as FT-IR, X-ray powder diffraction, DSC, SEM and NIR on the physical characteristics of the I type and II type crystal of rifampicin.

TABLE-2
GENERAL VIEW OF COMPARISON OF THE PHYSICAL CHARACTERISTICS OF THE I TYPE AND II TYPE CRYSTAL OF RIFAMPICIN

Item	Result	
	I Type crystal	II Type crystal
FT-IR	3481 cm^{-1} , 1726 cm^{-1}	3448 cm^{-1} , 1726 cm^{-1}
X-Ray powder diffraction	8.732° , 11.909°	11.072° , 19.845°
NIR	The I type and II type crystal of rifampicin could be differentiated efficiently.	
SEM	Bulk crystal	Irregular shape of the powder

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