

PEG

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Effect of PEG molecular weight on the physicochemical properties of piroxicam solid dispersions prepared by melting method

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OBJECTIVES: Piroxicam is a poorly soluble, highly permeable drug and the rate of its oral absorption is often controlled by the dissolution rate in the gastrointestinal. In this study we tried to improve the dissolution rate of a poorly water soluble drug, piroxicam, by solid dispersion systems using PEG2000, PEG4000, PEG6000 and PEG20000 as hydrophilic carriers. The goal was to investigate the effect of PEG molecular weight of carrier on the dissolution properties of piroxicam. **METHODS:** The solid dispersions were prepared by melting method. The evaluation of the dispersions properties was performed using solubility measurements, dissolution studies, FT-IR spectroscopy and powder X-ray diffractometry (PXRD). **RESULTS:** Solubility studies revealed a marked increase in the solubility of piroxicam with an increase in PEG molecular weight as well as concentration. This may arise from the modification of polarity of the medium, hence solubilizing effect of carriers. An increased dissolution rate of piroxicam at pH 1.2 and 7.2 was observed when the drug was dispersed in these carriers. The dissolution rate of piroxicam was markedly increased from solid dispersion of PEG2000, PEG4000, PEG6000, PEG20000 but dissolution rate was decreased as molecular weight or concentration of PEG increased, which may be attributed to the increased viscosity around the solid particles. Data from the X-ray diffraction and FT-IR spectroscopy showed that piroxicam crystallinity was decreased in the solid dispersions. **CONCLUSION:** Dissolution behavior and hence absorption rate piroxicam can be considerably enhanced by solid dispersion technique.

Keywords: Piroxicam; Solid dispersion; Melting method; PEG; X-ray diffraction; FT-IR spectroscopy; Dissolution.

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PEG2000 PEG6000, PEG4000, PEG2000

PEG

X-Ray

(Fourier transform infrared spectroscopy) FT-IR

PEG

/ / pH

(Solubilizing effect)

FT-IR

X

,FT-IR

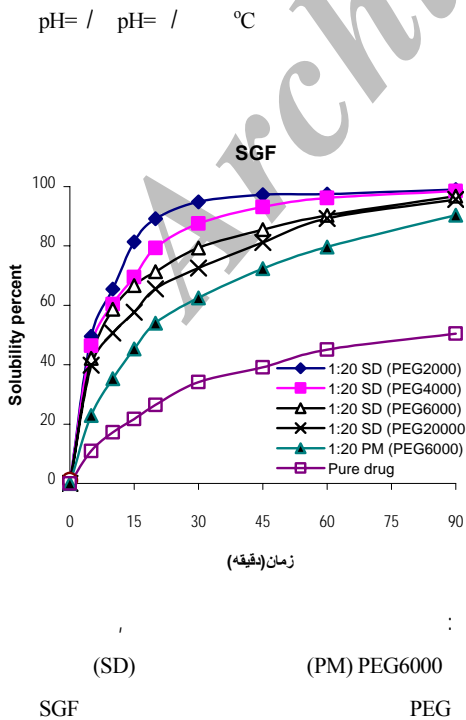
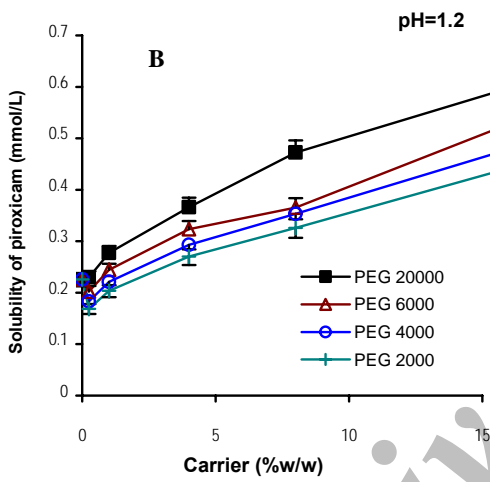
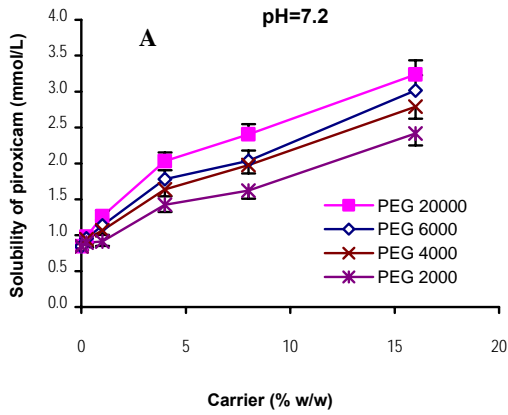
,X-Ray

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pH= / SIF pH= / SGF
± / °C

mg

ml

UV

SIF SGF

(PXR) X
(X-Ray Powder Diffraction)

(Siemens D5000, Germany)

Siemens

(Cross section)

(Cu Kα) X

°C

1.5406 Å

2θ (Room temperature)

/ ° 2θ

°/min

FT-IR

(Fourier Transform Infrared Spectroscopy)

FT-IR

(Bomem- Bomem 2000 FT-IR

USA)

(KBr)

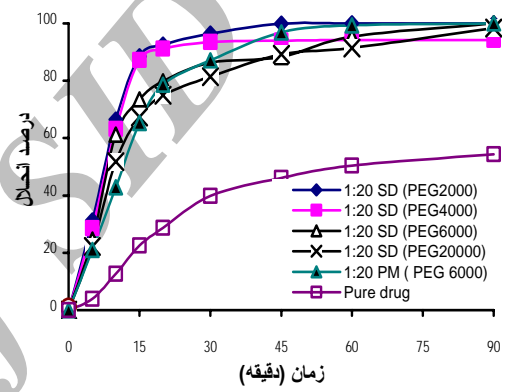
cm⁻¹ (Scaning range)

cm⁻¹

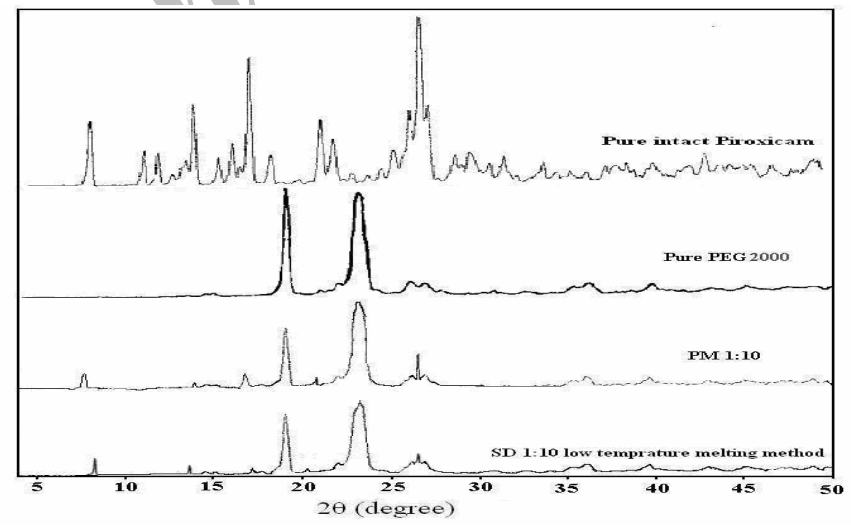
/ / pH

pH

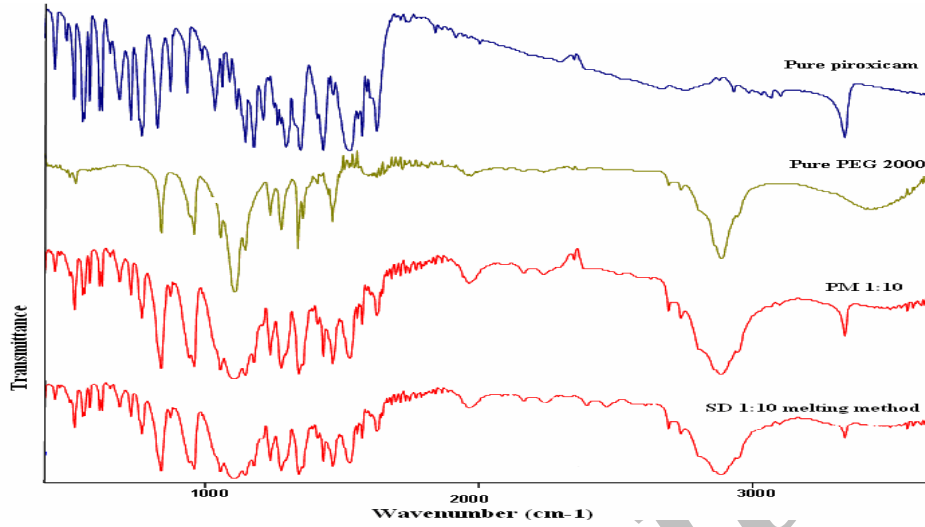
SIF
SGF
SIF
X
X
/ ° / ° 2θ
X ()
/ ° / ° θ α
θ β / ° / °
/ ° / ° / ° / ° / °
/ ° / ° / ° θ III
(.) / ° / ° / °
β



PEG (SD) (PM) PEG6000
SIF



PEG 2000 (SD) (PM)



PEG 2000 (SD) (PM) FT-IR

FT-IR

()

pH

/ °C

(μg/ml) / mmol/l (/ μg/ml)

USP

pH= /

pH= / (practically insoluble)

(very slightly soluble)

C-O cm⁻¹

cm⁻¹

O-H cm⁻¹

NH

cm⁻¹

() β

() Mihalic

cm⁻¹

()

pH= /

PEG20000

/ pH=7.2

(solubilizing effect)

X ()

() PEG2000

/ ° / ° 20 β

/ ° / ° / ° ()

(diffusivity)

() IR

PEG

.()

Zingone Rubessu

NH OH

.()

)

FT-IR

(

N-H O-H

.()

()

PVP k-30

(Solubilizing effect)

FT-IR

OH NH

.()

.()

()

()

NH



() X

PEG

(Solubilizing effect)

() Microenvironmental

.()

()

7- Reference:

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