

PEG

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Dissolution Enhancement of indomethacin by solid dispersions prepared with polyethylene glycoles of different molecular weights

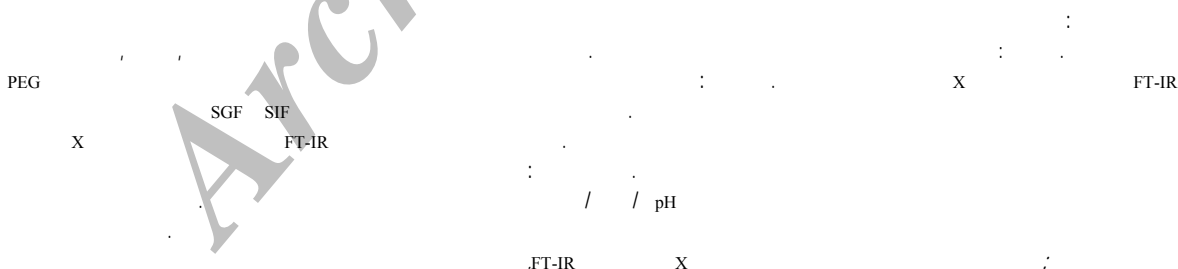
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OBJECTIVES: This study was designed to increase the dissolution rate of poorly water soluble anti rheumatic agent, indomethacin, preparing solid dispersion with different with polyethylene glycoles of different molecular weights, and to study the mechanism of enhanced dissolution properties. **Methods:** PEG₂₀₀₀ PEG₄₀₀₀ PEG₆₀₀₀ and PEG₂₀₀₀₀ were used as carriers and the solid dispersions were prepared by modified solvent method. Evaluation of solid dispersion properties was performed using solubility measurements, dissolution studies, Fourier-transform infrared spectroscopy and X-ray powder diffractometry (PXRD). **Results:** The results from solubility measurement indicated that, the solubility of indomethacin increased as the concentration and the molecular weight of PEG increased. The dissolution data revealed that these carriers can enhance the in vitro dissolution rate of indomethacin in both SGF (Simulated Gastric Fluid) and SIF (Simulated Intestinal Fluid) media. The results of infrared spectroscopy together with those from x-ray diffraction showed no drug-carrier interactions and indomethacin was still detectable in its solid state in all solid dispersions. **Conclusion:** An increased dissolution rate of indomethacin at pH 1.2 and 7.2 was observed when the drug was dispersed in these carriers. The solubilization effect of polyethylene glycoles as well as the reduction of particle aggregation and an alteration of the surface properties of the drug particles might be responsible for the enhanced dissolution rate.

Keywords: Indomethacin, Solid dispersion, X-ray diffraction; FT-IR spectroscopy.



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REV 5901 ubidecarenone RP69698 (HIV

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(PEG)

BCS

()

() II

) °C

(

PEG

(.)

X-ray

FT-IR

(Cs)

(.)

(A)



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()

(BASF,Germany) PEG₂₀₀₀₀ PEG₆₀₀₀ PEG₄₀₀₀ PEG₂₀₀₀

: (,)

Cenateur

(

(Erweka, Germany) USP

(.)

(Velp, Italia)

(Bomem, USA) FT-IR

(Shimadzu, Japan) UV

(Siemens, Germany) X-ray

(.)

(Mommert, Germany)

(Shimadzu, Japan)

Edwards, England)

(Golden Stars, French)

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(Clifton, England)

(.)

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Solid dispersion Solvent deposition

(:) : : , :

(Gris-PEG[®], Novartis) PEG6000

(Cesamet[®], Lilly) Povidone

) DMP 323 Ritonavir

(X-Ray Powder Diffraction) (PXRD) X

Siemens

(Siemens D5000, Germany)

Treated

Treated

1.5406 Å

(Cu Kα) X

Treated

2θ (Room temperature) °C

Treated

0.02° 2θ

°/min Scanning

FT-IR

(Fourier Transform Infrared Spectroscopy)

FT-IR

(Bomem-USA) Bomem 2000 FT-IR

(KBr)

(SIF SGF)

cm⁻¹ Scanning Range

°C

cm⁻¹

/ μm

UV

λ_{max}

pH

SGF SIF

(Dissolution test)

USP II

X

100 rpm

pH=7.2 (SIF) pH=1.2 (SGF)

± / °C

mg

/ °C / / pH

(μg/ml) / mmol/l (/ μg/ml)

ml

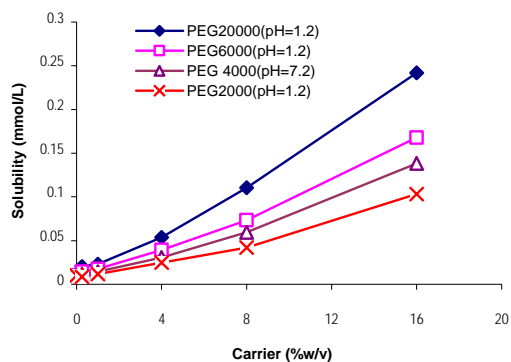
USP

pH= /

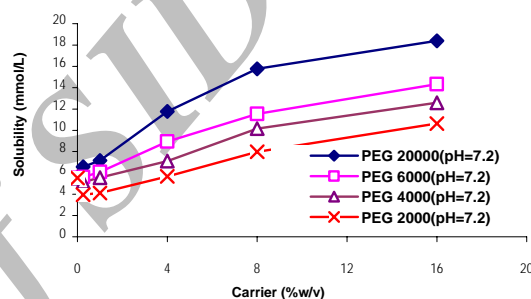
UV

pH= /

pH



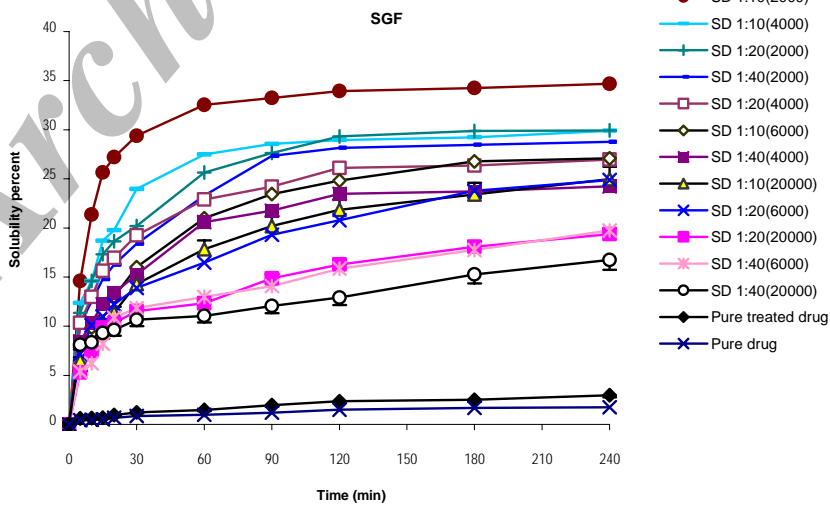
°C pH=1.2



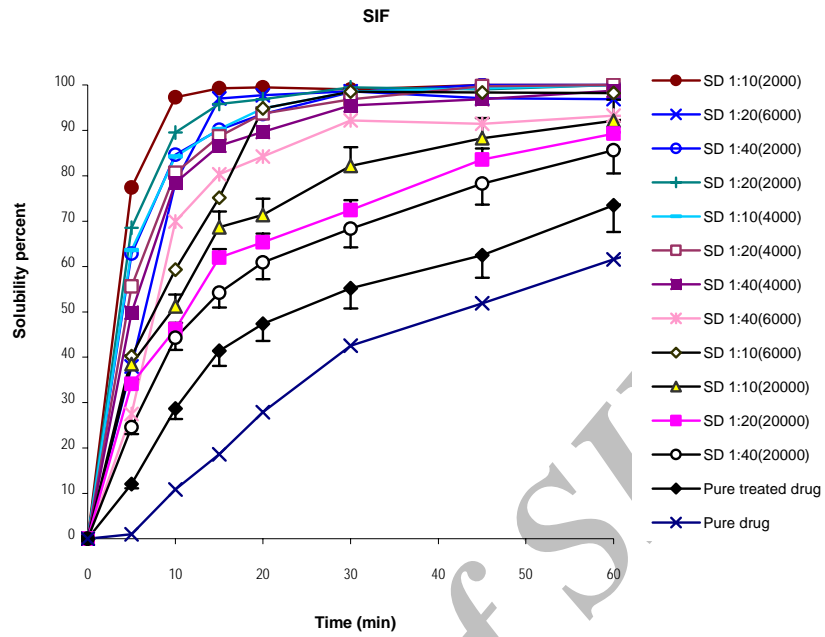
(dispersibility)

(Solubilizing effect)

°C pH=7.2



SGF



SIF

SGF

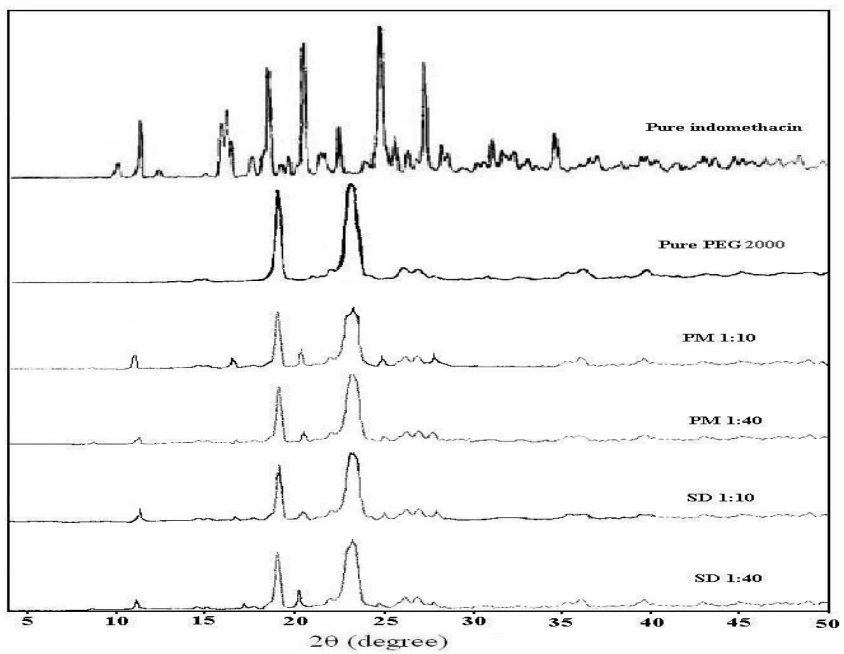
(Solubilizing effect)

(diffusivity)

Zingone Rubessu

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X



:PEG2000 (PM) (SD) :

/ / / / / / / / / /

/ (/ Å) / (/ Å) d-spacing 2θ

20 / °

20 / °

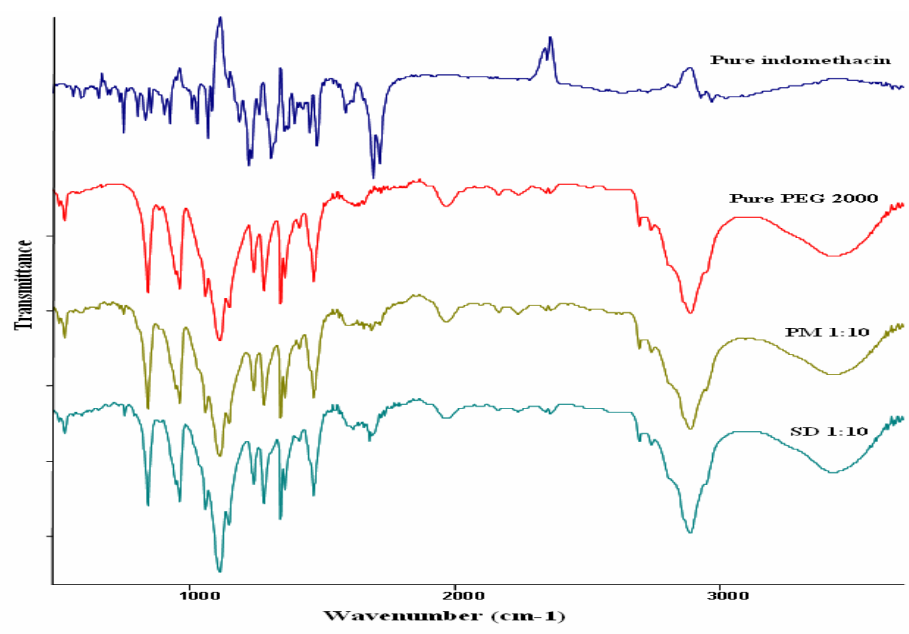
(crystal orientation)

2 θ = / °

FT-IR

FT-IR

/ / 20



: PEG 2000 (PM) (SD) FT-IR :
 IR
 X C-O cm^{-1} C-H
 . () cm^{-1} O-H cm^{-1}
 X IR
 ,FT-IR OH
 FT-IR
 X

SIF, SGF



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