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Sustain release formulation of propranolol hydrochloride by solid dispersion technique

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Abstract: Sustained release formulations have many advantages over the conventional dosage forms. There are various techniques to control the release rate of drugs, among which, controlling drug s dissolution rate is most popular due to its success and low cost. Although there are numerous studies to produce sustained release formulations, little studies were carried out to use solid dispersion technique to produce sustained release formulations. Propranolol is a β adrenergic receptor blocker that has some adverse effects. These side effects could be reduced by reduction of usage frequency and producing steady pharmacological effects by preparing sustain release formulation. In this study we tried to use solid dispersion technique to slow down the release rate in water from its tablet formulation. Solid dispersion formulations were prepared using molten-solvent technique. The final obtained powder was compressed into tablets and their dissolution were investigated at pH 1.2 and 6.8. FT-IR was used to find any interaction between the drug and excipient. The results showed that solid dispersions produced harder tablets than that of physical mixtures formulations. The amount of eduragit had no significant effect on release rate. It was interesting to note that solid dispersions containing PEG 6000 and eudragit had slow release rate. This indicates that the presence of PEG 6000 to slow down the release of propranolol from eudragit solid dispersion matrices is necessary. It was found that type of Eudragit had not significant effect on the release rate of propranolol from solid dispersions. Ethylcelllose alone was not able to decrease the release rate. Although PEG 6000 is hydrophilic excipient, the reduced release rate in presence of PEG 6000 is due to the enhance effect of PEG 6000 on the hardness of tablets. FT-IR study showed no interaction between the drug and excipients.

***Key words**: Propranolo hydrochloride, Solid dispersion, Sustained Release, eudragit.*

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.   /   /   pH

.   FTIR

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PEG 6000 .   RS   RL   .

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PEG   .   PEG6000

.   IR   .

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.   .

.( )   :   :

(   )

(Röhm   ) RS100   .

(Röhm   ) RL100

(BASF   ) PEG6000

)   CPS

.( )   (

(Merck   )

(Merck   )

(Merck   )

.   (   ) %

.   :

(Bomem) FT-IR

.( )   (Shimadzu-160) UV

Caleva) USP

(

(Velp)

Shimadzu)   /

(

.( )   (Golden stars)

(J/B Industrial Inc.)

...   .(   )   (Riken)

(Corning)   pH

:

( )

UV .

pH / /

UV / .

/ pH

/ /

Basket USP .

(ApparatusI)

in vitro .

pH= / pH= / pH

.

± rpm .

± . / °C :

( )

( ) .

. .

pH=6.8

PEG 6000

. .

. /

UV .

. .

(volume correction) :

.

$$C_{tn} = C_{on} + v/V \sum_{i=1}^{n-1} C_{oi}$$)

(

C_{tn}: n

C_{on}: n .

:v

:V   %

:Co   n

(similarity factor)   .( )   SD4   %

:   .

n

$$f_2 = 50 \log \{[1+ (1/n) \sum_{j=1} (R_j - T_j)^2]^{-0.5} * 100 \}$$

.(f_2 < 50)

( )

:n

:R_j

:T_j

Bar

.

f_2

/ kp   SD4

kp

.

.

FT-IR

FT-IR

Bomen 2000 FT-IR   .

(KBr)

(Elastic recovery)

cm^{-1} .

. cm^{-1}

RL RS   (c) (b)

PEG6000

.

(f_2)   .

a

(a)   .   f

.   .

(a) | (b) | (c) | (d) | (e) | (f)
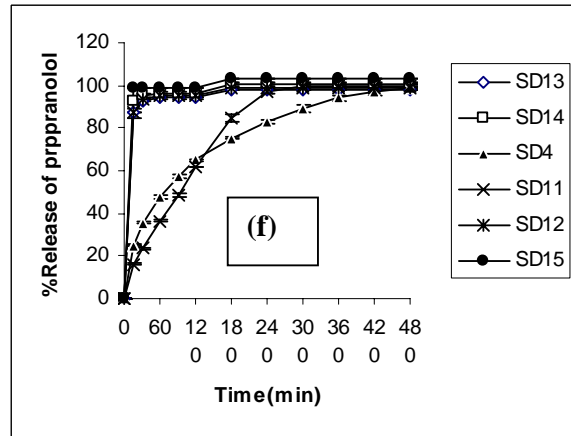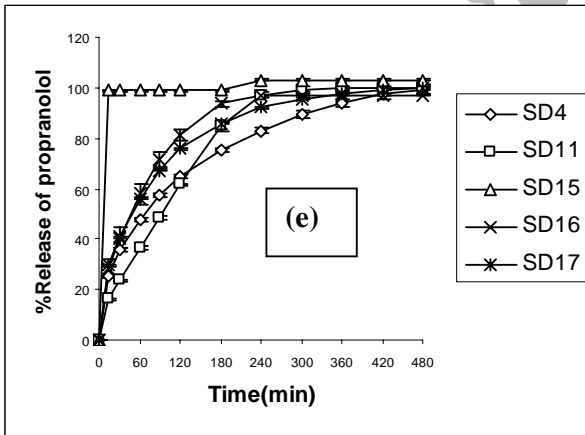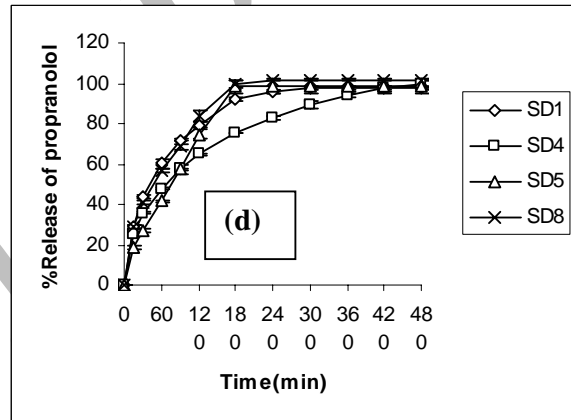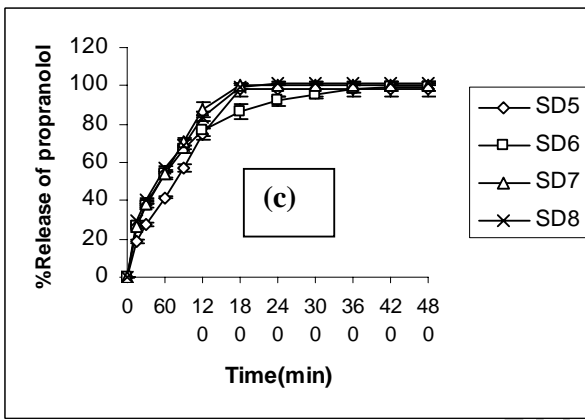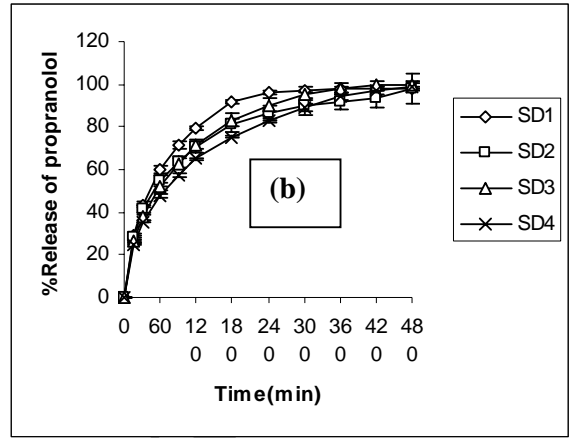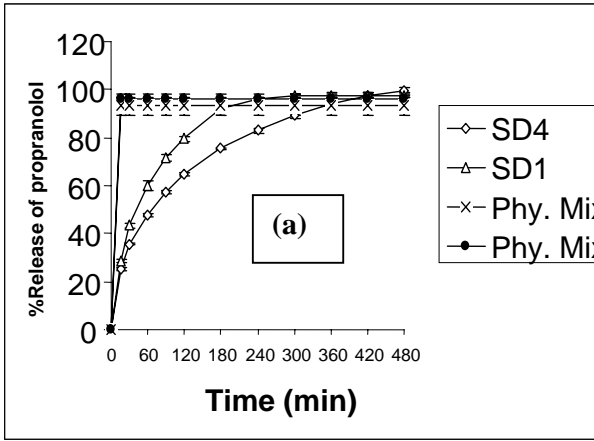
$(f_2 > 50)$ (d)

RS   RL   .

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	(g)			
	Eudragit RS100	Eudragit RL100	PEG6000	
SD1		-		
SD2		-		
SD3		-		
SD4		-		-
SD5	-			
SD6	-			
SD7	-			
SD8	-			-
SD9		-		
SD10	-			
SD11		-		-
SD12		-	-	-
SD13		-	-	
SD14		-	-	
SD15	-	-		-
SD16		-		-
SD17		-		-
SD18	-			-

SD14   SD13

PEG   PEG6000

(f)   PEG

(   )

.(   )   .

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	(g)			
	Eudragit RS100	Eudragit RL100	PEG6000	
Phy. Mix.1		-		
Phy. Mix.2		-		
Phy. Mix.3		-		
Phy. Mix.4		-		-
Phy. Mix.5		-		-
Phy. Mix.6		-	-	-
Phy. Mix.7	-	-		-
Phy. Mix.8		-		-
Phy. Mix.9		-		-

:

(kp)		(kp)	
SD1		SD15	,
SD2	,	SD16	,
SD3		SD17	,
SD4	,	SD18	,
SD5	,	Phy. Mix.1	,
SD6		Phy. Mix.2	
SD7	,	Phy. Mix.3	,
SD8	,	Phy. Mix.4	
SD9	,	Phy. Mix.5	
SD10	,	Phy. Mix.6	,
SD11	,	Phy. Mix.7	
SD12	,	Phy. Mix.8	,
SD13	,	Phy. Mix.9	,
SD14			

پروپرانولول

مخلوط فیزیکی Phy. Mix. 4

پراکندگی جامد F4

مخلوط فیزیکی Phy. Mix. 9

پراکندگی جامد F17

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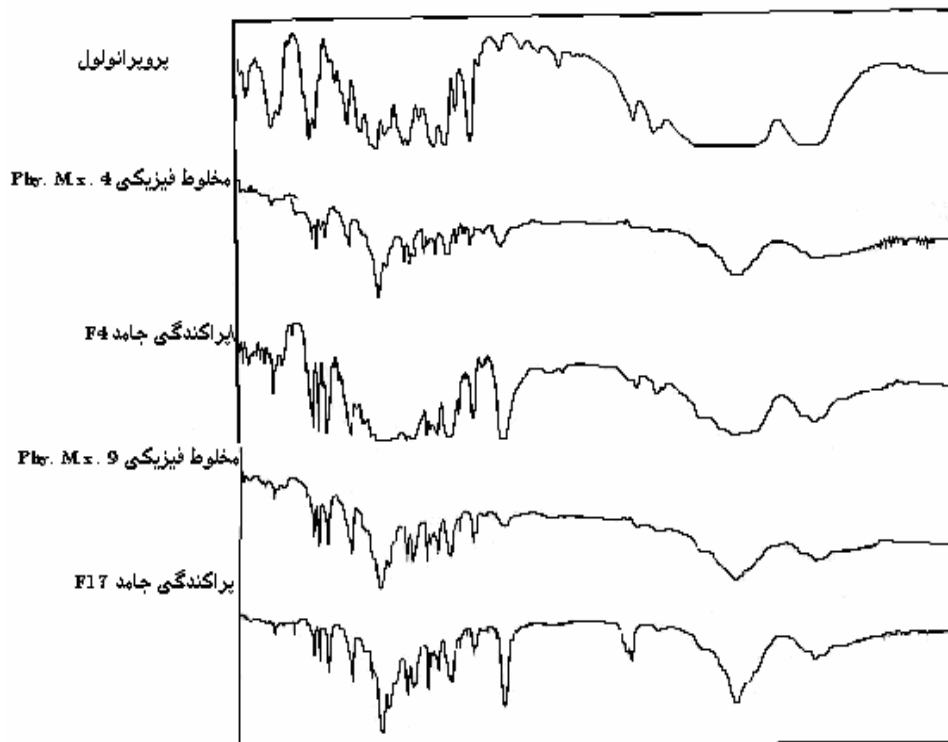
) SD12

( ) SD15 (PEG .

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PEG

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PEG

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IR

. PEG

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PEG .( )

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