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$(W/O \rightarrow O/W)$ $(O/W \rightarrow W/O)$

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(O/W)

(W/O) -

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$(O/W \rightarrow W/O)$

$(W/O \rightarrow O/W)$

$(O/W \rightarrow W/O)$.[ ]

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$(W/O \rightarrow O/W)$ (W) (   )

. (O)

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Email: hoab@ut.ac.ir
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(O/W)

$\cdot(W/O)$

.[ ] $(W/O \rightarrow O/W)$ $(O/W \rightarrow W/O)$

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(O/W)

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$(O/W \rightarrow W/O)$:

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Ambivalent region

always (W/O) dispersion   (O/W) ⟶ (W/O)

— (O/W to W/O)
⋯ (W/O to O/W)

Ambivalent region

always (O/W) dispersion   (W/O) ⟶ (O/W)

Oil phase hold up

Impeller speed (rpm)

[ ]   :

                                                                    :

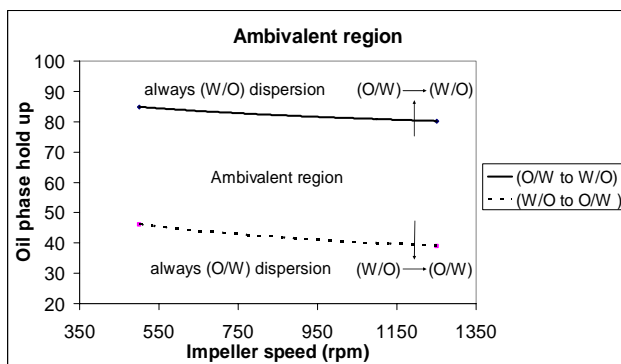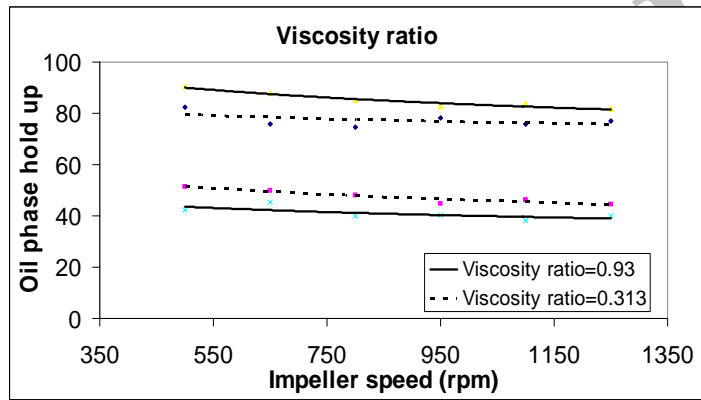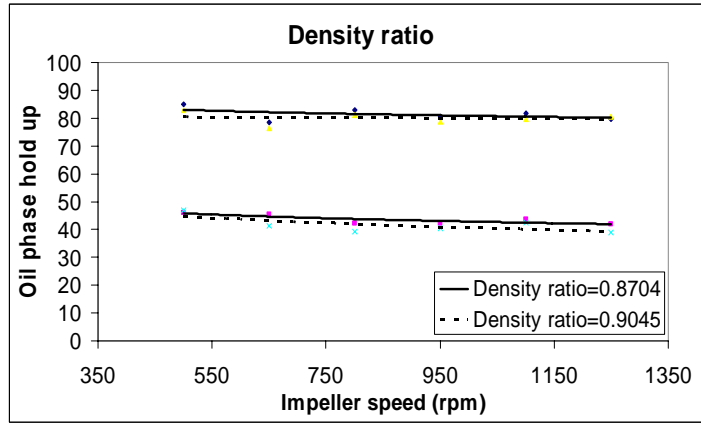   :
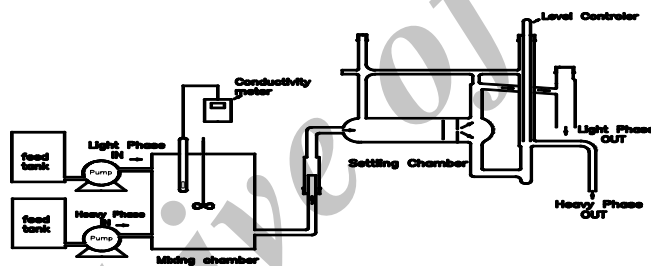
$\sigma(\text{N}/\text{m})$	$\lambda = \dfrac{\mu_d}{\mu_c}$	$\dfrac{\rho_d}{\rho_c}$	$\mu_{aq}(\text{Pa.s})$	$\mu_{org}(\text{Pa.s})$	$\rho_{aq}\left(\text{kg}/\text{m}^3\right)$	$\rho_{org}\left(\text{kg}/\text{m}^3\right)$		
/	/	/	/	/			/	
/	/	/	/	/			/	
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/	/	/	/	/			+ / ( )	
/	/	/	/	/			+ /( )	

Density ratio

Oil phase hold up vs Impeller speed (rpm)

— Density ratio=0.8704
- - - Density ratio=0.9045

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Viscosity ratio

Oil phase hold up vs Impeller speed (rpm)

— Viscosity ratio=0.93
- - - Viscosity ratio=0.313

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(O/W)

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(W/O)

(/)

(/(   )   +   ) $(W/O \rightarrow O/W)$

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ρ_d / ρ_c

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(O/W)

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$(O/W \rightarrow W/O)$.

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$(W/O \rightarrow O/W)$.[   ]
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$(\lambda = \mu_d / \mu_c)$

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) .[   ] $(\frac{\phi_{d,i}}{1-\phi_{d,i}} = \sqrt{\frac{\mu_d}{\mu_c}}$
(+ /) (/ λ
( ) .

. $(W/O \rightarrow O/W)$ $(O/W \rightarrow W/O)$. (W/O) (O/W)
$(O/W \rightarrow W/O)$ λ
(O/W)
. ( ) $(\lambda$))
$(W/O \rightarrow O/W)$

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(D_{32})
(O/W)
. λ
$\lambda < 1$ (O/W) . (W/O)
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$)\lambda$.
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(O/W)
( ) (W/O)

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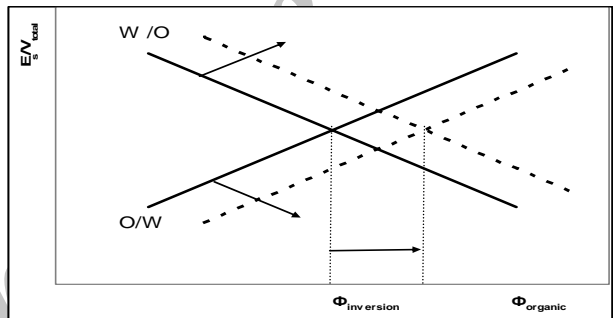-   ( ) $\lambda > 1$ (W/O)

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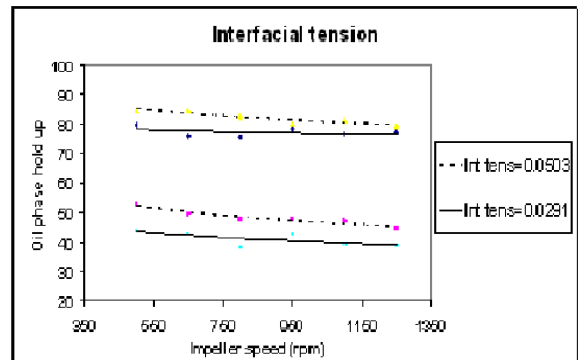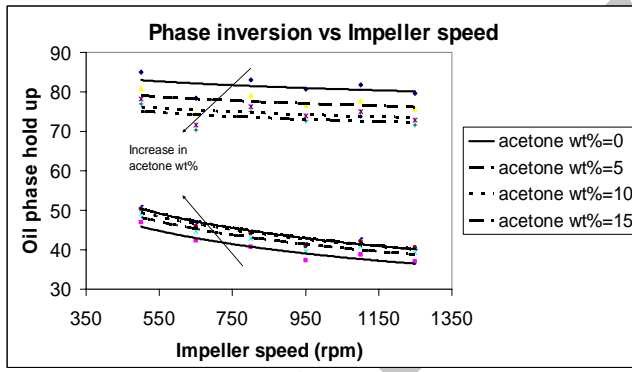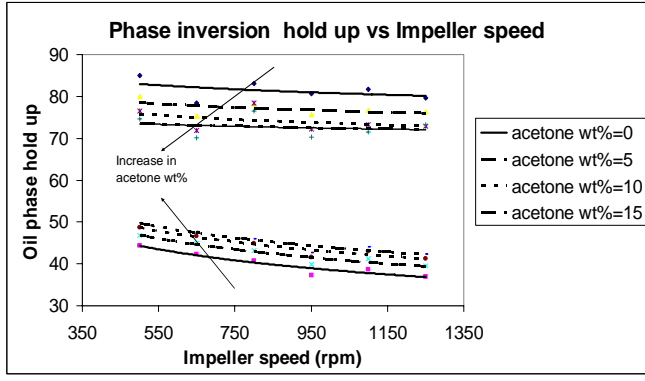   ( )

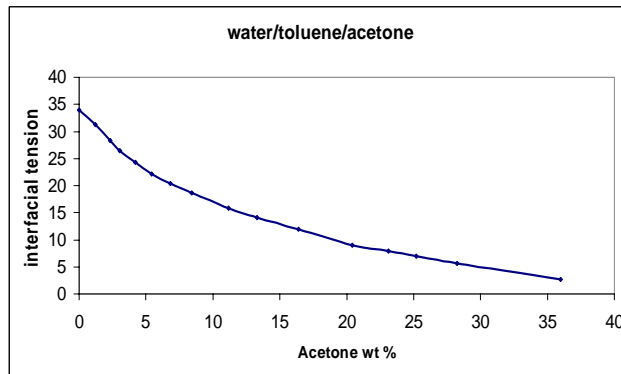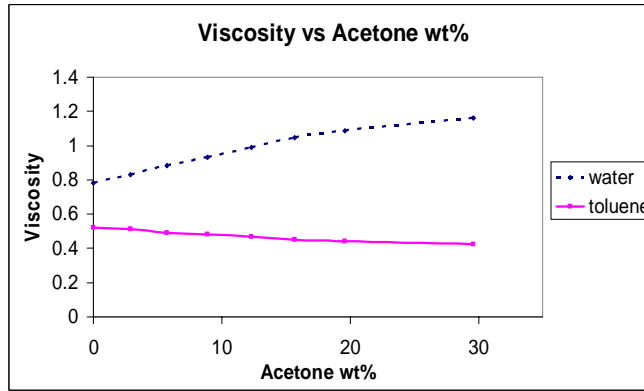   .   .

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E/V s total

W /O

O/W

$\Phi_{inversion}$ $\Phi_{organic}$

[ ] λ :

Interfacial tension

Oil phase hold up

Int tens=0.0503
Int tens=0.0291

350   550   750   950   1150   1350
Impeller speed (rpm)

                                                                        :

Phase inversion hold up vs Impeller speed

Oil phase hold up

90
80
70
60
50
40
30

350   550   750   950   1150   1350

Impeller speed (rpm)

Increase in acetone wt%

acetone wt%=0
acetone wt%=5
acetone wt%=10
acetone wt%=15

:

Phase inversion vs Impeller speed

Oil phase hold up

90
80
70
60
50
40
30

350   550   750   950   1150   1350

Impeller speed (rpm)

Increase in acetone wt%

acetone wt%=0
acetone wt%=5
acetone wt%=10
acetone wt%=15

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λ $(O/W \rightarrow W/O)$ λ

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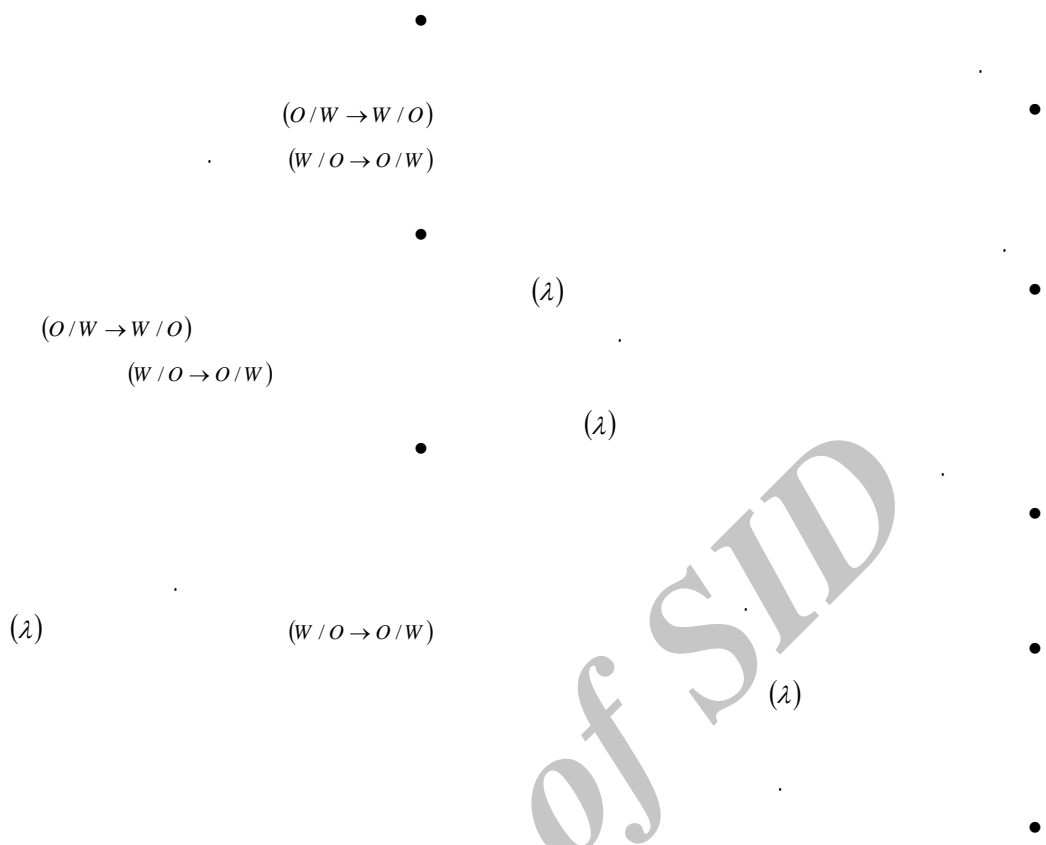( )   ( )

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$(O/W \rightarrow W/O)$

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$(W/O \rightarrow O/W)$.

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Viscosity vs Acetone wt%

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water/toluene/acetone

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(W/O) (O/W) ●   .

$(O/W \rightarrow W/O)$

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                                          ●

$(\mu_d/\mu_c > 1)$ $(\mu_d/\mu_c < 1)$

(O/W) $\mu_d/\mu_c < 1$.

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. $(W/O \rightarrow O/W)$

(W/O) $\mu_d/\mu_c > 1$

•

$(O/W \rightarrow W/O)$

$(W/O \rightarrow O/W)$

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(λ)

$(O/W \rightarrow W/O)$

$(W/O \rightarrow O/W)$

(λ)

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(λ)

$(W/O \rightarrow O/W)$

(λ)

1- Kumar, S. (1995). "On phase inversion characteristics of stirred dispersions." *Chem. Eng. Sci.*, Vol. 51, PP. 831-834.

2- Hu, B., Liu, L., Matar, O. K., Angeli, P., Hewitt, G. F. and Perez de Ortiz, E. S. (2006). "Investigation of phase inversion of liquid-liquid dispersions in agitated vessels." *Tsinghua Sci.and.Tech.*, Vol. 11, PP. 202-206.

3- Yeo, L. Y., Matar, O. K., Perez de Ortiz, E. S. and Hewitt, G. F. (2000). "Phase inversion and associated phenomena." *Multiphase Sci. Tech.*, Vol. 12, PP. 51-116.

4- Norato, M. A., Tsouric, C. and Tavlarides, L . L. (1998). "Phase inversion structure in liquid- liquid dispersions." *Can. J. Chem. Eng.*, Vol. 76, PP. 486-494.

5- Yeo, L. Y., Matar, O. K., Perez de Ortiz, E. S. and Hewitt, G. F. (2002). "Simulation studies of phase inversion in agitated vessels using a monte Carlo technique." *Journal of Colloid and Interface Sci.,* Vol. 248, PP. 443-454.

6- Hu, B., Angeli, P., Matar, O. K. and Hewitt, G. F. (2005). "Prediction of phase inversion in agitated vessels using a two-region model." *Chem. Eng. Sci.,* Vol. 60, PP. 3487-3495.

7- Yeo, L. Y., Matar, O. K., Perez de Oritz, E. S. and Hewitt, G. F. (2002). "A simple predictive tool for modeling phase inversion in liquid- liquid dispersions." *Chem. Eng. Sci.,* Vol. 57, PP. 1069-1072.

8- Hadjiev, D. and Paulo, J. B. A. (2005). "Extraction separation in mixer–settlers based on phase inversion. " *Separation and Purification Technology*, Vol. 43, PP. 257-262.

9- Reeve, R. N. and Godfrey, J. C. (2002). "Phase inversion during liquid- liquid mixing in continuous flow, pump mix, agitated tanks" *Trans IChemE,* Vol. 80, PP. 864-871.

10- Bouchama, F., Van Aken, G. A., Autin, A. J. E. and Koper, G. J. M. (2003). "On the mechanism of catastrophic phase inversion in emulsions." *Journal of Colloid and Interface Sci.,* Vol. 231, PP. 11-17.

11- Tsouris, C. and Dong, J. (2000). "Effects of electric fields on phase inversion of liquid-liquid dispersions." *Chem. Eng. Sci.,* Vol. 55, PP. 3571-3574.

1- Multi Phases
2- Dispersed Phase Hold up
3- Ambivalent Region
4- Hysteresis
5- Secondary Dispersion
6- Film Drainage
7- Deformation
8- Electrostatic Interaction
9- Conductivity Meter
10- Cocurrent
11- Yeo et al
12- Mobile
13- Immobile