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Entitled:

Laboratory Investigations of the Phase Microemulsions System between Oil and Surfactant

Student achievement

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بسم الله الرحمن الرحيم

أَوَلَمْ يَرَ الَّذِينَ كَفَرُوا أَنَّ السَّمَاوَاتِ وَالْأَرْضَ كَانَتَا
رَتْقًا فَفَتَقْنَاهُمَا ۖ وَجَعَلْنَا مِنَ الْمَاءِ كُلَّ شَيْءٍ حَيٍّ
ۖ أَفَلَا يُؤْمِنُونَ ﴿٣٠﴾

صدق الله العظيم

Dedication

We began more than the hands of our masters and more than them and we suffered a lot of difficulties, and today we are thankful for the night and the fatigue of the days and the end of our journey between the depths of this humble work.

To the beacon of science and Imam Mustafa to the illiterate, who taught the learners to the master of creation to our noble messenger Muhammad peace be upon him.

To my first and Nebrasi, who enlightens me, who gave me and still gives me no limit to those who raised my head high, and I can not help but pray to God Almighty to keep you alive God prolong your life with love and satisfaction

To my beloved father

Who taught me alphabetical letters and who taught me to withstand, no matter how the circumstances changed I miss you the words of my blood ink words of gratitude and gratitude Words reverberate all over the tongu Yes it is expensive mom

To the dear mother

To the most beautiful flowers of the world .. To me who is blessed with the finest moments of happiness .. Those who share life with their sweet and bitter.

My brothers and sisters

To the one who lined with them on the wall of time, the most beautiful dicatriz .. To the light of the eye, which I see .. To the pulse of the heart which lives.

Friends and Lovers

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ABSTRACT

This research was conducted to investigatedthe extraction of oil from the cloth by using the Gubaraeun water and two typesof chemical surfactants.This work was conducted to identify and compare the best salinity gradient design using Gubaraeun water flooding (GWF) application for chemical enhanced oil recovery (EOR) under different formation of water salinity and solution temperature. The laboratory experimentsweredesigned to extractthe oils using brine solution, which oilto form a layer consisting of oil and water. The brine solution of soap and cistern waterwere prepared by different concentrations and salinity.The mixture was injected into special glass tubesand placed inside the oven and kept atdifferent temperatures 30, 50 and 70^{0}C for 48-72 hours.It was found that the oil recoveries were based on salinity of water and mixture temperature.The average thickness of the extracted layerwas0.3ml.

1. Introduction

Microemulsions, or µ-emulsions, are isotropic mixtures of oil, water and surfactant; usually with a co-surfactant and the oil being a mixture of different hydrocarbons and olefins. In contrast to ordinary,the emulsionsare kinetically stable and thermodynamically unstable.On the other hand, the microemulsions are thermodynamically stable, which then therefore are not require high inputs of energy or shear conditions for their formation. Usually, the droplet sizes of the dispersed phase in microemulsions as named are in the magnitude of ~10nm. The microemulsions attracted the attentcon of many researchers becaure they are commercially researchers due to commercially availableand the application as used as drug delivery vehicles.

1.1. Microemulsions: Definition and History

Microemulsions were not really recognized until the work of Hoar and Schulman in 1943, who reported a spontaneous emulsion of water and oil on addition of a strong surface-active agent (Hoar 1943) . The term "microemulsion" was used even later by Schulman et al. in 1959. It has been much debate about the word "microemulsion" to describe such systems (Shinoda, K.; Friberg, S 1975). One of the best definitions of microemulsions is from Danielsson and Lindman (1981) “a microemulsion is a system of water, oil and an amphiphile which is a single optically isotropic and thermodynamically stable liquid solution”. Some prefer the names “micellar emulsion” (Adamson, A 1969) or “swollen micelles” (Friberg 1969). Microemulsions were probably discovered well before the studies of Schulmann.The first commercial microemulsions were probably the liquid waxes discovered by Rodawald in 1928. In the last 20 years, understanding microemulsion properties has been considered. Also,the microemulsions can be considered as small-scale versions of emulsions, i.e., droplet type dispersions either of oil-in-water (o/w) or of water-in-oil (w/o), with a size range in the order of 5−50 nm in drop radius. The drops of the dispersed phase weregenerally large (> 0.1 μm)showing a milky color in solutions rather than a translucent appearance. For microemulsions, the microemulsion formation is dependent on the surfactant type and its structure. If the surfactant is ionic and contains a single hydrocarbon chain such as sodium dodecylsulphate, SDS,then the microemulsions were only formed.However, if a co-surfactant such as a medium size aliphatic alcohol and/or electrolyte (e.g., 0.2 M NaCl) were also present. These results could be from one of the most fundamental properties of microemulsions, which is an ultra-low interfacial tension between the oil and water phases, $\gamma_{o/w}$.Generally, the main role of the surfactant is to reduce $\gamma_{o/w}$ sufficiently which means lowering the energy required to increase the surface werea.Then,the spontaneous dispersion of water or oil droplets occurs and the system is thermodynamically stable.

1.2. Microemulsion Type

The microemulsions is classifiedby Winsor (1948)and identified in four general types of phase equilibrium:

- Type I: the surfactant is preferentially soluble in water and oil-in-water (o/w) microemulsions form (Winsor I). The surfactant-rich water phase coexists with the oil phase where surfactant is only present as monomers at small concentration.
- Type II: the surfactant is mainly in the oil phase and water-in-oil (w/o) microemulsions form. The surfactant-rich oil phase coexists with the surfactant-poor aqueous phase (Winsor II).

- Type III: a three-phase system where a surfactant-rich middle-phase coexists with both excess water and oil surfactant-poor phases (Winsor III or middle-phase microemulsion).
- Type IV: a single-phase (isotropic) micellar solution, that forms upon addition of a sufficient quantity of amphiphile (surfactant plus alcohol).

As illustrated in Figure1, the phase transitions were brought about by increasing either electrolyte concentrations (in the case of ionic surfactants) or temperature (for non-ionics).

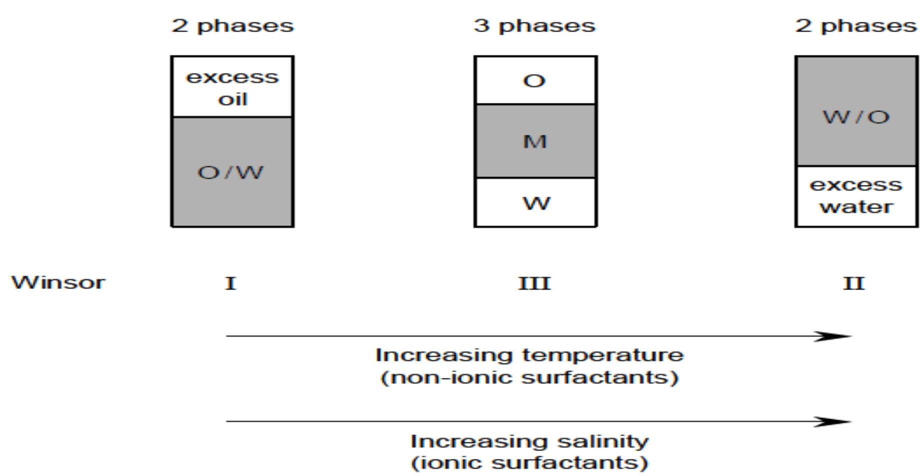

Figure1: Winsor classification and phase sequence of microemulsions encountered as temperature or salinity is scanned for non-ionic and ionic surfactant respectively. Where: the middle-phase microemulsion (M) with both excess oil (O) and water (W).

1.3. Surfactants

Surfactant is surface-active agents consists of lipophilic moiety and hydrophilic moiety in a molecule. The interfacial properties between two kinds of fluids like the interfacial tension between water and oil (Bourrel and Schecter, 1988). Surfactant molecules consist of a lipophilic tail and a hydrophilic head group as shown in the **Figure2**.

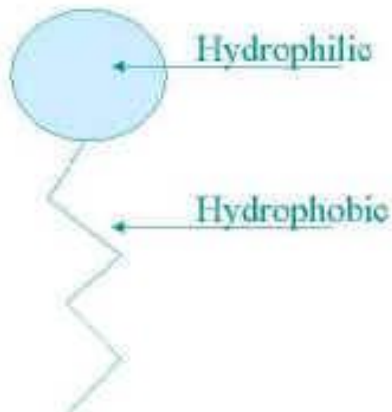

Figure2**:** Surfactant Molecules

1.3.1. Types of Surfactants

Typically,the surfactants can be categorized into four groups; anionic, cationic, non-ionic, and zwitterionic families depending on the charge of the head.

- **Anionic Surfactants**

Anionic surfactants have a negative charge in the surface-active portion of the molecule in an aqueous solution. Thesesurfactants are the most widely used for laundering, dishwashing liquids and shampoos such as Sodium dodecyl sulfate (SDS) as shown in the Figure3.

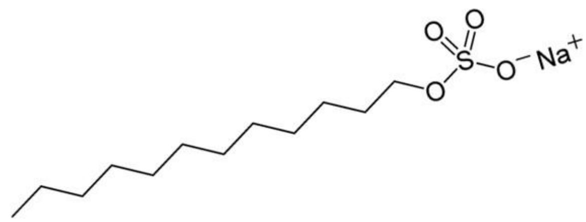

Figure3**:** Sodium dodecyl sulfate (SDS)

- **Cationic Surfactants**

In solution, the head is positively charged. Based on quaternary ammonium cations for example benzethonium chloride (BZT) as shown in the Figure4.

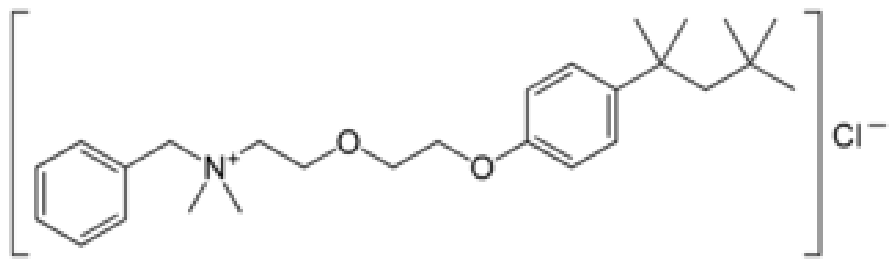

Figure4**:** Benzethonium chloride (BZT)

- **Zwitterionic Surfactants**

These surfactants are very mild, making them particularly suited for use in personal cwere and household cleaning products. They can bedepending on the acidity or pH of the water as:

1. anionic (negatively charged)

2. cationic (positively charged)
3. non-ionic (no charge) in solution

An example of an amphoteric/zwitterionic surfactant is alkyl betaine as shown in the Figure 5.

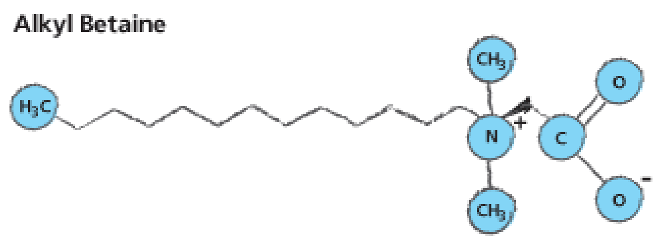

Figure5: amphoteric/zwitterionic surfactant

- **Nonionic surfactant**

These surfactants do not have an electrical charge, which make them resistant to water hardness deactivation using as grease removers in laundry products, household cleaners and hand dishwashing liquids. The most commonly used non-ionic surfactants are ethers of fatty alcohols as shown in the Figure 6.

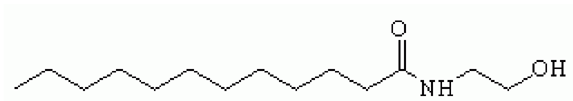

Figure6: non-ionic surfactants

1.3.2. SurfactantMechanism

Surfactants can work in three different ways:

A. roll-up:the surfactant lowers the oil/solution and fabric/solution interfacial tensions and in this way lifts the stain of the fabric as shown in the Figure7.

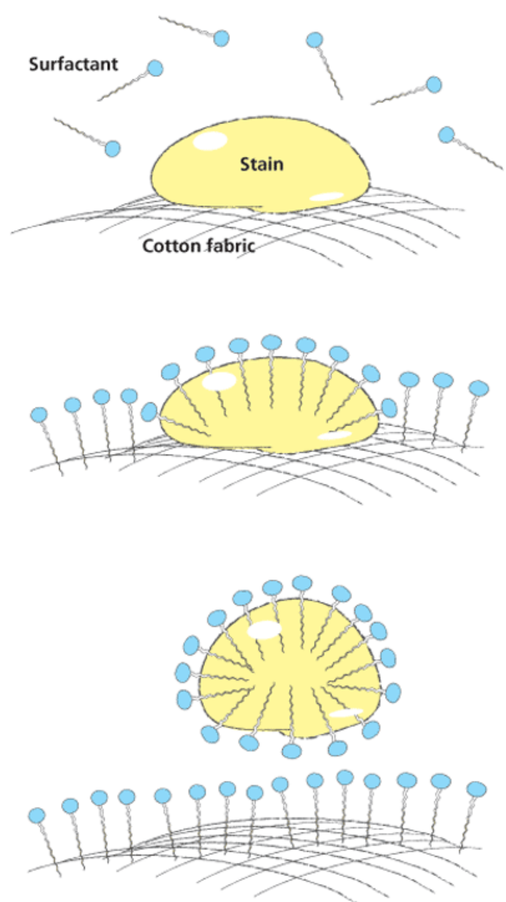

Figure7: roll-up

B. emulsification: the surfactant lowers the oil-solution interfacial tension and makes easy emulsification of the oily soils possible as shown in the Figure 8.

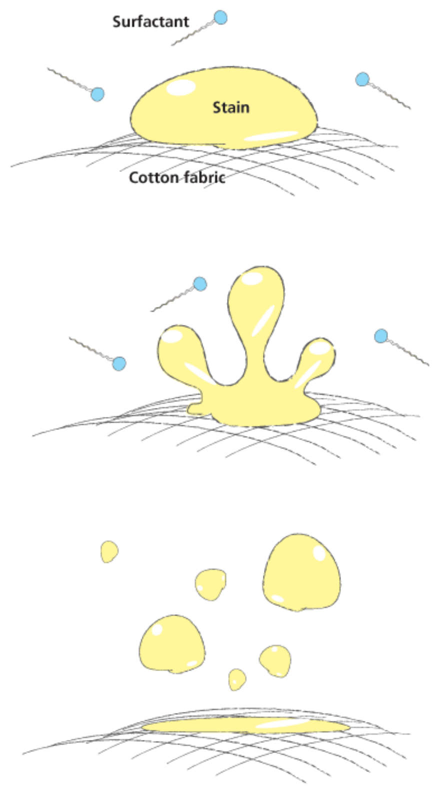

Figure8: emulsification

C. Solubilization: through interaction with the micelles of a surfactant in a solvent (water), a substance spontaneously dissolves to form a stable and clear solution.

Research Objectives:

The objectives of this project were:

1. To make it easy to understood the microemolsion.
2. As comprehensive literature study for microemolsion and surfactant.
3. To understand the factors effect during the experimental such as PH, salinity and temperature.
4. To understand the basic concept of phase behavior test, the way to design.
5. Estimate the best oil recovery for the different cases.

2. Experimental

2.1. Apparatus

Thermal Silicon, Oven (Memmert oven Model 100-800 is laboratory oven), PH (Electron Corporation) (scientific Orion 4-star benchtop), Scale for sampling (Kern scale ALS140-2 used in this study), Water hyperventilation, Heater and Mixer, Burette (Glasfirn Giessen), Sticker, and Magne were used.

2.2. Experimental Design

A-Tubes with small diameter: Figures 9 and 10 plastic and glass tubes with a small diameter and not closed from the bottom and from the top and listed from 0 to 10ml.

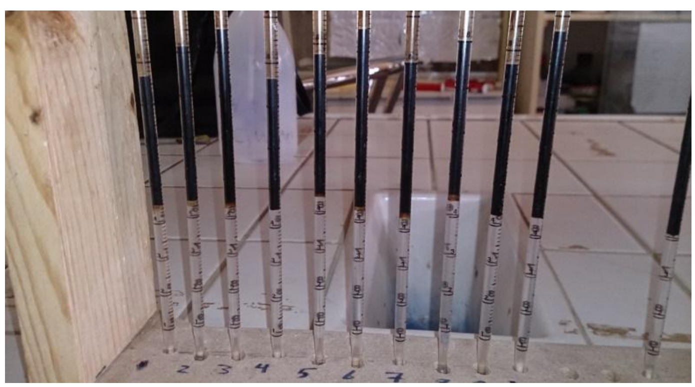

Figure9: experimental design1.

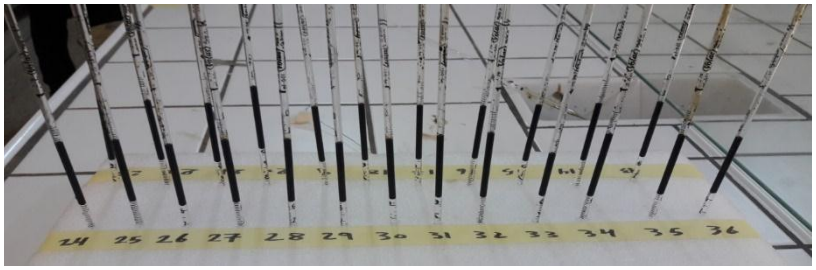

Figure10: Experimental design 2.

B-Pipe holder: tube holder capable of carrying 37 tubes perpendicularly as shown in Figure11

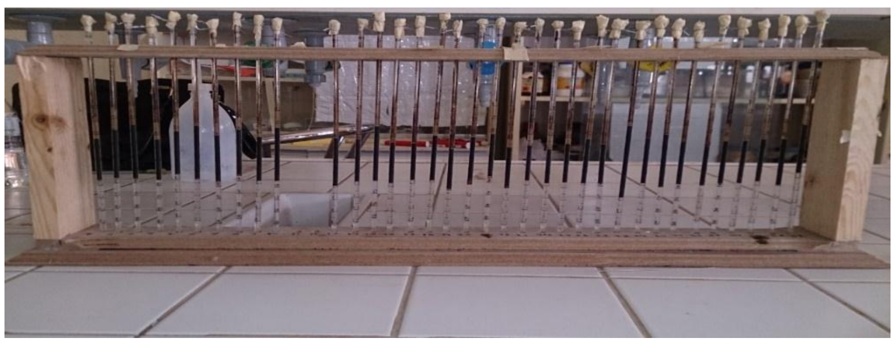

Figure **11**: *Experimental design 3*

C-Glass Flasks (250ml): Figure12Glass flasks in which 6 different types of salinity were preppared for water of Gubaraeun, Salinity = (35, 25,15,5,0.5, 0.1ppt).

Figure 12: Gaberun water samples with different salinity.

D-Plastic Cups: Figure13 cups in which saline solution (water of Gubaraeunand soap) was prepared at 4 different concentrations of soap and concentrations were [0.5%, 1%, 1.5% and 2%], so that each concentration takes 6 different types of salinity.

Figure 13: Surfactant concentration.

E-Pipe Holder (large capacity): Figure14the tube holder was capable of carrying 24 tubes vertically.

Figure14**:** Experimental design 4

F-Glass Tubes with a Wider Diameter: Figure15 glass tubes with a wider diameter closed from the bottom and fitted with covers and inserted from 0 to 5 ml.

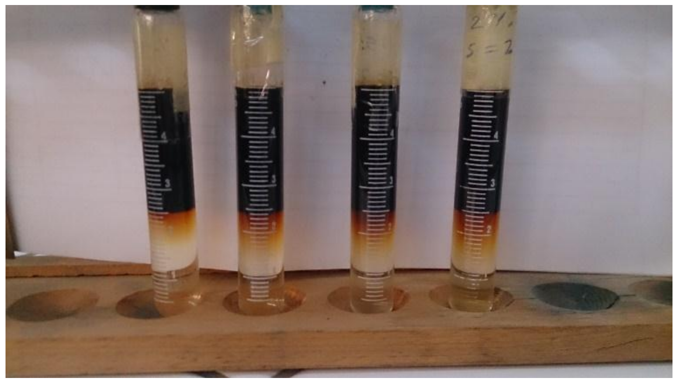

Figure15: Experimental design 5.

H-Oil: Figure16 the three types of oil used in this study, were taken from Hamada field-V32 and V2, Jakhira field-GSOP. The analysis of composition of oil done at petroleum institute, as shown in the table 1.

Figure16*: Oil Samples.*

Table 1: Compostion of Oil

NO.	Component	Formula	Hamada field V32	Hamada field V2	Jakhira field-GSOP
			Flashed Liquid Mole%	Flashed Liquid Mole%	Flashed Liquid Mole%
1	Hexane	C_6H_{14}	3.24	3.99	2.92
2	Heptane	C_7H_{16}	6.94	8.08	3.45
3	Octane	C_8H_{18}	13.53	14.71	6.27
4	Nonane	C_9H_{20}	12.38	12.74	6.54
5	Decane	$C_{10}H_{22}$	11.05	10.69	6.44
6	n-Undecane	$C_{11}H_{24}$	8.78	8.81	6.44
7	n-Dodecanes	$C_{12}H_{26}$	6.83	7.15	5.78
8	n-Tridecanes	$C_{13}H_{28}$	6.87	6.88	6.93
9	n-Tetradecanes	$C_{14}H_{30}$	4.80	4.70	5.89
10	n-Pentadecanes	$C_{15}H_{32}$	4.17	4.05	6.11
11	n-Hexadecanes	$C_{16}H_{34}$	3.05	2.89	4.76
12	n-Heptadecanes	$C_{17}H_{36}$	3.04	2.72	4.69
13	n-Octadecanes	$C_{18}H_{38}$	2.76	2.52	4.90
14	n-Nonadecanes	$C_{19}H_{40}$	2.48	2.30	4.48
15	n-Eicosane	$C_{20}H_{42}$	1.59	1.41	3.39
16	n-Heneicosane	$C_{21}H_{44}$	1.46	1.31	3.34
17	n-Docosane	$C_{22}H_{46}$	1.32	1.19	2.92
18	n-Tricosane	$C_{23}H_{48}$	0.99	0.89	2.66
19	n-Tetracosane	$C_{24}H_{50}$	0.89	0.74	2.18
20	n-Pentacosane	$C_{25}H_{52}$	0.74	0.60	1.90
21	n-Hexacosane	$C_{26}H_{54}$	0.66	0.53	1.58
22	n-Heptacosane	$C_{27}H_{56}$	0.59	0.46	1.55
23	n-Octacosane	$C_{28}H_{58}$	0.50	0.36	1.21
24	n-Nonacosane	$C_{29}H_{60}$	0.31	0.26	1.11
25	n-Triacontane	$C_{30}H_{62}$	0.25	-	0.69
26	n-Hentriacontane	$C_{31}H_{64}$	0.24	-	0.66
27	n-Dotriacontane	$C_{32}H_{66}$	0.22	-	0.45
28	n-Tritriacontane	$C_{33}H_{68}$	0.18	-	0.33
29	n-Tetratriacontane	$C_{34}H_{70}$	0.13	-	0.24
30	n-Pentatriacontane plus	$C_{35}H_{72}$+	-	-	0.20
Total			100	100	100

2.3. Surfactants

A- Sodium Dodecyl Sulfate

Table 2 *demonstrates osme p*roperties Sodium Dodecyl Sulfate Used in This Study.

Properties	
Chemical formula	$NaC_{12}H_{25}SO_4$
Molar mass	288.372 g/mol
Appearance	white or cream-colored solid
Odor	Odorless
Density	1.01 g/cm^3
Melting point	206 °C (403 °F; 479 K)
Surface tension:	
CMC	8.2 mM at 25 °C
Refractive index (n_D)	1.461

B- Cetyltrimethylammonium Bromide

Table 3 Demonstrates Some Properties Cetyltrimethylammonium Bromide (CTAB)

Properties	
Chemical formula	$C_{19}H_{42}BrN$
Molar mass	364.45 g/mol
Appearance	white powder
Melting point	237 243 °C (459 to 469 °F; 510 to 516 K) (decomposes)

2.4. Experiment Procedures

2.4.1. Preparation of PH

pH Electron Corporation, a device for measuring pH, conductivity and soluble salts was used. Note that the pH of the sample is approximately equal to 10 and reduce the value of pH by adding acid H_2SO_4 to obtain three cases (high, medium, and low).

2.4.2. Preparation of Salinity

The water sample was dilute it by adding distilled water until to get salinity in three cases (high, medium, and low).

2.4.3. Preparation Brine without Surfactant

A. The first test

In this test, 1ml plastic test tubes are used and closed with a silicon (non-thermal) and a tube holder capable of carrying 37 tubes were held them vertically as holder.The Gubaraeunwater samples at thres differensalility were injected using burette at three different types of salinity in the pipes (10, 6 and 4 ppt) and the same procedure was used in the oil injection,but the volume of water and oil is approximately equal in the tube.The pipes were injected with water of Gubaraeun at three different pH numbers (10, 6 and 4) and inject the oil.The tubeswere closed from the top by silicon andkept at room temperature for 24 hours before readings. The sampleswere then putted in the oven at a temperature of 30 ,40 ,50 ,70 $C^0$for 72 hours before changing the temperature.The readings were taken at each temperature.

B. The second test

In this test, the same steps usedin the first test was applied with slightly different.Thermal silicon was used to close the pipes from the top and bottom.

2.4.4. Preparation Brine with Surfactant

A. The third test

In this test, 1 ml glass tubes and thermal silicon were used. The salinity of the water of Gubaraeunwas reduced at salinity (35, 25, 15, 5, 0.5 and 0.1 ppt) using distilled water. It should be noted that the oil density used in this test is lighter than the oil density used in the first and second tests. The surfactant (SDS) was added with different concentrations to water of Gubaraeun.

B. Preparation of surfactant concentrations

In the preparation of the concentrations was adopted on the equation of the weight concentrationand we prepare four different concentrations of the surfactant (0.05%, 0.1%, 0.15% and 0.2%).

0.05%: 0.025g of the surfactant was dissolved in the water of Gubaraeun after dilution of salinity by heated mixer.**0.1%:** 0.05g of the surfactant dissolved in the water of Gubaraeun after dilution of salinity by heated mixer.**0.15%:** 0.075g of the surfactant dissolved in the water of Gubaraeun after dilution of salinity by heated mixer.**0.2%:** 0.1g of the surfactant dissolved in the water of Gubaraeun after dilution of salinity by heated mixer. Each concentration was taken six salinitiesat different water Gubaraeun samples. The dissolved soap (brine solution) with water in the tube at about 4ml and also injected the oil at the same size.The tubes being closed from the top after injection by thermal silicon.Then placed the samples at room temperature for 72 hours and then take readings.Put the samples were put in the oven at 30, 50 and 70˚c degrees so that each temperature was taken 72 hours and then we take readings at each temperature. After reading the samples at 70°C, thenputted the samples in the vibrating water bath at 70°C for 5 hours.After completing the samples in the water bath, we return the samples to the oven at the same temperature 70 for 72 hours and then take readings.

C. The fourth test

In this test being used test tubes with a wider diameter closed from the bottom and with covers from the top. The concentration of surfactant was increased by adding another kind of surfactant (Cetyltrimethylammonium bromide**)**. The concentrations of surfactant dissolved in water diluted salinity in this test were 0.5 %, 1 %, 1.5 % and 2 % depending on the same equation of the weight concentration, and this test we performed the same steps of the third test.

2.5. Oil and Gubaraeun Water with different pH and salinity without Surfactant Results:

Table 4 describes the experimental results and discussion of the current research with different pH and salinity **o**f Gubaraeun water without surfactant.

Table 4 Cases with Different Concentration of pH and Salinity and without Surfactant

Cases	**Salinity**	**pH**
	Ppt	
Case#1	35	4
	25	
	15	
	5	
	0.5	
	0.1	
Case#2	35	7
	25	
	15	
	5	
	0.5	
	0.1	
Case#3	35	10
	25	
	15	
	5	
	0.5	
	0.1	

2.6. Oil and Gubaraeun Water Results (with surfactant):

Table 5 describes the experimental results and discussion of the current research with surfactant. The table 5 two types of surfactants (Surf.#1 is SDS and Surf.#2 is CTAB) at four different concentrations so that each concentration takes six different concentrations of salinity.

Table 5 Cases with Different Concentration ofSurfactant and Salinity.

Cases	Salinity	Surf. Conc. (w/v%)	
	Ppt	**Surf.#1**	**Surf.#2**
Case#1	35	0.05	0.5
	25		
	15		
	5		
	0.5		
	0.1		
Case#2	35	0.1	1.0
	25		
	15		
	5		
	0.5		
	0.1		
Case#3	35	0.15	1.5
	25		
	15		
	5		
	0.5		
	0.1		
Case#4	35	0.2	2
	25		
	15		
	5		
	0.5		
	0.1		

- pH was 10.0 as water samples received

2.7. Mathematical calculations:

Sol .oil= Top of ME – Aqueous Level

Sol. Water = Aqueous Level – Bottom of ME

Oil sol. Ratio=

$$\frac{\text{Sol .oil}}{\text{Total vol} - \text{Aqueous Level}} \text{x } 100$$

Water sol. Ratio=

$$\frac{\text{Sol .Water}}{\text{Total vol} - \text{Aqueous Level}} \text{x } 100$$

Concentration solute (w/v %) = mass of solute (g)/volume of solution (ml) x 100 (1)

1. Results and Discussions

Case#1: Different Salinity with Surf#A 0.05 and Surf#B 0.5.

A- at 12^{o}C

Table 6 the results of the different salinity with Surf#A 0.05 and Surf#B 0.5 at 12^{o}C. It it can be seen, that the aqueous level which water phase (Gubaraeun water and surfactant) was constant (2.5 ml) and the oil level was constant (5 ml) and each phases had 2.5 ml. After 72 hr,there was no change noted to the samples where the brine and the oil inside the tube kept the same size as shown in Figure 13.

Table 6 The Results of Different Salinity with Surf#A 0.05 and Surf#B 0.5 at 12 ^{o}C.

Surf#A. Con	Surf#B. Con	Salinity	At Start of Test		Total Vol.	In Equilibrium		Type	Sol. Oil	Sol. Water	Oil Sol. Ratio	Water Sol. Ratio
			Aqueous Level	Oil Level		Top of ME	Bottom of ME					
wt%		ppt			ml	ml	ml		ml	Ml	ml/ml	ml/ml
0.05	0.5	35	2.5	5	5	0	0	-	0	0	0	0
		25	2.5	5	5	0	0	-	0	0	0	0
		15	2.5	5	5	0	0	-	0	0	0	0
		5	2.5	5	5	0	0	-	0	0	0	0
		0.5	2.5	5	5	0	0	-	0	0	0	0
		0.1	2.5	5	5	0	0	-	0	0	0	0

Figure **17**: The Results of Different Salinity with Surf#A 0.05 and Surf#B 0.5 at 12 ^{o}C.

B- at 30^{o}C

Table 7the results of the different salinity with Surf#A 0.05 and Surf#B 0.5 at 30^{o}C. From this table,it can be seen,the aqueous level which water phase (Gubaraeunwater and surfactant) was constant (2.5 ml) and the oil level was constant (5 ml) and each phases had 2.5 ml. After 72 hr. In the table 7, the amount of water was dissolved at salinity 35 and 25was 0.5ml, salinity 15 ,5 and 0.5 in 0.2 ml and salinity 0.1 in 0.1 ml. These data,it can be assumed that the samples were in the type III (middle-phase microemulsion)where wasType III: three-phase system where a surfactant-rich middle-phase coexists with both excess water and oil surfactant-poor phases.

Table 7 The Results of Different Salinity with Surf#A 0.05 and Surf#B 0.5 at temperature is 30°C.

Surf#A. Con	Surf#B. Con	Salinity	At Start of Test		Total Vol.	In Equilibrium		Type	Sol. Oil	Sol. Water	Oil Sol. Ratio	Water Sol. Ratio
			Aqueous Level	Oil Level		Top of ME	Bottom of ME					
wt%		ppt			ml	ml	ml		ml	Ml	ml/ml	ml/ml
0.05	0.5	35	2.5	5	5	2.6	2	III	0.1	0.5	4	20
		25	2.5	5	5	2.7	2	III	0.2	0.5	8	20
		15	2.5	5	5	2.6	2.3	III	0.1	0.2	4	8
		5	2.5	5	5	2.6	2.3	III	0.1	0.2	4	8
		0.5	2.5	5	5	2.6	2.3	III	0.1	0.2	4	8
		0.1	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4

Figure14 the results of the different salinity with Surf#A 0.05 and Surf#B 0.5 at 30 °C. From this Figure, it can be assumed that the samples in the third phase and that depending on the color. It can be noted that that the oil was black and brine was an aqueous color and Microemulsion It was a golden color.

Figure **18:** The Results of Different Salinity with Surf#A 0.05 and Surf#B 0.5 at 30°C.

Figure15as an example of the results of salinity was 25 with Surf#A 0.05 and Surf#B 0.5 at 30^{o}C. The Figure formation of Microemulsion when salinity 25ppt and concentration with Surf#A 0.05 and Surf#B 0.5). Figure15, the solubilization ratio plot,it can be seen, theoptimum salinity of this case was range between 18 and 22 ppt, with the solubilization ratio for water was 2.3 ml/ml and for oil was oil was 11 ml/ml. The good middle phase type-III microemulsion occurred in the range of 18 to 22 ppt.

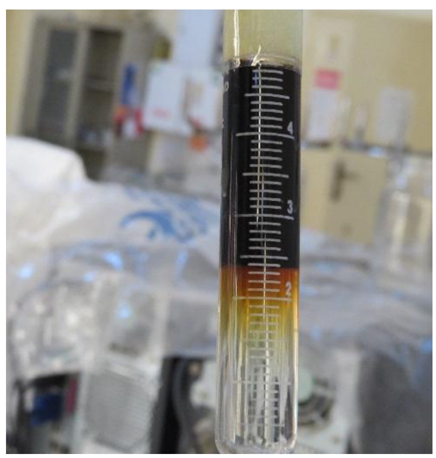

Figure19: Example of The Results of Salinity was 25 with Surf#A 0.05 and Surf#B 0.5 at 30 ^{o}C

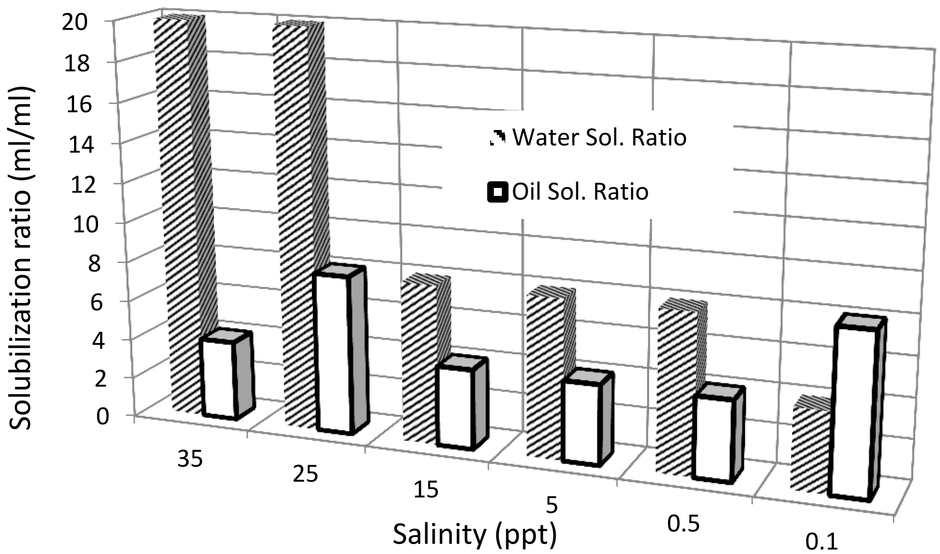

Figure **20:** Solubilization Ratio Plot Results Of Different Salinity With Surf#A 0.05 And Surf#B 0.5 At 30 ^{O}C.

C- at 50^{o}C

Table 8that the results of the different salinity with Surf#A 0.05 and Surf#B 0.5 at 50^{o}C. It it can be seen, that the aqueous level which water phase (Gubaraeunwater and surfactant) was constant (2.5 ml) and the oil level was constant (5 ml) and each phases has 2.5 ml. After 72 hr, in the table, the amount of water dissolved at salinity 35 and 25 was 0.7 ml and salinity 15, 5, 0.5 and 0.1 was 0.1 ml. Through these data we assumed that the samples were in the type III (middle-phase microemulsion).

Table 8 The Results of Different Salinity with Surf#A 0.05 andSurf#B 0.5 at 50 ^{o}C.

Surf#A.Con	Surf#B.Con	Salinity	At Start of Test		TotalVol.	In Equilibrium		Type	Sol. Oil	Sol.Water	Oil Sol. Ratio	Water Sol. Ratio
			Aqueous Level	Oil Level		Top of ME	Bottom of ME					
wt%		ppt			ml	ml	ml		ml	Ml	ml/ml	ml/ml
0.05	0.5	35	2.5	5	5	2.6	1.8	III	0.1	0.7	4	28
		25	2.5	5	5	2.7	1.8	III	0.2	0.7	8	28
		15	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		5	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		0.5	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		0.1	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4

*ME: micro-emulation

Figure16 the results of the different salinity with Surf#A 0.05 and Surf#B 0.5 at 50^{o}C. Itit can be seen,that the microemulsion at 50°C was higher than at 30°C. Figure17that the solubilization ratio plot results of different salinity with Surf#A 0.05 and Surf#B 0.5 at 50^{o}C.

Figure 21: The Results of Different Salinity with Surf#A 0.05 and Surf#B 0.5 at 50 ^{o}C.

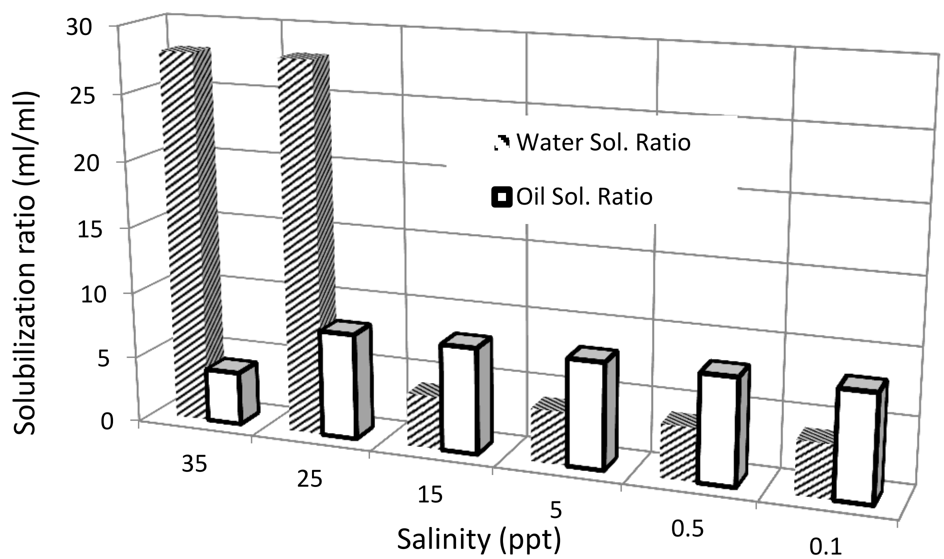

Figure **22**: Solubilization Ratio Plot Results of Different Salinity with Surf#A 0.05 and Surf#B 0.5 at 50^{o}C.

D-at 70^{o}C

Table 9that the results of the different salinity with Surf#A 0.05 and Surf#B 0.5 at 70^{o}C. It it can be seen,that the aqueous level which water phase (Gubaraeun water and surfactant) was constant (2.5 ml) and the oil level was constant (5 ml) and each phases has 2.5 ml. After 72 hr, in the table, the amount of water dissolved at salinity 35 was 0.3 ml and salinity 25, 15,5, 0.5 and 0.1 was 0.1 ml, it can be assumed that the samples were was in the typeIII(middle-phase microemulsion).

Table 9 The Results of Different Salinity with Surf#A 0.05 and Surf#B 0.5 at 70°C.

Surf#A.Con	Surf#B.Con	Salinity	At Start of Test: Aqueous Level	At Start of Test: Oil Level	Total Vol.	In Equilibrium: Top of ME	In Equilibrium: Bottom of ME	Type	Sol. Oil	Sol. Water	Oil Sol. Ratio	Water Sol. Ratio
wt%		ppt			ml	ml	ml		ml	ml	ml/ml	ml/ml
0.05	0.5	35	2.5	5	5	2.7	2.2	III	0.2	0.3	8	12
		25	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		15	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		5	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		0.5	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		0.1	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4

Figure18that the results of the different salinity with Surf#A 0.05 and Surf#B 0.5 at 70°C. Itit can be seen, the color of the brine acquired the golden color and the mixing layer was dark gold and oil was black-colored.It was also noted that the brine acquired a golden color due to the decomposition of some heavy material to the oil in brine. Figure19 that the solubilization ratio plot results of different salinity with Surf#A 0.05 and Surf#B 0.5 at 70°C.

Figure **23**: The Results of Different Salinity with Surf#A 0.2 and Surf#B 2 at 70 ^{o}C.

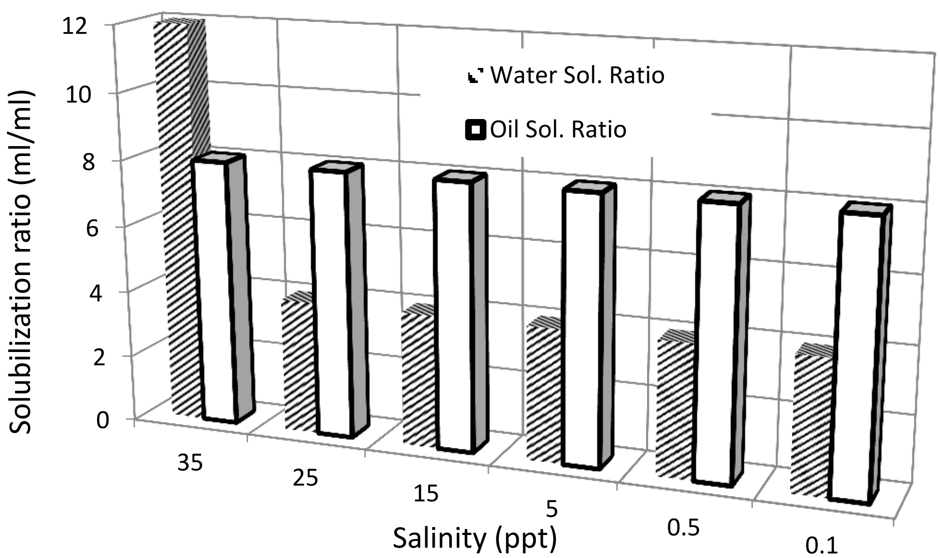

Figure 24:Solubilization Ratio Plot Results of Different Salinity with Surf#A 0.05 and Surf#B 0.5 at 70^{o}C.

Case#2: Different Salinity with Surf#A 0.1 and Surf#B 1.

A-at 12^{o}C

At this temperature, the aqueous level which water phase (Gubaraeun water and surfactant) was constant (2.5ml), the oil level was constant (5ml) and each phases had 2.5ml. After 72 hr, it was noticedthere was no change to the samples where the brine and the oil inside the tube kept at the same size. The microemulsion were not formed in this case.

B- at 30^{o}C

Table 10that the results of the different salinity with Surf#A 0.1 and Surf#B 1 at 30^{o}C. It it can be seen, the aqueous level which water phase (Gubaraeun water and surfactant) was constant (2.5ml) and the oil level was constant (5ml) and each phases had 2.5ml). After 72 hr, in the table, the amount of water was dissolved at salinity 35 ,15 ,5 and 0.5 in 0.4 ml and salinity 25ppt in 0.5 ml, and 0.1pptwas 0.3 ml. It can be assumed that the samples were in the type III(middle-phase microemulsion).

Table 10 The Results of Different Salinity with Surf#A 0.01 and Surf#B 1 at 30 ^{o}C.

			At Start of Test			In Equilibrium						
Surf#A.Con	**Surf#B.Con**	**Salinity**	**Aqueous Level**	**Oil Level**	**Total Vol.**	**Top of ME**	**Bottom of ME**	**Type**	**Sol. Oil**	**Sol. Water**	**Oil Sol. Ratio**	**Water Sol. Ratio**
wt%		**ppt**			**ml**	**Ml**	**ml**		**ml**	**ml**	**ml/ml**	**ml/ml**
0.1	**1**	**35**	**2.5**	**5**	**5**	**2.7**	**2.1**	**III**	**0.2**	**0.4**	**8**	**16**
		25	**2.5**	**5**	**5**	**2.6**	**2**	**III**	**0.1**	**0.5**	**4**	**20**
		15	**2.5**	**5**	**5**	**2.6**	**2.1**	**III**	**0.1**	**0.4**	**4**	**16**
		5	**2.5**	**5**	**5**	**2.7**	**2.1**	**III**	**0.2**	**0.4**	**8**	**16**
		0.5	**2.5**	**5**	**5**	**2.7**	**2.1**	**III**	**0.2**	**0.4**	**8**	**16**
		0.1	**2.5**	**5**	**5**	**2.7**	**2.2**	**III**	**0.2**	**0.3**	**8**	**12**

Figure20 the results of the different salinity with Surf#A 0.1 and Surf#B 1 at30^{o}C. From this Figure, it can be assumed that the samples in the third phase and that depending on the color. It can be noted that the oil was black and brine was aqueous color and microemulsion. It was a golden color. Figure21that the solubilization ratio plot results of different salinity with Surf#A 0.1 and Surf#B 1 a 30^{o}C.

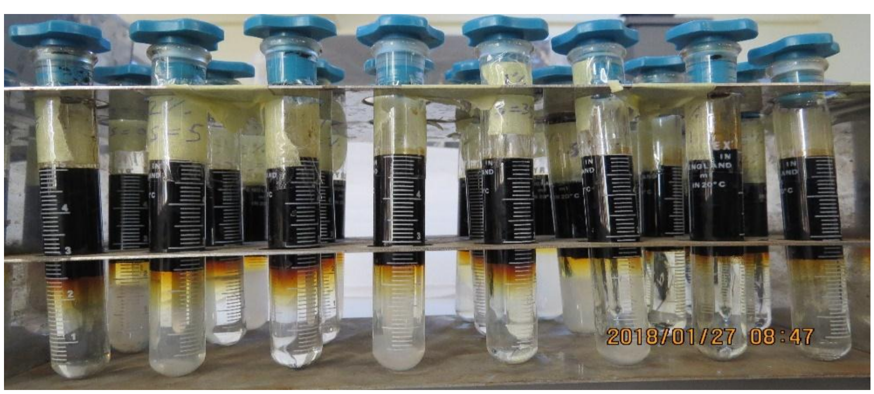

Figure 25: The Results of Different Salinity with Surf#A 0.1 and Surf#B 1 at 30 ^{o}C.

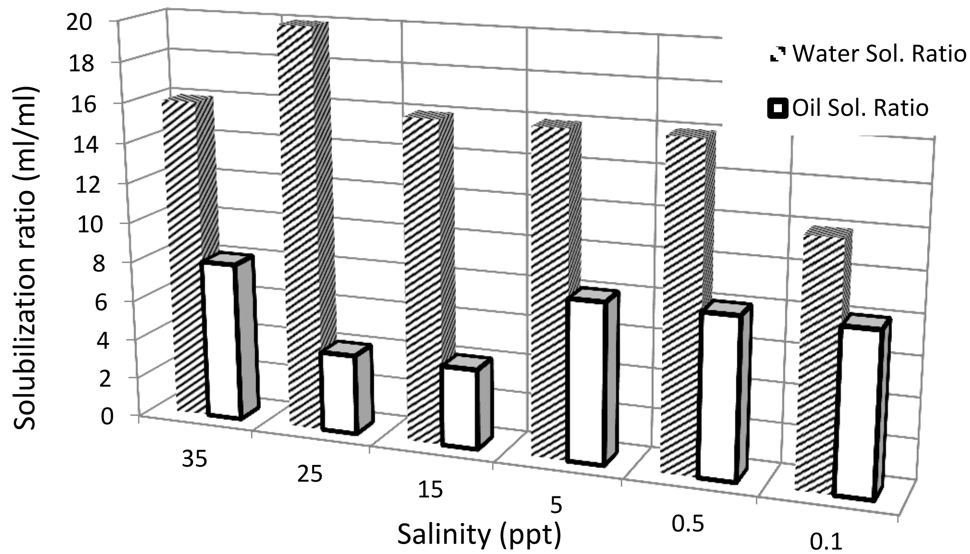

Figure 26:Solubilization Ratio Plot Results of Different Salinity with Surf#A 0.1 and Surf#B 1 at 30 ^oC.

C- at 50^{o}C

Table 11that the results of the different salinity with Surf#A 0.1 and Surf#B 1 at 50 ^oC. From this table,itit can be seen,that the aqueous level which water phase (Gubaraeun water and surfactant) was constant (2.5 ml) and the oil level was constant (5 ml) and each phases had 2.5 ml. After 72 hr, in the table, the amount of water dissolved at salinity 35 was 0.9 ml and salinity 25 was 1.1 ml and salinity 15 was 0.7 ml and salinity 5, 0.5 and 0.1 ppt in 0.1 ml. Through these data,it can be assumed that the samples were in the type III(middle-phase microemulsion).

Table 11 The Results of Different Salinity with Surf#A 0.1 and Surf#B 1 at 50°C.

Surf#A.Con	Surf#B.Con	Salinity	At Start of Test		Total Vol.	In Equilibrium		Type	Sol. Oil	Sol. Water	Oil Sol. Ratio	Water Sol. Ratio
			Aqueous Level	Oil Level		Top of ME	Bottom of ME					
wt%		ppt			ml	ml	ml		ml	ml	ml/ml	ml/ml
0.1	1	35	2.5	5	5	2.7	1.6	III	0.2	0.9	8	36
		25	2.5	5	5	2.6	1.4	III	0.1	1.1	4	44
		15	2.5	5	5	2.6	1.8	III	0.1	0.7	4	28
		5	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		0.5	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		0.1	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4

Figure22 the results of the different salinity with Surf#A 0.1 and Surf#B 1 at 50 °C. From this Figure, it can be seen, the microemulsion at 50°C was higher than at 30°C. In this concentration, however, we note that when salinity was high, such as 35, 25 and 15, the mixing layer was larger than that of low salinity. Figure23 the solubilization ratio plot results of different salinity with Surf#A 0.1 and Surf#B 1 at 50 °C.

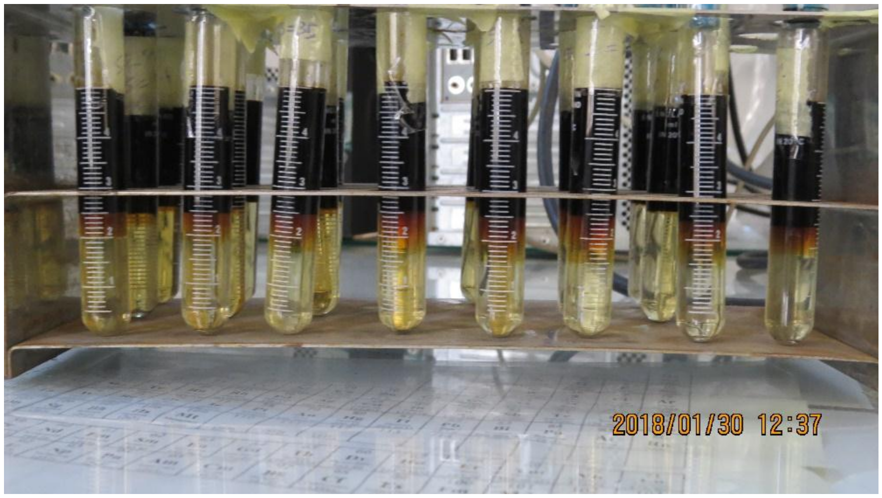

Figure 27: The Results of Different Salinity with Surf#A 0.1 and Surf#B 1 at 50 °C.

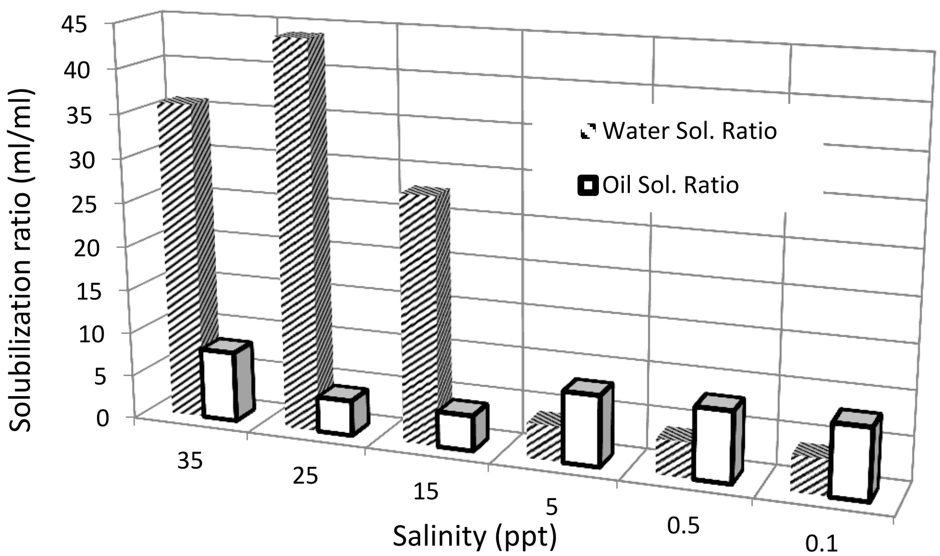

Figure 28: Solubilization Ratio Plot Results of Different Salinity with Surf#A 0.1 and Surf#B 1 at 50°C.

D- at 70°C

Table 12that the results of the different salinity with Surf#A 0.1 and Surf#B 1 at 70°C. From thwas table, it it can be seen, the aqueous level which water phase (Gubaraeunwater and surfactant) was constant

(2.5 ml) and the oil level was constant (5 ml) and each phases has 2.5 ml. After 72 hr, in the table it was noted that the amount of water dissolved at salinity 35 is 0.6 ml and salinity 25 was 0.9 ml and salinity 15,5, 0.5 and 0.1 was 0.1 ml. Through these data can be assumed that the samples were in the type III(middle-phase microemulsion).

Table 12 The Results of Different Salinity with Surf#A 0.1 and Surf#B 1 at 70°C.

Surf#A.Con	Surf#B.Con	Salinity	At Start of Test		Total Vol.	In Equilibrium		Type	Sol. Oil	Sol. Water	Oil Sol. Ratio	Water Sol. Ratio
			Aqueous Level	Oil Level		Top of ME	Bottom of ME					
wt%		ppt			ml	ml	ml		ml	ml	ml/ml	ml/ml
0.1	1	35	2.5	5	5	2.7	1.9	III	0.2	0.6	8	24
		25	2.5	5	5	2.7	1.6	III	0.2	0.9	8	36
		15	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		5	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		0.5	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		0.1	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4

Figure24 the results of the different salinity with Surf#A 0.1 and Surf#B 1 at 70°C. From this Figure, it can be seen,through the picture we note that the brine acquired a golden color due to the decomposition of some heavy material to the oil in brine. Figure25that the solubilization ratio plot results of different salinity with Surf#A 0.1 and Surf#B 1 at 70^{o}C.

Figure 29: The Results of Different Salinity with Surf#A 0.1 and Surf#B 1 at70^{o}C.

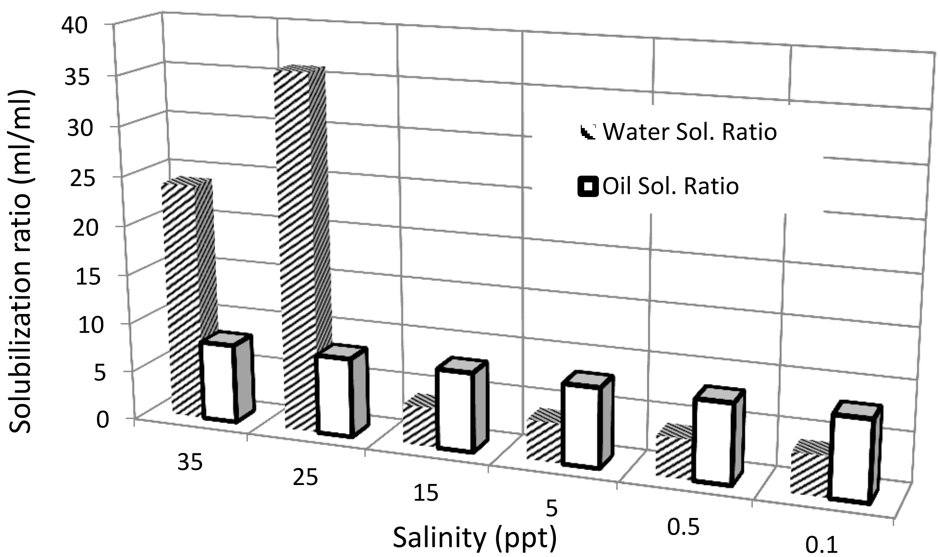

Figure 30: Solubilization Ratio Plot Results of Different Salinity with Surf#A 0.1 and Surf#B 1 at 70^{o}C.

Case#3: Different Salinity with Surf#A 0.15 and Surf#B 1.5

A- at 12^{o}C

At this temperature, the aqueous level which water phase (Gubaraeun water and surfactant) was constant (2.5 ml) and the oil level was constant (5 ml) and each phases has 2.5 ml. After 72 hr, there was no change to the samples where the brine and the oil inside the tube kept the same size. The Microemulsion were not formed in this case.

B- at 30^{o}C

Table 13that the results of the different salinity with Surf#A 0.15 and Surf#B 1.5 at 30^{o}C. From this table,it it can be seen, the aqueous level which water phase (Gubaraeun water and surfactant) was constant (2.5 ml) and the oil level was constant (5 ml) and each phases had 2.5 ml. After 72 hr, in the table, the amount of water was dissolved at salinity 35, 15 and 0.1pptwas 0.3 ml and salinity 25 ,5and0.5was 0.4ml.Through these data, it can be assumed that the samples were in the type III(middle-phase microemulsion).

Table 13 The Results of Different Salinity with Surf#A 0.15 and Surf#B 1.5 at 30°C.

Surf#A.Con	Surf#B.Con	Salinity	At Start of Test		Total Vol.	In Equilibrium		Type	Sol. Oil	Sol. Water	Oil Sol. Ratio	Water Sol. Ratio
			Aqueous Level	Oil Level		Top of ME	Bottom of ME					
wt%		ppt			ml	ml	ml		ml	ml	ml/ml	ml/ml
0.15	1.5	35	2.5	5	5	2.7	2.2	III	0.2	0.3	8	12
		25	2.5	5	5	2.6	2.1	III	0.1	0.4	4	16
		15	2.5	5	5	2.7	2.2	III	0.2	0.3	8	12
		5	2.5	5	5	2.7	2.1	III	0.2	0.4	8	16
		0.5	2.5	5	5	2.6	2.1	III	0.1	0.4	4	16
		0.1	2.5	5	5	2.7	2.2	III	0.2	0.3	8	12

Figure26that the results of the different salinity with Surf#A 0.15 and Surf#B 1.5 at 30°C. From this Figure, it can beassumed that the samples in the third phase and that depending on the color. It was also noted that the oil was black and brine was a aqueous color and Microemulsion. It was a golden color. Figure27 the solubilization ratio plot results of different salinity with Surf#A 0.1 and Surf#B 1 at 30°C.

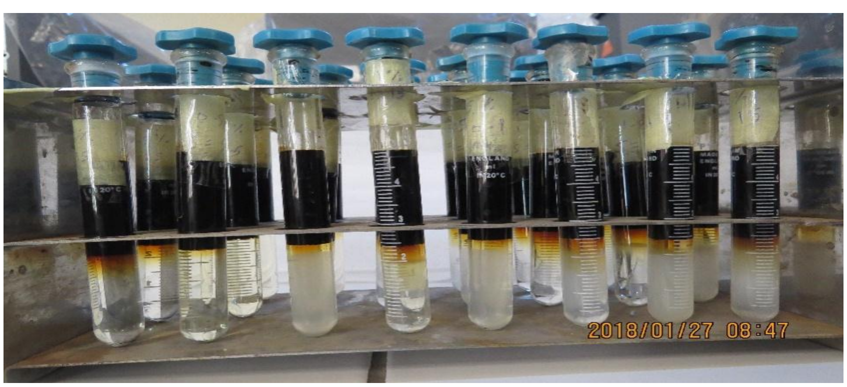

Figure 31:The Results of Different Salinity with Surf#A 0.15 and Surf#B 1.5 at 30 °C.

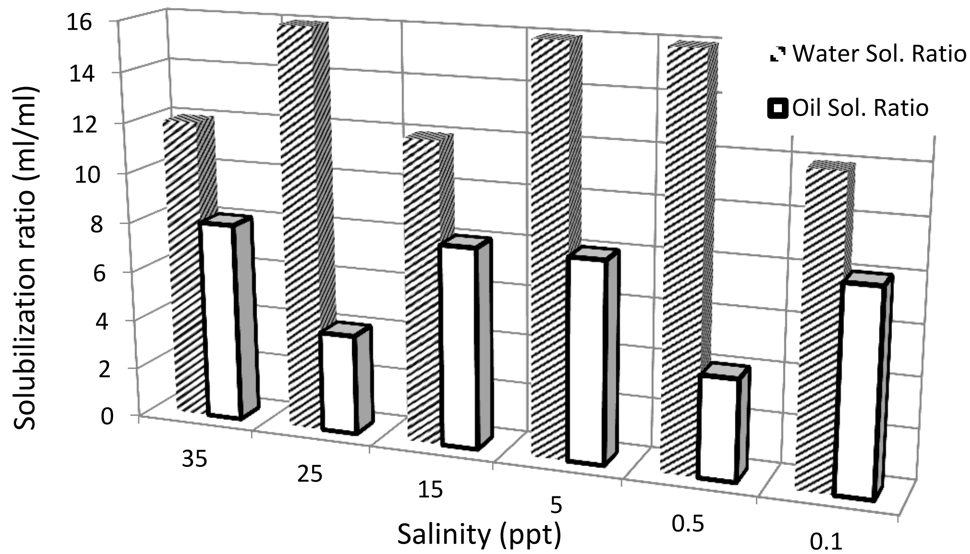

Figure 32:*S*olubilization Ratio Plot Results of Different Salinity with Surf#A 0.15 and Surf#B 1.5 at 30^{o}C.

C- at 50^{o}C

Table 14 the results of the different salinity with Surf#A 0.15 and Surf#B 1.5 at 50^{o}C. From this table,it it can be seen, the aqueous level which water phase (Gubaraeunwater and surfactant) was constant (2.5 ml) and the oil level was constant (5 ml) and each phases had 2.5 ml. After 72 hr, in the table it can be amount of water dissolved at salinity 35 was 1 ml, salinity 25 was 1.2 ml, salinity 15 was 0.5 ml , salinity 5 was 0.3ml ,salinity 0.5 was 0.2ml and salinity 0.1 was 0.1 ml.

Table 14 The Results of Different Salinity with Surf#A 0.15 and Surf#B 1.5 at 50^{o}C.

Surf#A.Con	Surf#B.Con	Salinity	At Start of Test		Total Vol.	In Equilibrium		Type	Sol. Oil	Sol. Water	Oil Sol. Ratio	Water Sol. Ratio
			Aqueous Level	Oil Level		Top of ME	Bottom of ME					
wt%		ppt			ml	ml	ml		ml	ml	ml/ml	ml/ml
0.15	1.5	35	2.5	5	5	2.7	1.5	III	0.2	1	8	40
		25	2.5	5	5	2.7	1.3	III	0.2	1.2	8	48
		15	2.5	5	5	2.7	2	III	0.2	0.5	8	20
		5	2.5	5	5	2.7	2.2	III	0.2	0.3	8	12
		0.5	2.5	5	5	2.7	2.3	III	0.2	0.2	8	8
		0.1	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4

Figure28 the results of the different salinity with Surf#A 0.15 and Surf#B 1.5 at 50^{o}C. From this Figure, it it can be seen, in this concentration, however, it can be noted that when salinity was high, such as 35, 25and15, the mixing layer was larger than that of low salinity. Figure29 the solubilization ratio plot results of different salinity with Surf#A 0.15 and Surf#B 1.5 at 50^{o}C.

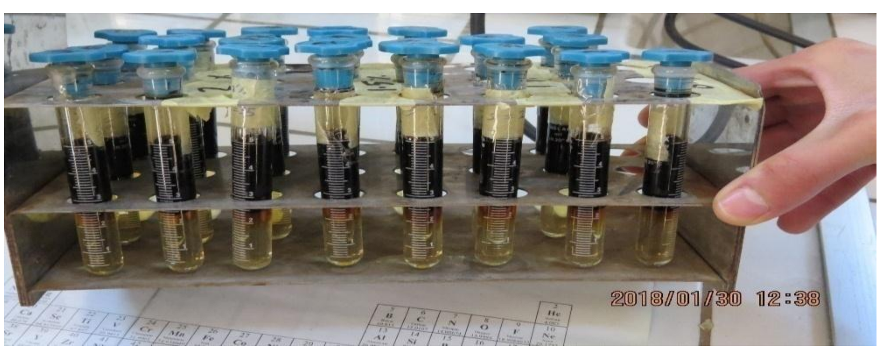

Figure 33:The Results of Different Salinity with Surf#A 0.15 and Surf#B 1.5 at 50^{o}C.

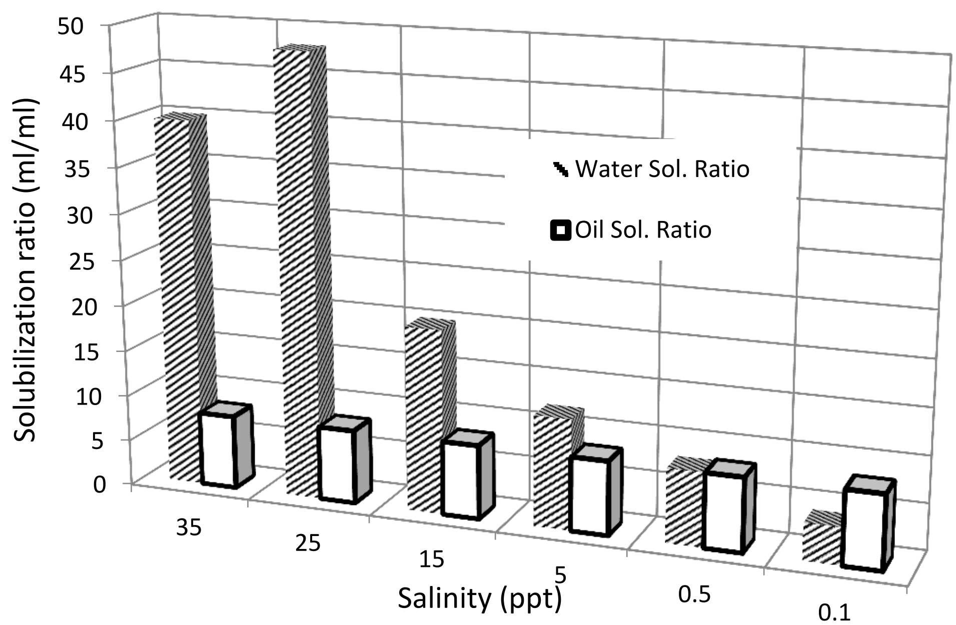

Figure 34: Solubilization Ratio Plot Results of Different Salinity with Surf#A 0.15 and Surf#B 1.5 at 50^{o}C.

D-at 70^{o}C

Table 15 the results of the different salinity with Surf#A 0.15 and Surf#B 1.5 at 70^{o}C. From this table,it it can be seen,that the aqueous level which water phase (Gubaraeunwater and surfactant) was constant (2.5 ml) and the oil level was constant (5 ml) and each phases has 2.5 ml. After 72 hr, in the table, the amount of water dissolved at salinity 35 was 0.8 ml , salinity 25 was 1.1 ml and salinity 15,5 , 0.5 and 0.1 was 0.1 ml.

Table 15 The Results of Different Salinity with Surf#A 0.15 and Surf#B 1.5 at 70°C.

Surf#A.Con	Surf#B.Con	Salinity	At Start of Test		Total Vol.	In Equilibrium		Type	Sol. Oil	Sol. Water	Oil Sol. Ratio	Water Sol. Ratio
			Aqueous Level	Oil Level		Top of ME	Bottom of ME					
wt%		Ppt			ml	ml	ml		ml	ml	ml/ml	ml/ml
0.15	1.5	35	2.5	5	5	2.7	1.7	III	0.2	0.8	8	32
		25	2.5	5	5	2.7	1.4	III	0.2	1.1	8	44
		15	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		5	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		0.5	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		0.1	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4

Figure31that the results of the different salinity with Surf#A 0.15 and Surf#B 1.5 at 70°C. From this Figure, it can be noted that the brine acquired a golden color due to the decomposition of some heavy material to the oil in brine. Figure32 was noted that the solubilization ratio plot results of different salinity with Surf#A 0.15 and Surf#B 1.5 at 70 °C.

Figure 35: The Results of Different Salinity with Surf#A 0.15 and Surf#B 1.5 at 70°C.

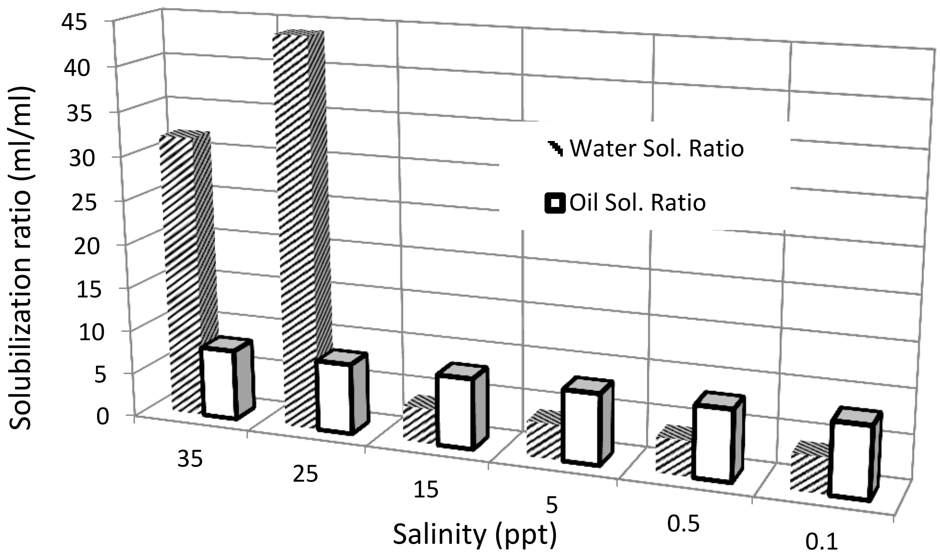

Figure 36: Solubilization Ratio Plot Results of Different Salinity with Surf#A 0.15 and Surf#B 1.5 at 70 ^{o}C.

Case#4: Different Salinity with Surf#A 0.2 and Surf#B 2.

A- at 12^{o}C

At this temperature, the aqueous level which water phase (gaberoun water and surfactant) was constant (2.5 ml) and the oil level was constant (5 ml) and each phases has 2.5 ml. After 72 hr, there was no change to the samples where the brine and the oil inside the tube kept the same size. The Microemulsionwere not formed in this case.

B-at 30 ^{o}C

Table 16that the results of the different salinity with Surf#A 0.2 and Surf#B 2 at 30^{o}C. From this table, it can be seen, the aqueous level which water phase (Gubaraeun water and surfactant) was constant (2.5 ml) and the oil level was constant (5 ml) and each phases has 2.5 ml. After 72 hr, in the table it was noted that the amount of water dissolved at salinity 35 , salinity 25 was0.5 ml , salinity 15 ,5 and 0.5 was 0.4 ml and salinity 0.1 was 0.3 ml.Through these data we assumed that the samples were in the type III(middle-phase microemulsion).

Table 16 The Results of Different Salinity with Surf#A 0.2 and Surf#B 2 at 30 ^{o}C.

Surf#A.Con	Surf#B.Con	Salinity	At Start of Test		Total Vol.	In Equilibrium		Type	Sol. Oil	Sol. Water	Oil Sol. Ratio	Water Sol. Ratio
			Aqueous Level	Oil Level		Top of ME	Bottom of ME					
wt%		ppt			ml	ml	ml		ml	ml	ml/ml	ml/ml
0.2	2	35	2.5	5	5	2.7	2	III	0.2	0.5	8	20
		25	2.5	5	5	2.6	2	III	0.1	0.5	4	20
		15	2.5	5	5	2.6	2.1	III	0.1	0.4	4	16
		5	2.5	5	5	2.6	2.1	III	0.1	0.4	4	16
		0.5	2.5	5	5	2.6	2.1	III	0.1	0.4	4	16
		0.1	2.5	5	5	2.6	2.2	III	0.1	0.3	4	12

Figure33that the results of the different salinity with Surf#A 0.2 and Surf#B 2 at 30^{o}C. From this Figure, it can be assumed that the samples in the third phase and that depending on the color. It can be noted that that the oil was black and brine was a aqueous color and Microemulsion It was a golden color. Note at this concentration the increase in the mixing layer. Figure34, the solubilization ratio plot results of different salinity with Surf#A 0.2 and Surf#B 2 at 30 °C.

Figure 37:The Results of Different Salinity with Surf#A 0.2 and Surf#B 2 at 30 °C.

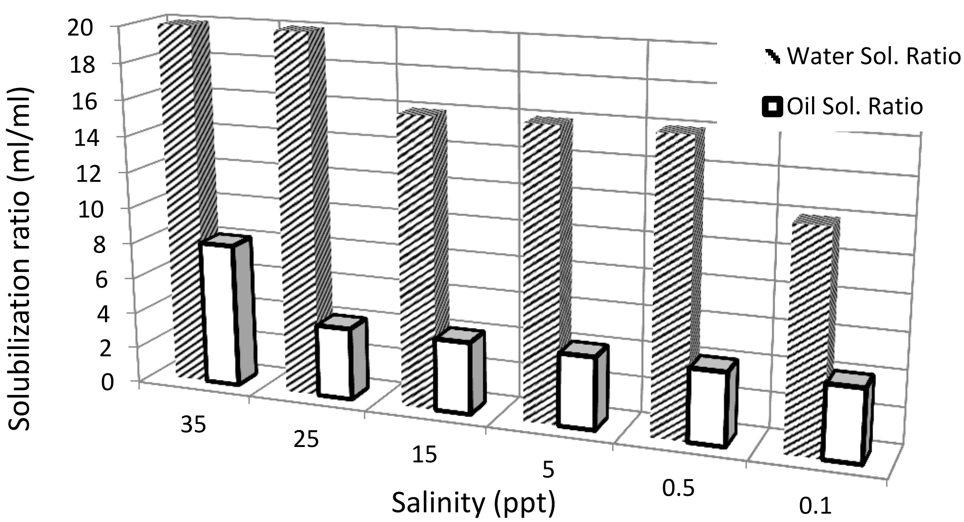

Figure 38: Solubilization Ratio Plot Results of Different Salinity with Surf#A 0.15 and Surf#B 1.5 at 30 °C.

C- at 50 ^{o}C

Table 17 the results of the different salinity with Surf#A 0.2 and Surf#B 2 at 50 ^{o}C. From this table, we can seen the aqueous level which water phase (Gubaraeun water and surfactant) was constant (2.5 ml) and the oil level was constant (5 ml) and each phases has 2.5 ml. After 72 hr, in the table it was noted that the amount of water dissolved at salinity 35 was 0.9 ml, salinity 25 was 1 ml , salinity 15 was 0.7 ml , salinity 5 was 0.3ml ,salinity 0.5 was 0.4ml and salinity 0.1 was 0.2 ml.

Table 17 The Results of Different Salinity with Surf#A 0.2 and Surf#B 2at 50 ^{o}C.

Surf#A.Con	Surf#B.Con	Salinity	At Start of Test		Total Vol.	In Equilibrium		Type	Sol. Oil	Sol. Water	Oil Sol. Ratio	Water Sol. Ratio
			Aqueous Level	Oil Level		Top of ME	Bottom of ME					
wt%		ppt			ml	ml	ml		ml	ml	ml/ml	ml/ml
0.2	2	35	2.5	5	5	2.7	1.6	III	0.2	0.9	8	36
		25	2.5	5	5	2.6	1.5	III	0.1	1	4	40
		15	2.5	5	5	2.7	1.8	III	0.2	0.7	8	28
		5	2.5	5	5	2.7	2.2	III	0.2	0.3	8	12
		0.5	2.5	5	5	2.6	2.1	III	0.1	0.4	4	16
		0.1	2.5	5	5	2.6	2.3	III	0.1	0.2	4	8

Figure35, the results of the different salinity with Surf#A 0.2 and Surf#B 2 at 50 ^{o}C. From this Figure, it can be seen, from this Figure, it can be seen, the microemulsion at 50 ° C was higher than at 30 ° C. Figure36 the solubilization ratio plot results of different salinity with Surf#A 0.2 and Surf#B 2 at 50 ^{o}C.

Figure 39:The Results of Different Salinity with Surf#A 0.2 and Surf#B 2 at 50 ^{o}C.

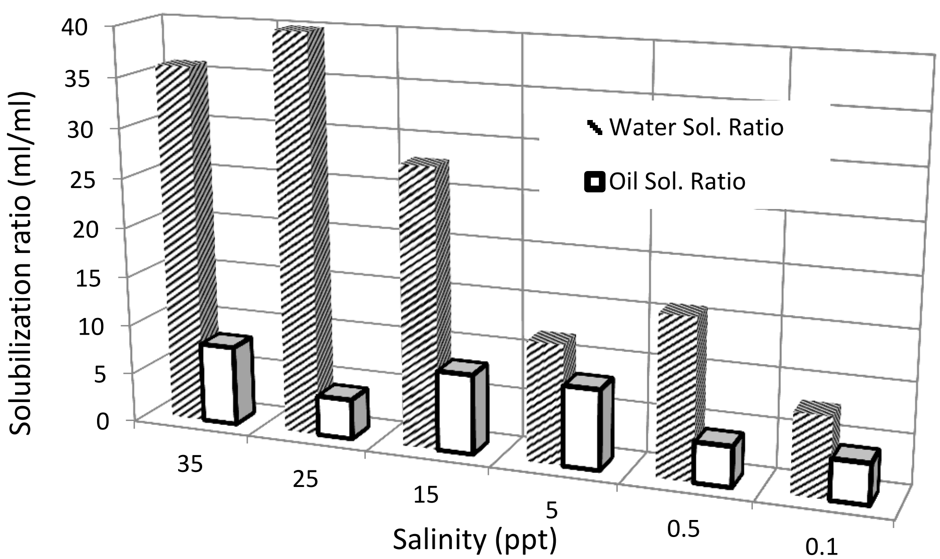

Figure 40:Solubilization Ratio Plot Results of Different Salinity with Surf#A 0.15 and Surf#B 1.5 at 50 ^{o}C.

D- at 70 ^{o}C

Table 18 the results of the different salinity with Surf#A 0.2 and Surf#B 2 at 70 ^{o}C. From this table, it can be seen, the aqueous level which water phase (Gubaraeun water and surfactant) was constant (2.5 ml) and the oil level was constant (5 ml) and each phases has 2.5 ml. After 72 hr, in the table it was noted that the amount of water dissolved at salinity 35 was 0.9 ml , salinity 25 was 1.1 ml , salinity 15 was 0.8 ml and salinity 5 , 0.5 and 0.1 was 0.1 ml.

Table 18 The Results of Different Salinity with Surf#A 0.2 and Surf#B 2 at 70 ^{o}C.

Surf#A.Con	Surf#B.Con	Salinity	At Start of Test		Total Vol.	In Equilibrium		Type	Sol. Oil	Sol. Water	Oil Sol. Ratio	Water Sol. Ratio
			Aqueous Level	Oil Level		Top of ME	Bottom of ME					
wt%		ppt			ml	ml	ml		ml	ml	ml/ml	ml/ml
0.2	2	35	2.5	5	5	2.7	1.6	III	0.2	0.9	8	36
		25	2.5	5	5	2.7	1.4	III	0.2	1.1	8	44
		15	2.5	5	5	2.7	1.7	III	0.2	0.8	8	32
		5	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		0.5	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4
		0.1	2.5	5	5	2.7	2.4	III	0.2	0.1	8	4

Figure37, the results of the different salinity with Surf#A 0.2 and Surf#B 2 at 70 ^{o}C. From this Figure, it can be seen,through the picture we note that the brine acquired a golden color due to the decomposition of some heavy material to the oil in brine. Figure38, the solubilization ratio plot results of different salinity with Surf#A 0.2 and Surf#B 2 at 70 ^{o}C.

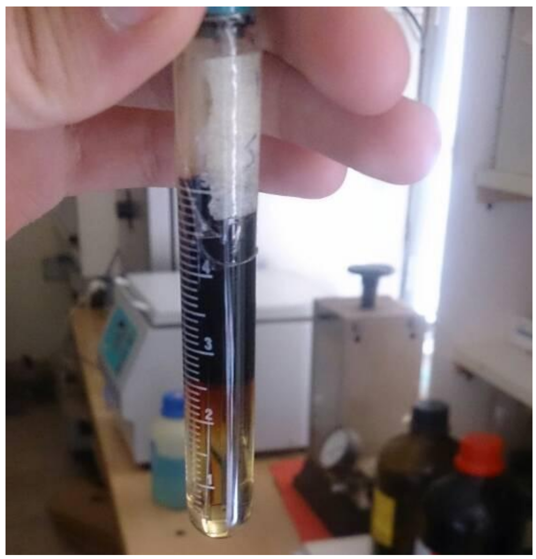

Figure 41: The Results of Different Salinity with Surf#A 0.2 and Surf#B 2 at 70 ^{o}C.

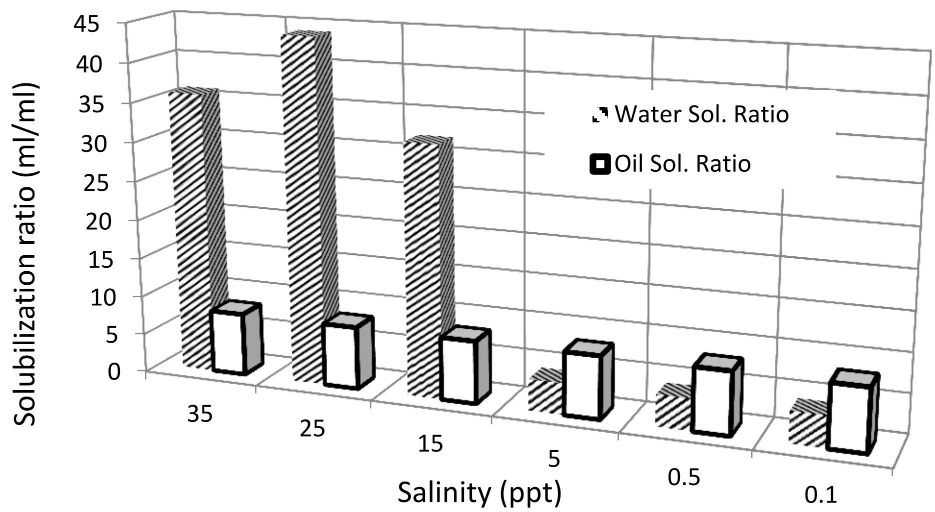

Figure 42:Solubilization Ratio Plot Results of Different Salinity with Surf#A 0.15 and Surf#B 1.5 at 70 ^{o}C.

After 48 hours of setting the samples in the oven at 70 ° C we noticed that the low salinity samples did not have a blending layer and the brine obtained the golden color for all concentrations and samples with high salinity. The blending layer was higher than in previous temperatures

Conclusion

When the concentration of the surfactant andsalinity of water washigh, the blending layer will be greaterNoticed that the best composition of the blending layer was at 50 C^0 temperature for all concentrations where the oil retained its black color and brine with a watery color with an increase in the blending layer which kept the golden color

Assumed through the fourth test that the samples took the third phase (the type III(middle-phase microemulsion)) we relied heavily on color. After 48 hours of setting the samples in the oven at 70 ° C, observed that the low salinity samples of all concentrations obtained the brine of the golden color while the high salinity samples kept brine on the water color and assumed that the salt in the water obstructed the descent of heavy oil compounds.

Recommendation

1. Take cwere of the use of safety equipment while doing work inside the laboratory such as glasses, jumps, muzzle and coat to avoid touching or inhaling any toxic chemicals.
2. Give sufficient time for the samples inside the oven (72 hours at least).
3. Sometimes we heat the oil before injection to become easy injection into the tube and to avoid the adhesion of some oil droplets that may be stuck on the wall of the tube.
4. In the pipes with the small diameter not closed from the bottom and the top should be closed well from the bottom before injection to avoid leakage of brine solution and also from the top after injection to avoid evaporation of oil.
5. Use glass tubes instead of plastics because plastic tubes were affected by high temperature such as 50 and 70 ˚C.
6. It is recommended that the size of brine and oil is equal in the tube, which helps in taking the reading.
7. It is preferable to use pipes with a wider diameter, allowing for easy injection, shaking and reading

8. When heating a brine solution, it is preferable to use glass flasks instead of plastic to withstand the temperature
9. Allow enough time to dissolve the surfactant in the water in the mixer (from 3 to 5 hours) and also do not increase the speed of the mixer during melting to avoid the foam formation
10. It is preferable to heat a brine solution containing a high concentration of surfactant during the mixing process to avoid any deposits at the bottom of the tube.

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