Appendix

Basic Data of Chapter II A

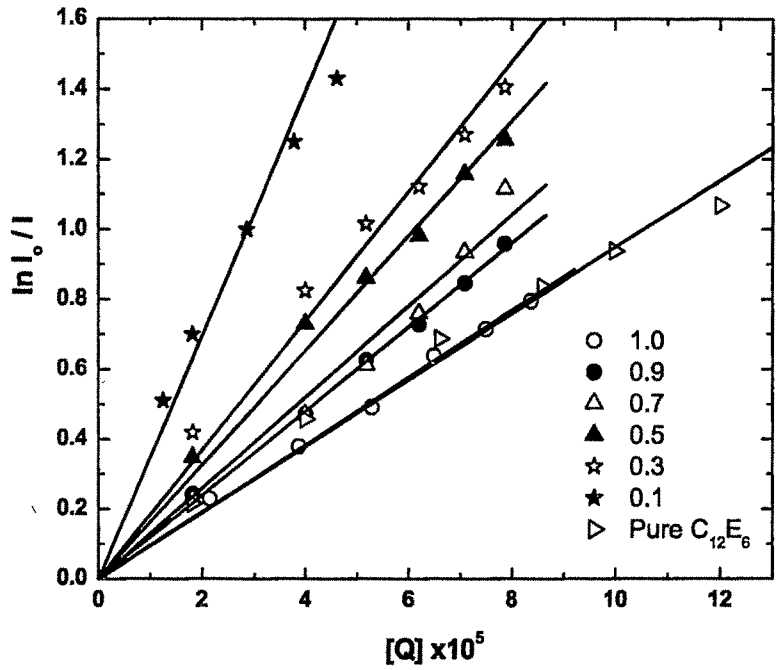

Figure II A. 1 plot of concentration of quencher [Q] *vs.* In I_o/I for different mixed systems 16-4-16,2Br$^-$:$C_{12}E_6$ at 25°C.

TABLE II A. 1 Activity Coefficient Values (f_1 and f_2) of 16-4-16:$C_{12}E_6$ Mixed Surfactant Systems in Aqueous Medium at Different Temperatures.

X $C_{12}E_6$	Activity coefficient (f_1) 16-4-16		
	303	308	313 K
0.9	0.053 (0.024)	0.059 (0.017)	0.057 (0.190)
0.7	0.165 (0.024)	0.135 (0.015)	0.126 (0.013)
0.5	0.101 (0.005)	0.098 (0.005)	0.111 (0.007)
0.3	0.244 (0.007)	0.247 (0.008)	0.198 (0.006)
0.1	0.178 (0.002)	0.125 (0.002)	0.137 (0.012)

Values in parenthesis are f_2 i.e. activity coefficient of Nonionic Surfactant

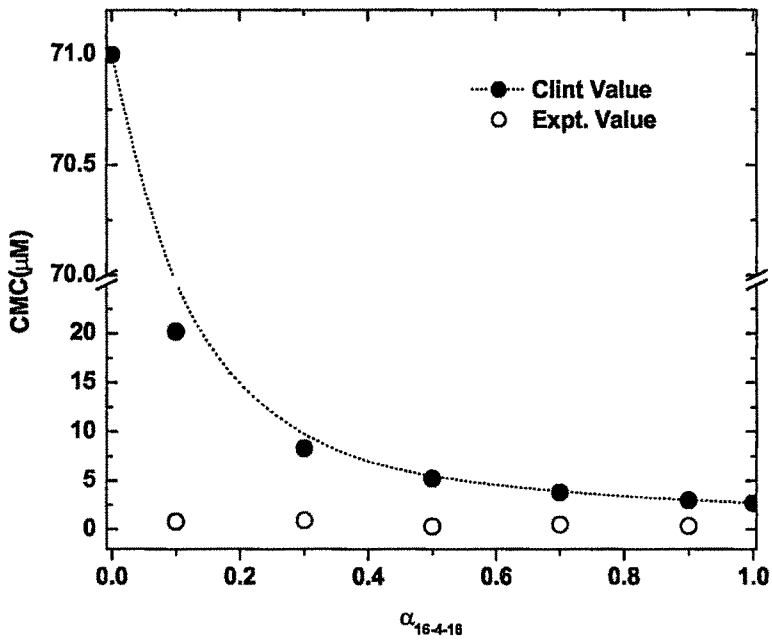

Figure II A. 2 Plot of mole fraction of 16-4-16 ($\alpha_{16\text{-}4\text{-}16}$) vs CMC for 16-4-16,2Br: $C_{12}E_6$ mixtures at 30°C.

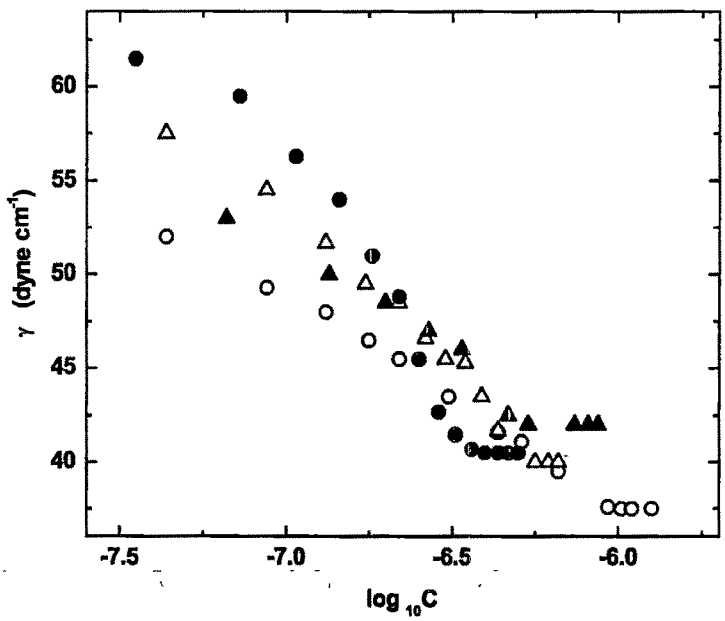

Figure II A. 3 Surface tension *vs.* $\log_{10} C$ plots for mixed surfactant system, at different mole fraction of 16-4-16,2Br$^-$ at 30°C (o) 0.3, (Δ) 0.7, (●) 0.9 and (▲) 0.1.

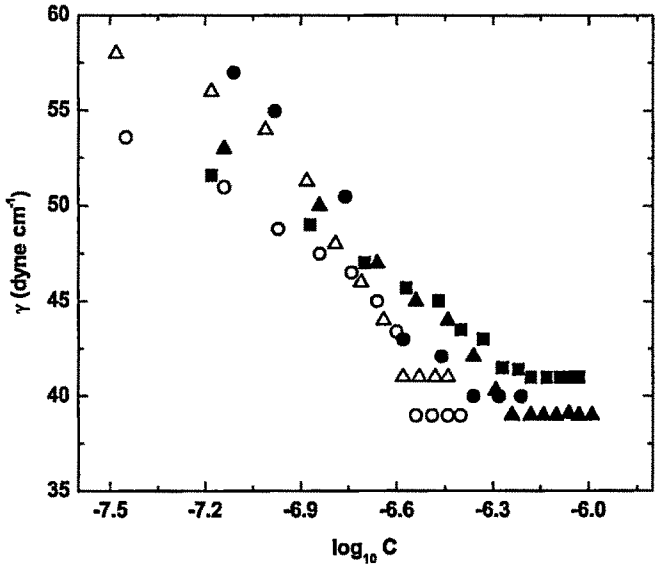

Figure II A. 4 Surface tension *vs.* Concentration plots for mixed surfactant system, at different mole fraction of 16-4-16,2Br$^-$ at 35°C (o) 0.9, (●) 0.7, (Δ) 0.5, (▲) 0.3 and (■) 0.1.

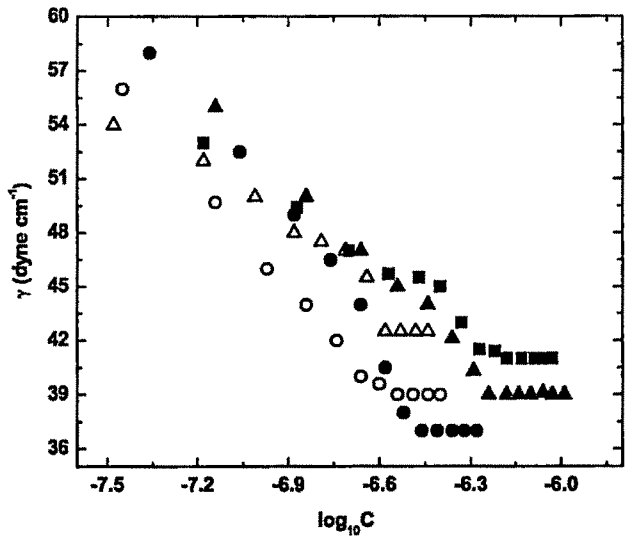

Figure II A. 5 Surface tension *vs.* Concentration plots for mixed surfactant system, at different mole fraction of 16-4-16,2Br$^-$ at 40°C (o) 0.9, (●) 0.7, (Δ) 0.5, (▲) 0.3 and (■) 0.1.

Basic Data of Chapter II B

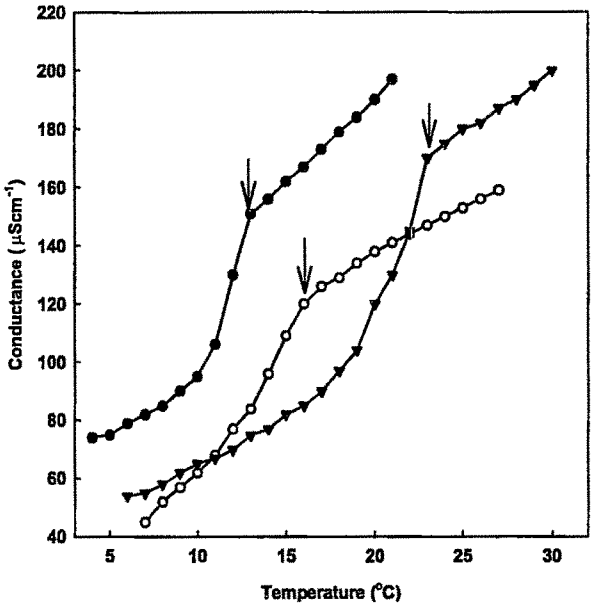

Figure II B. 1 Determination of the Krafft temperature: Temperature dependence of the conductance of 3mM surfactant for (●) pure 16-10-16,2Br⁻, (o) 16-10-16,2Br⁻:$C_{12}E_6$(5:5), (▼)16-10-16,2Br⁻:TX-100 (9:1) the arrow indicate the temperature of complete clarification of the system.

TABLE II B 1 Surface excess concentration (Γ_{max}) of 16-10-16, 2Br⁻:$C_{12}E_6$ and 16-10-16, 2Br⁻:Triton X-100 mixed surfactant systems in aqueous medium at different temperatures. (X=mole fraction)

$X_{16\text{-}10\text{-}16}$	$\Gamma \times 10^{10}$ (molcm^{-2})					
	$C_{12}E_6$			Triton X-100		
	303	308	313	303	308	313K
0.0	2.48	2.71	2.86	3.27	3.08	3.00
0.1	1.44	1.79	1.92	1.27	1.13	1.35
0.3	1.90	1.70	1.96	1.97	2.54	1.09
0.5	1.45	1.54	1.00	2.42	2.52	1.76
0.7	3.30	2.26	2.97	1.81	1.80	2.26
0.9	2.41	4.00	3.90	2.15	1.80	4.81
1.0	2.13	2.20	2.31	2.13	2.20	2.31

TABLE II B 2 Minimum area per molecule A_{min} of 16-10-16, $2Br^-$:$C_{12}E_6$ and 16-10-16, $2Br^-$:Triton X-100 mixed surfactant systems in aqueous medium at different temperatures. (X=mole fraction)

$X_{16\text{-}10\text{-}16}$	A_{min} (nm^2)					
	$C_{12}E_6$			Triton X-100		
	303	308	313	303	308	313K
0.0	0.67	0.61	0.58	0.51	0.54	0.55
0.1	1.16	0.93	0.87	1.31	1.47	1.32
0.3	0.88	0.98	0.85	0.84	0.65	1.52
0.5	1.14	1.08	1.66	0.69	0.65	0.95
0.7	0.50	0.73	0.56	0.91	0.92	0.73
0.9	0.69	0.41	0.43	0.77	0.92	0.35
1.0	0.78	0.75	0.72	0.78	0.75	0.72

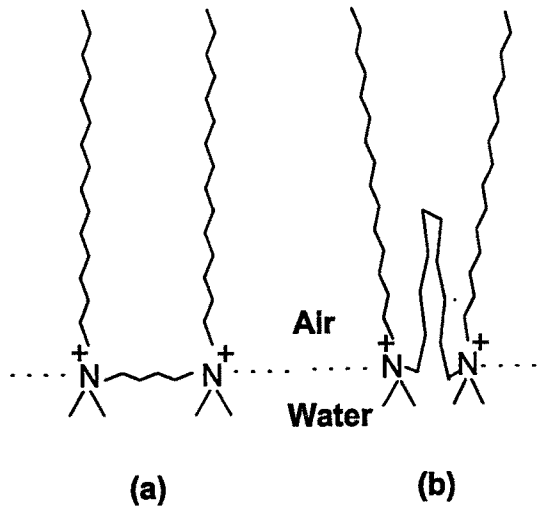

Figure II B. 2 Schematic representation of bis (quaternary ammonium) dimeric surfactants at air-water interface: (a) s = 4 ; (b) s =10.

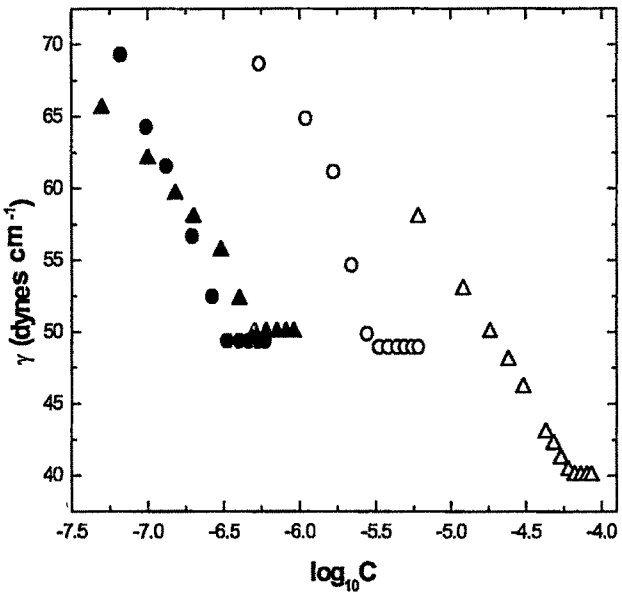

Figure II B. 3 Representative plots of surface tension vs. $\log_{10}$ C for (o) pure 16-10-16,2Br$^-$, (▲)16-10-16,2Br$^-$:$C_{12}E_6$(5:5), (●)16-10-16,2Br$^-$:$C_{12}E_6$(9:1), (Δ) pure $C_{12}E_6$ at 30°C.

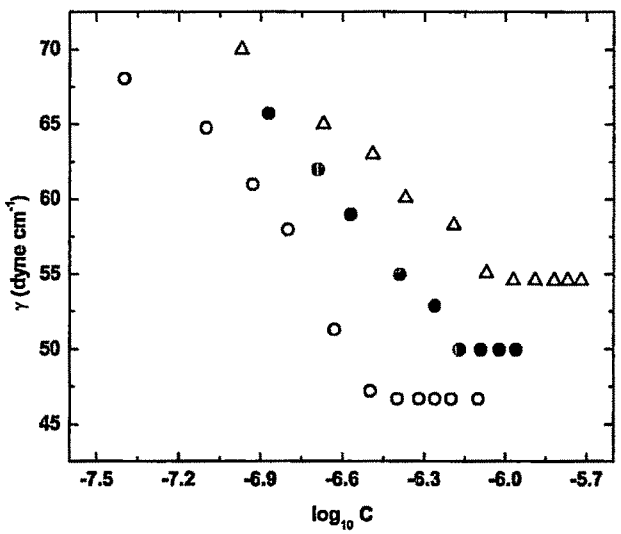

Figure II B. 4 Surface tension *vs.* $\log_{10}$ C plots for 16-10-16,2Br$^-$: $C_{12}E_6$ mixed surfactant system, at different mole fraction of 16-10-16,2Br$^-$ at 30°C (o) 0.7, (●) 0.3 and (Δ) 0.1.

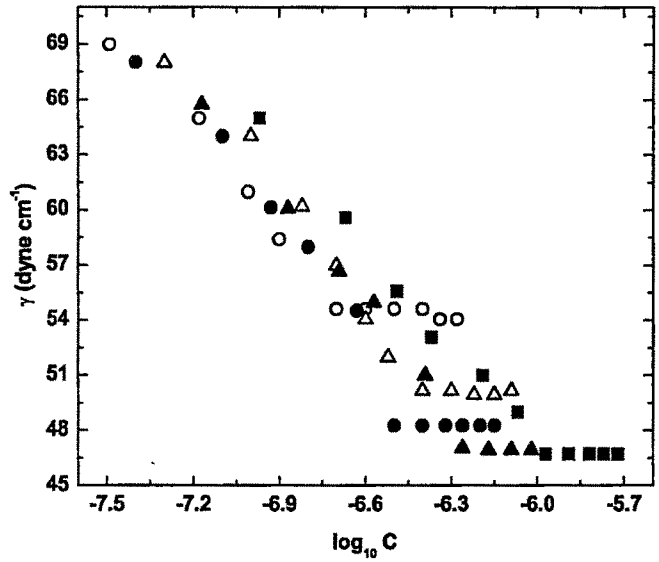

Figure II B. 5 Surface tension *vs.* $\log_{10}$ C plots for 16-10-16,2Br$^-$: $C_{12}E_6$ mixed surfactant system, at different mole fraction of 16-10-16,2Br$^-$ at 35°C (o) 0.9, (●) 0.7, (Δ) 0.5, (▲) 0.3 and (■) 0.1.

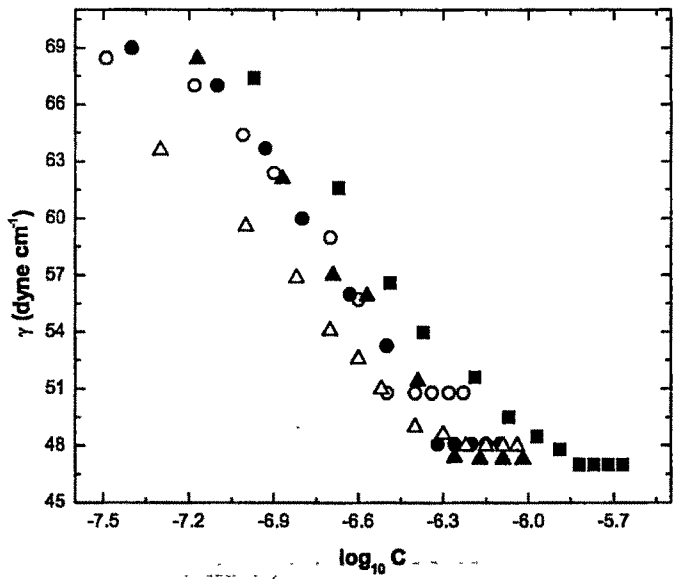

Figure II B. 6 Surface tension *vs.* $\log_{10}$ C plots for 16-10-16,2Br$^-$: $C_{12}E_6$ mixed surfactant system, at different mole fraction of 16-10-16,2Br$^-$ at 40°C (o) 0.9, (●) 0.7, (Δ) 0.5, (▲) 0.3 and (■) 0.1.

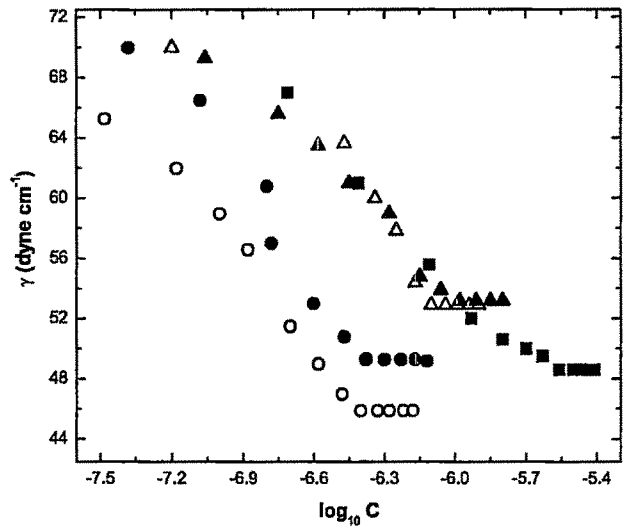

Figure II B. 7 Surface tension *vs.* $\log_{10}$ C plots for 16-10-16,2Br$^-$: Triton X 100 mixed surfactant system, at different mole fraction of 16-10-16,2Br$^-$ at 30°C (o) 0.9, (●) 0.7, (Δ) 0.5, (▲) 0.3 and (■) 0.1.

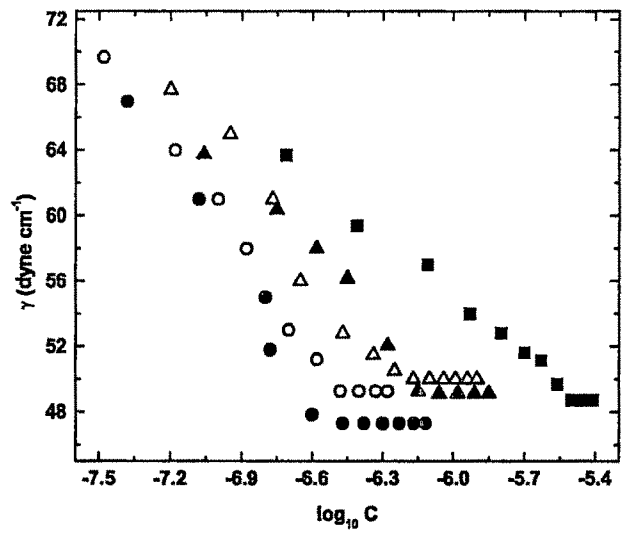

Figure II B. 8 Surface tension *vs.* $\log_{10}$ C plots for 16-10-16,2Br$^-$: Triton X 100 mixed surfactant system, at different mole fraction of 16-10-16,2Br$^-$ at 35°C (o) 0.9, (●) 0.7, (Δ) 0.5, (▲) 0.3 and (■) 0.1.

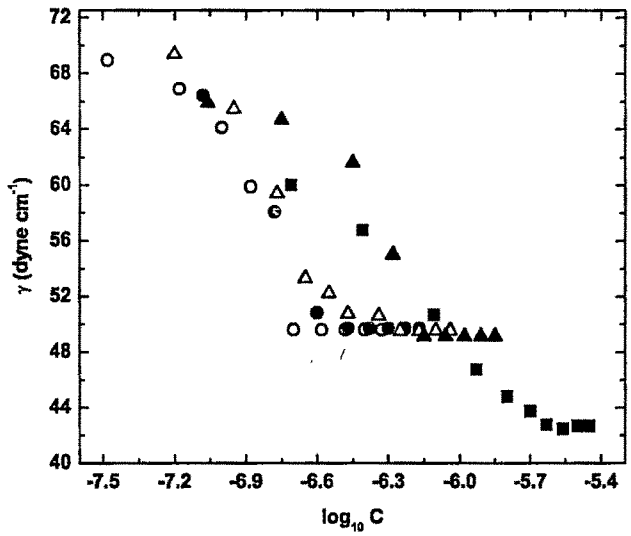

Figure II B. 9 Surface tension *vs.* $\log_{10}$ C plots for 16-10-16,2Br$^-$: Triton X 100 mixed surfactant system, at different mole fraction of 16-10-16,2Br$^-$ at 35°C (o) 0.9, (●) 0.7, (Δ) 0.5, (▲) 0.3 and (■) 0.1.

Basic Data of Chapter III

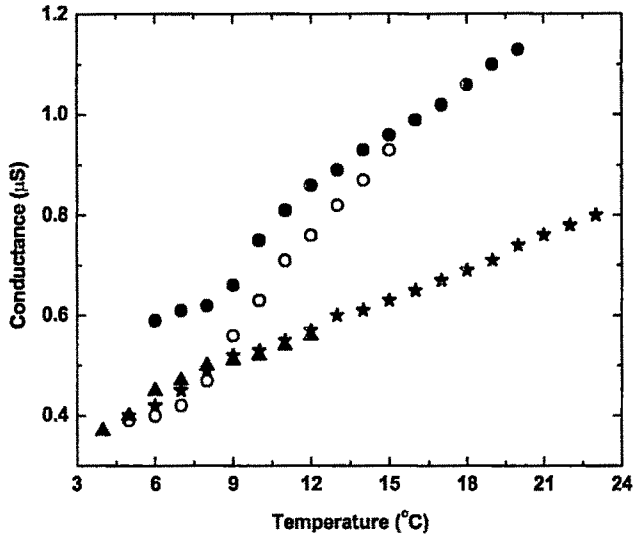

Figure III 1 Plot of conductance *vs.* temperature for TTAB : Brij 35 mixed surfactant system for Krafft temperature measurements at different mole fraction of TTAB (●) 0.8, (○) 0.7, (△) 0.6, (★) 0.5, (▲) 0.4.

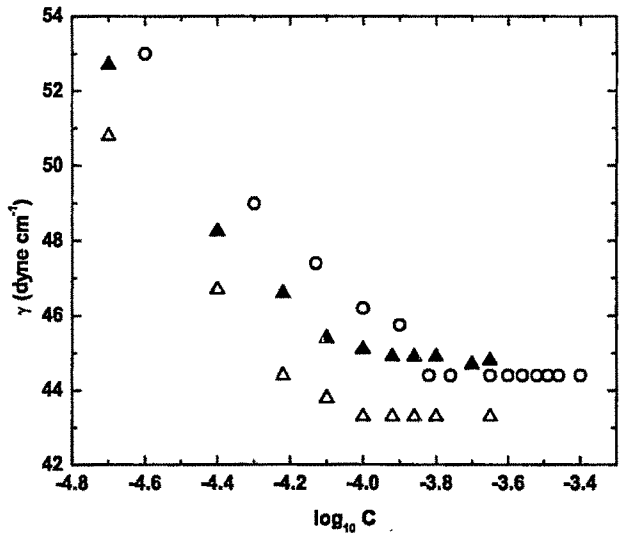

Figure III 2 Polts of Surface tension(γ) *vs.* log10 C (concentration of surfactant, M) at 35°C for TTAB:Brij 35 mixed surfactant system at different mole fraction of TTAB (○) 0.5, (△) 0.2 and (▲) 0.4.

Basic Data of Chapter IV

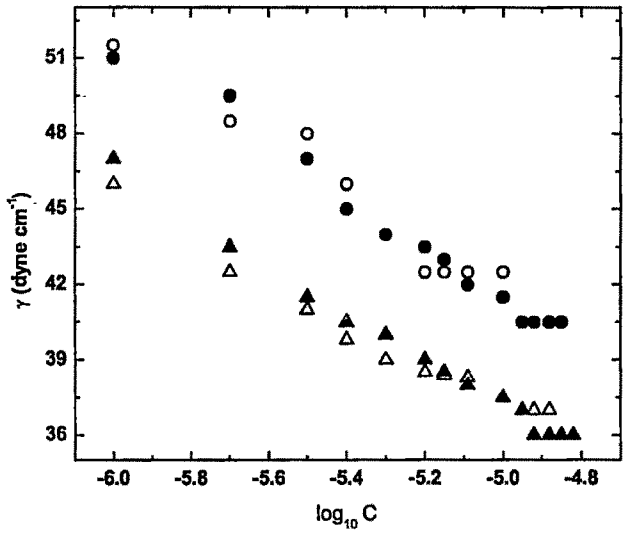

Figure IV.A.1 surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ at *p*H 2 at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

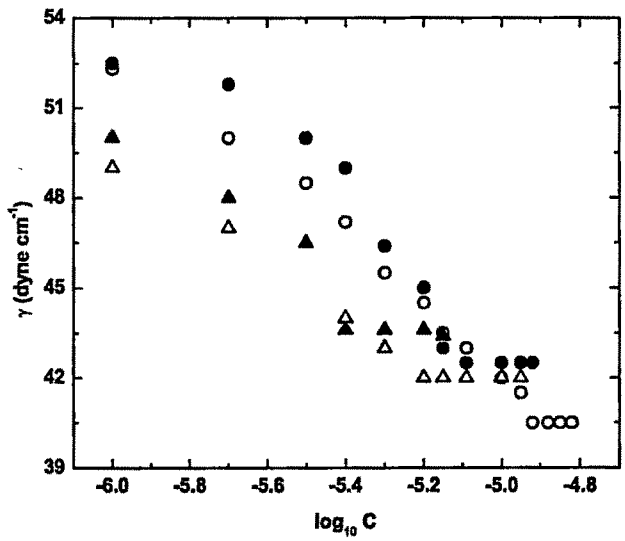

Figure IV.A.2 surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ at *p*H 3 at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

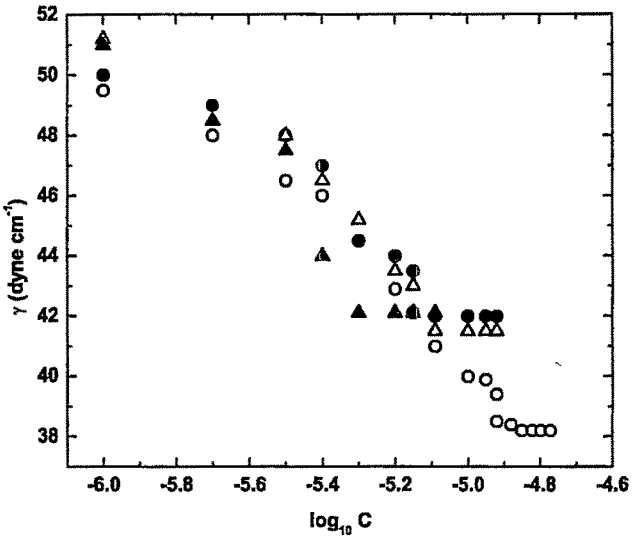

Figure IV.A.3 surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ at *p*H 4 at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

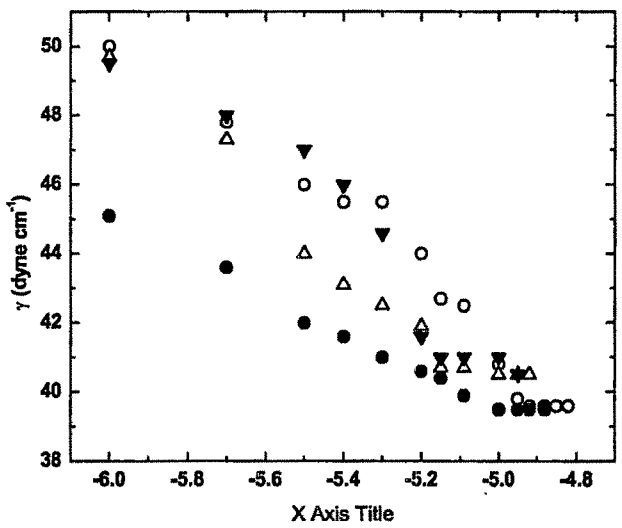

Figure IV.A.4 surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ at *p*H 5 at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

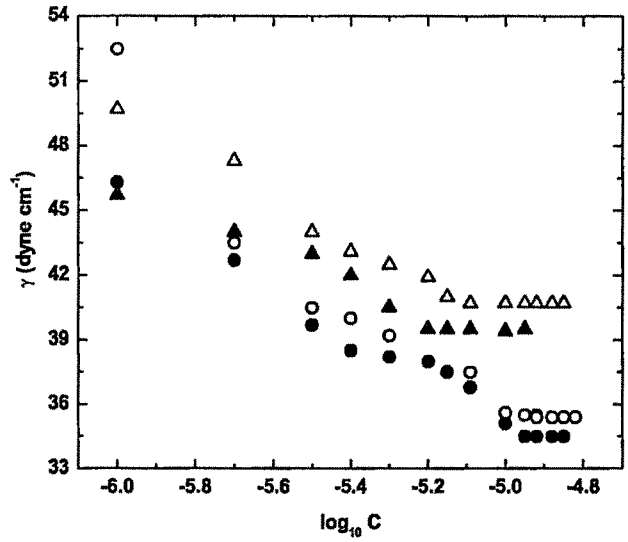

Figure IV.A.5 surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ at *p*H 6.8 at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

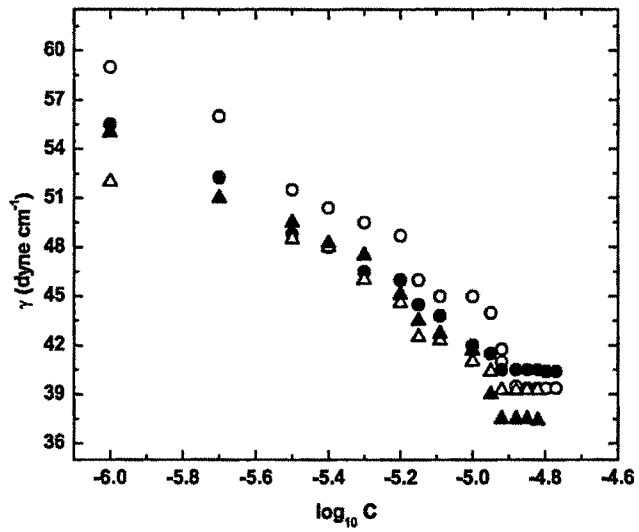

Figure IV.A.6 surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ at *p*H 9 at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

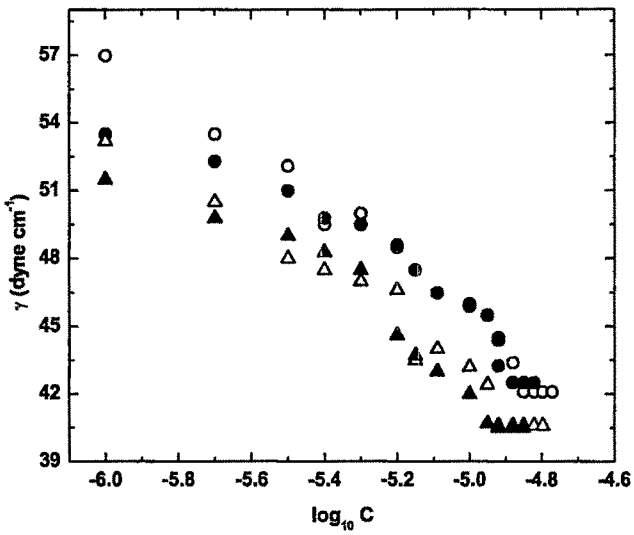

Figure IV.A.7 surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ at *p*H 11 at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

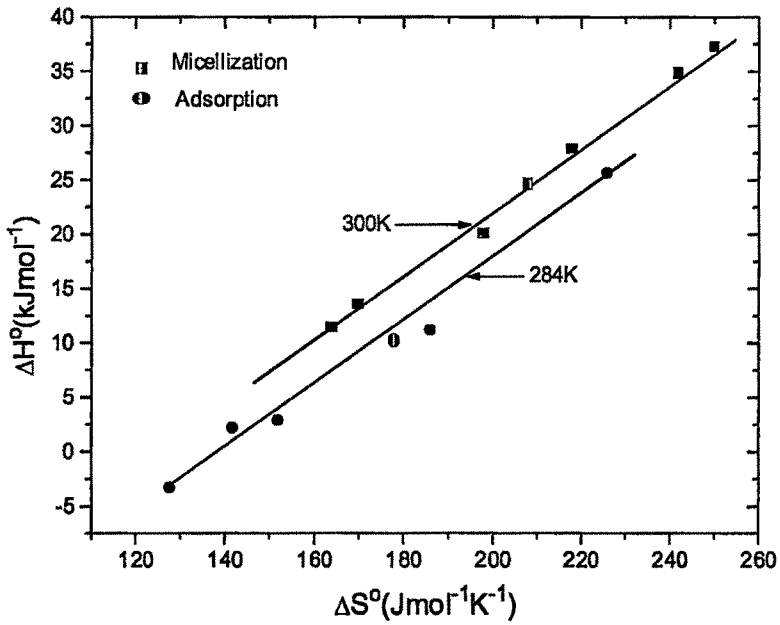

Figure IV.A.8 Enthalpy-entropy compensation plot for micellization and adsorption taking all systems together.

Basic Data of Chapter V

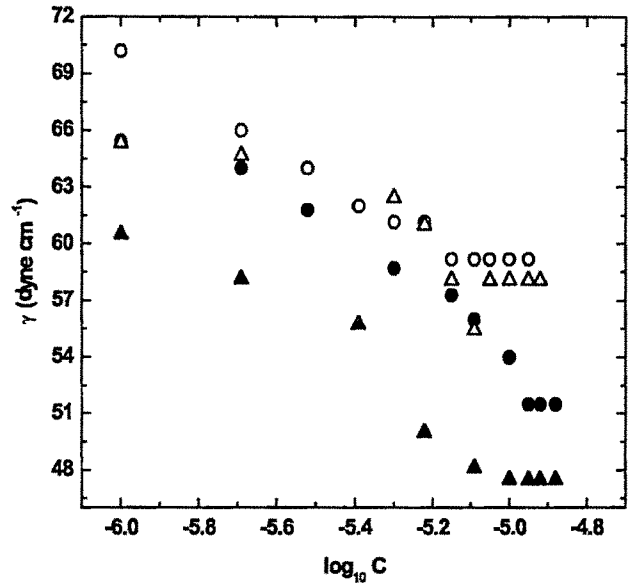

Figure V.1 surface tension *vs.* surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.25 % D-glucose at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

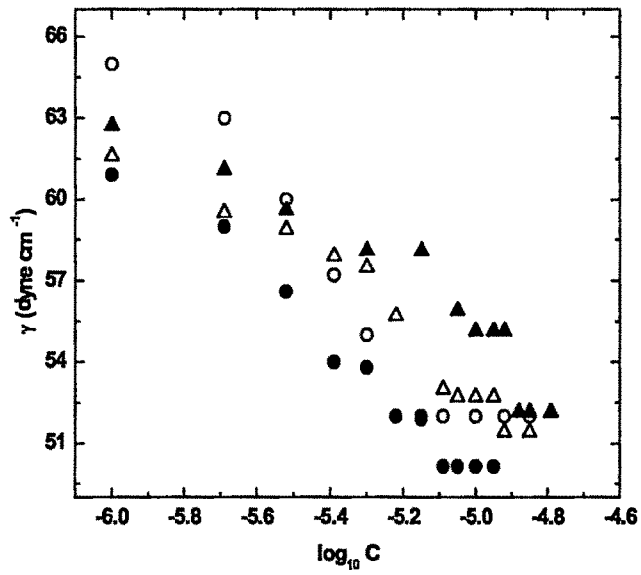

Figure V.2 surface tension *vs.* surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.50 % D-glucose at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

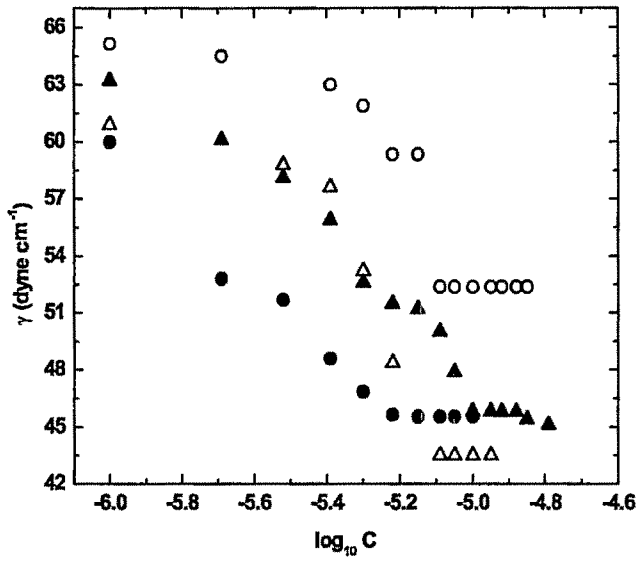

Figure V.3 surface tension *vs.* surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.75 % D-glucose at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

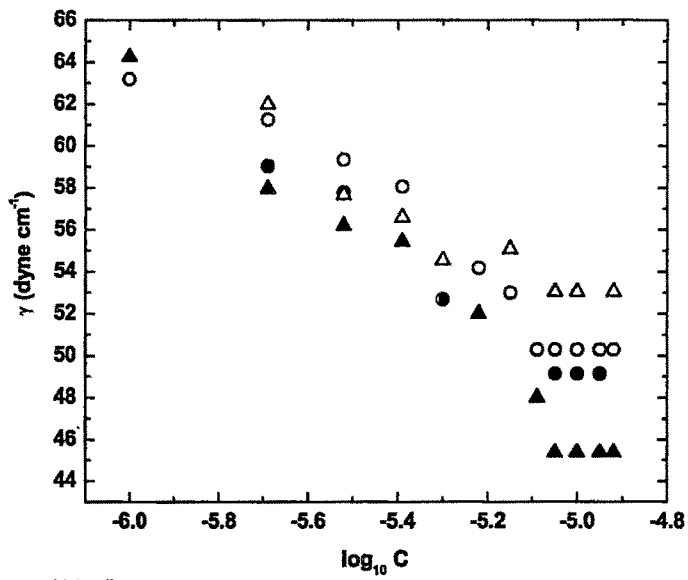

Figure V.4 surface tension *vs.* surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 1.0 % D-glucose at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

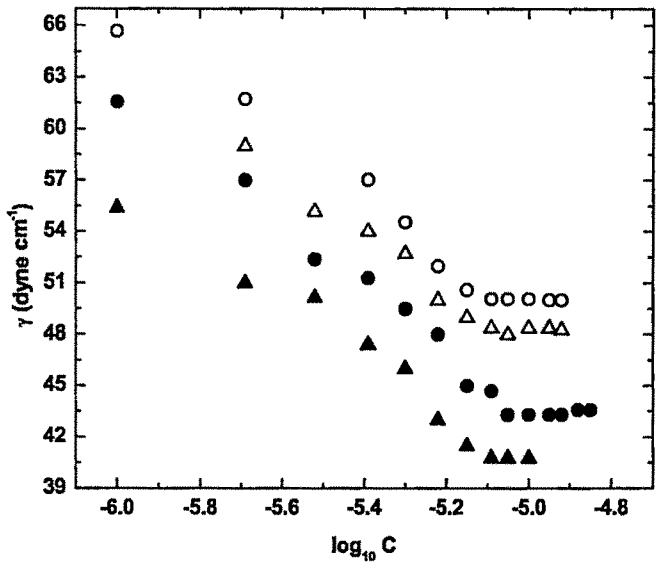

Figure V.5 surface tension *vs.* surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.25 % D-ribose at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

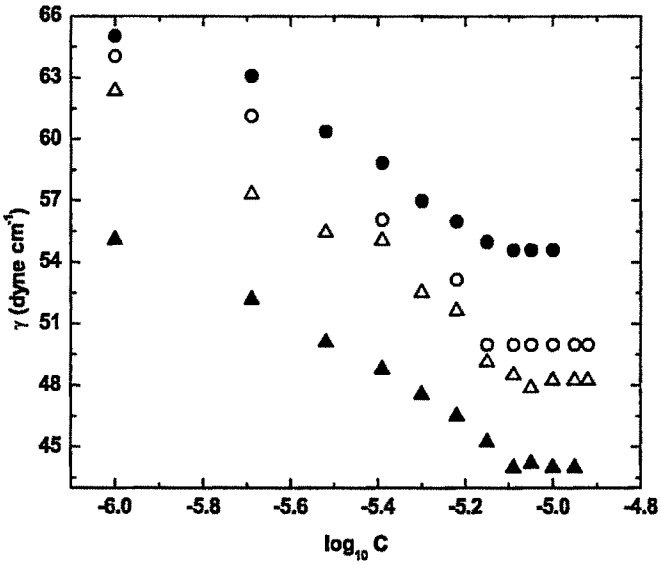

Figure V.6 surface tension *vs.* surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.50 % D-ribose at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

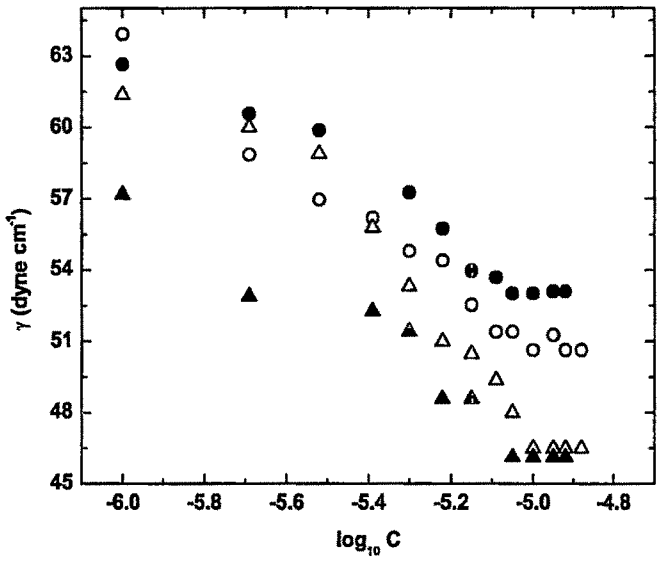

Figure V.7 surface tension *vs.* surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.75 % D-ribose at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

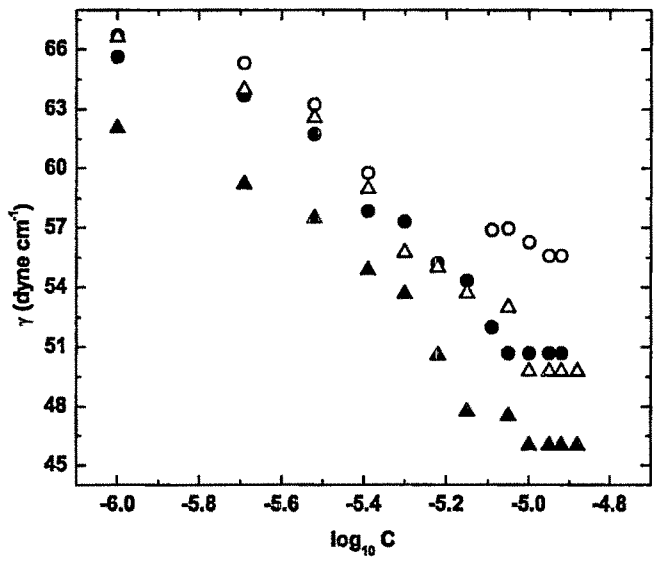

Figure V.8 surface tension *vs.* surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 1.0 % D-ribose at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

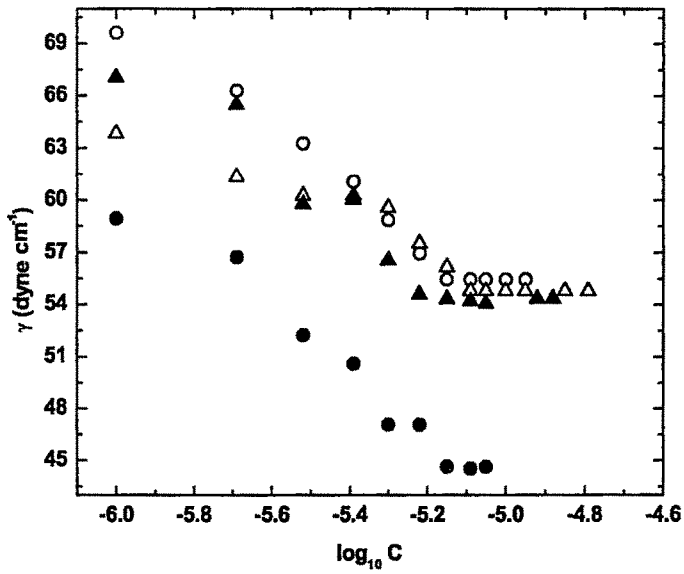

Figure V.9 surface tension *vs.* surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant,M) of $C_{12}E_{10}$ in presence of 0.25 % sucrose at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

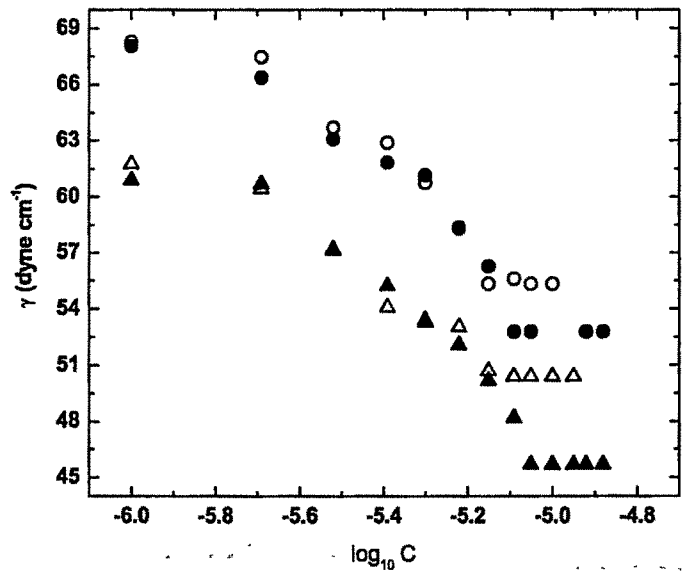

Figure V.10 surface tension *vs.* surface tension (g) *vs.* $\log_{10}$C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.50 % sucrose at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

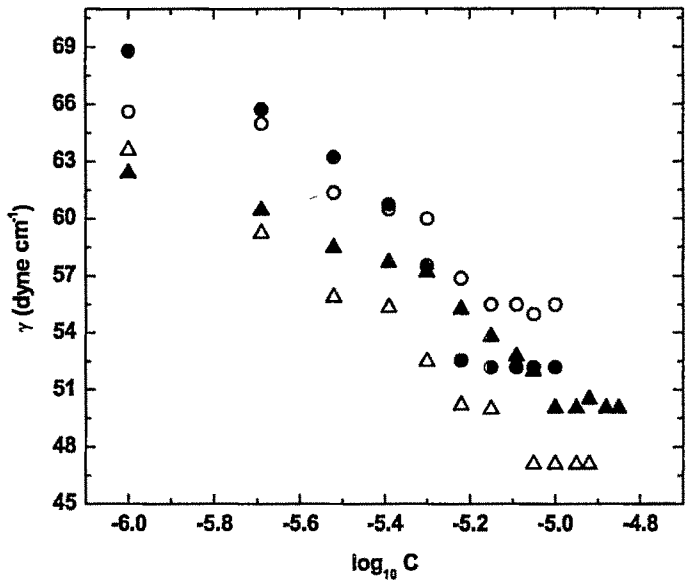

Figure V.11 surface tension *vs.* surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.75 % sucrose at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

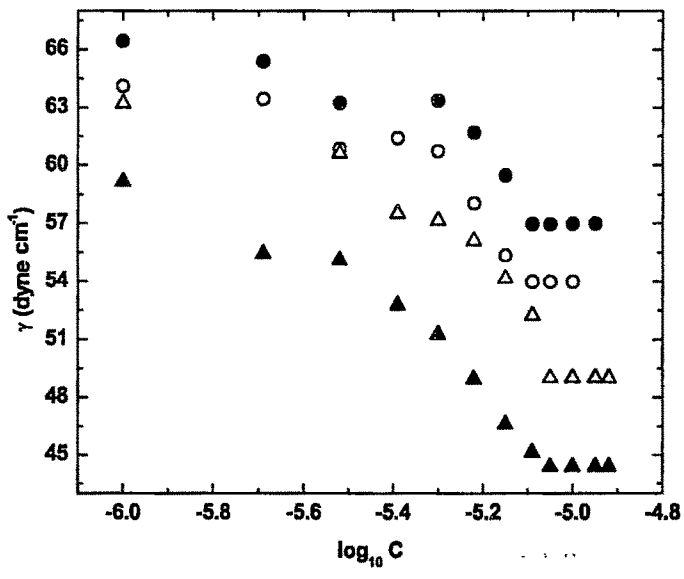

Figure V.12 surface tension *vs.* surface tension (g) *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 1.0 % sucrose at different temperature (○) 35, (●) 40, (△) 45 and (▲) 50°C.

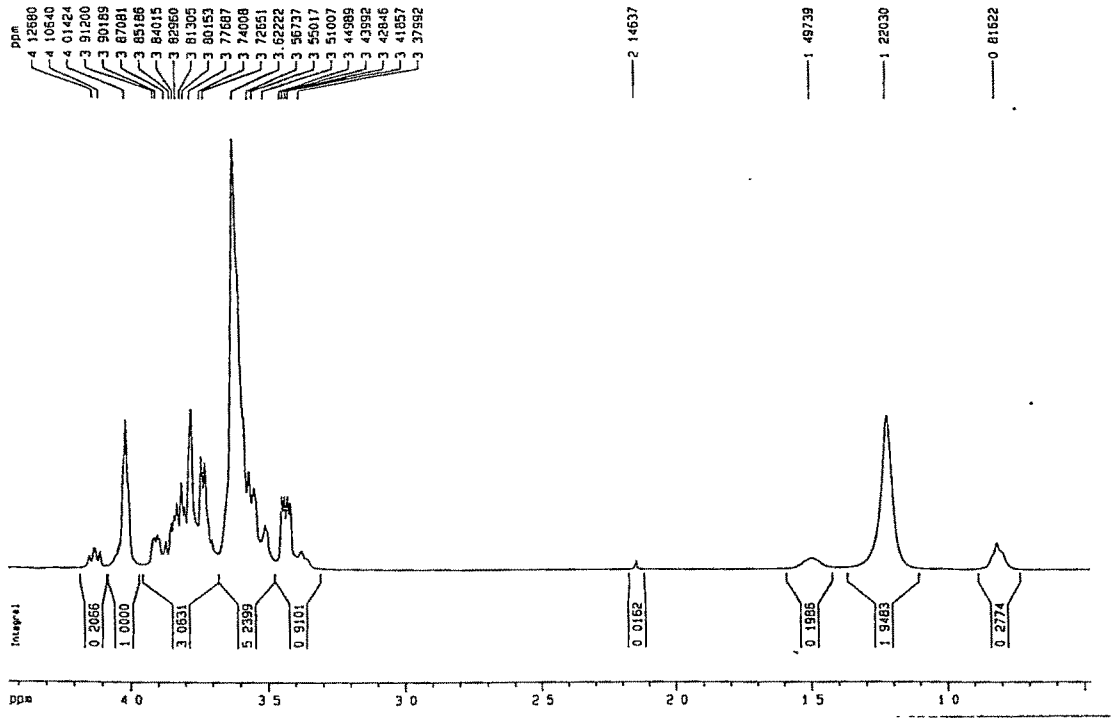

Figure V.13 ^{1}H NMR spectra of $C_{12}E_{10}$ in presence of Ribose (5% w/v)

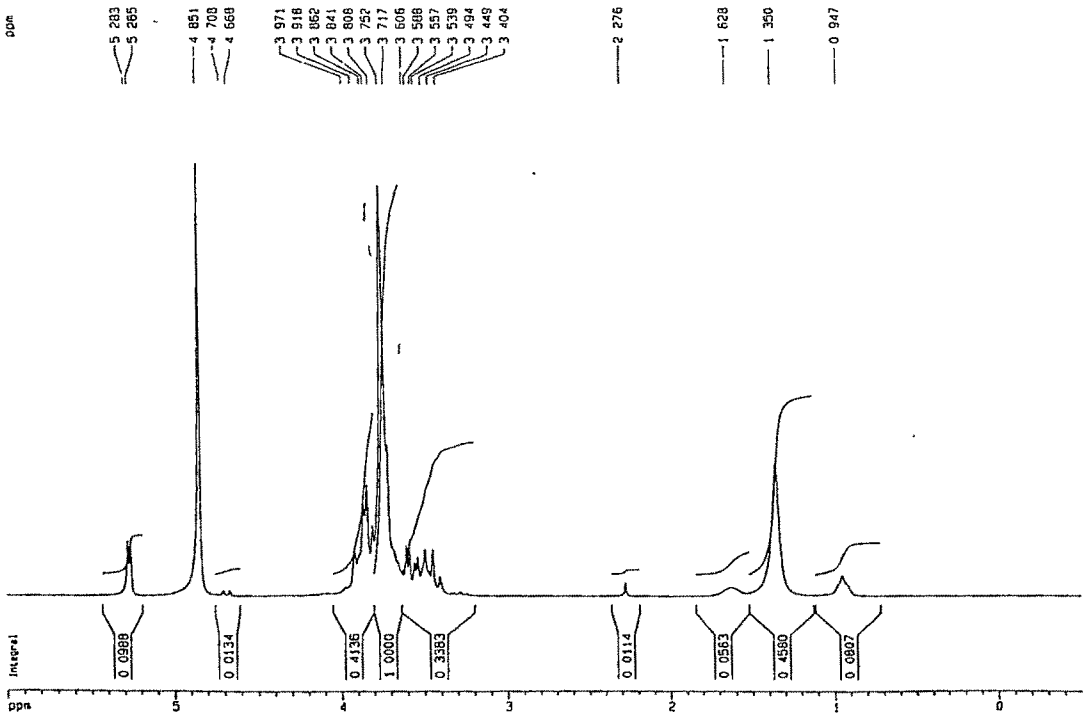

Figure V.14 ^{1}H NMR spectra of $C_{12}E_{10}$ in presence of Glucose (5% w/v)

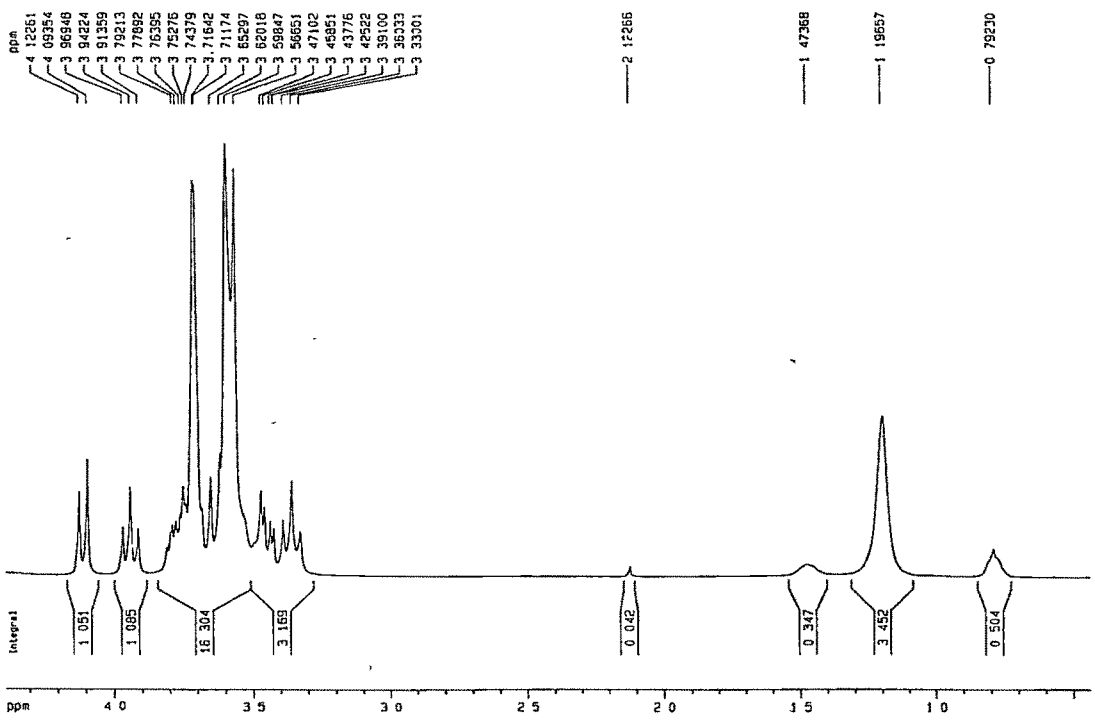

Figure V.15 ^{1}H NMR spectra of $C_{12}E_{10}$ in presence of Sucrose (5% w/v)

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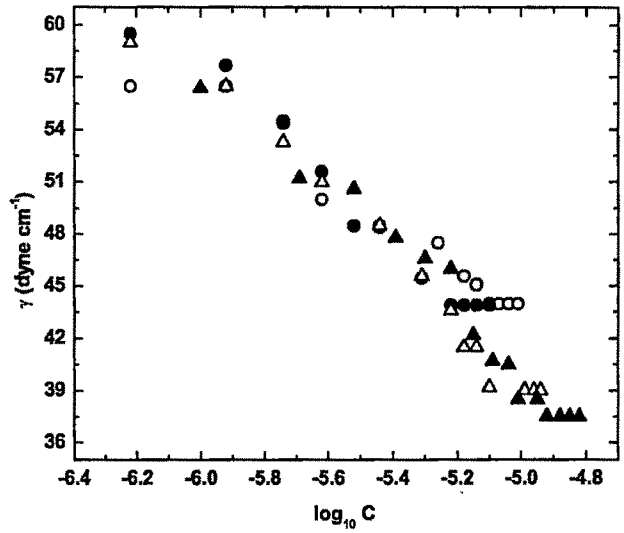

Figure VI.1 Surface tension *vs.* $\log_{10} C$ (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.25 % Ethanol at different temperature (○) 30, (●) 35, (△) 40 and (▲) 45°C.

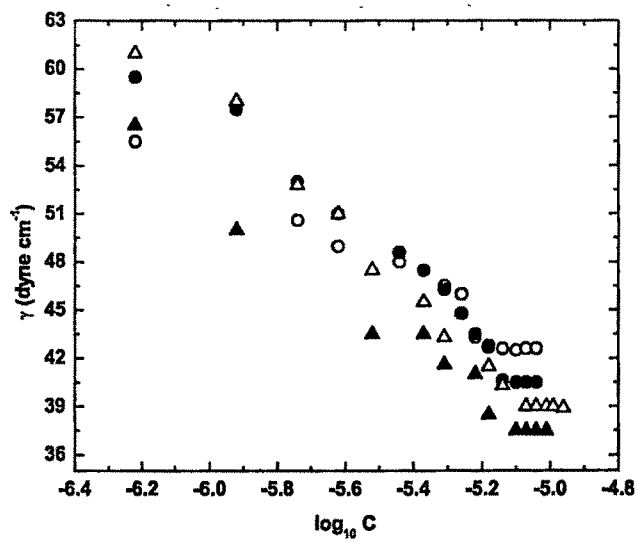

Figure VI.2 Surface tension *vs.* $\log_{10} C$ (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.50 % Ethanol at different temperature (○) 30, (●) 35, (△) 40 and (▲) 45°C.

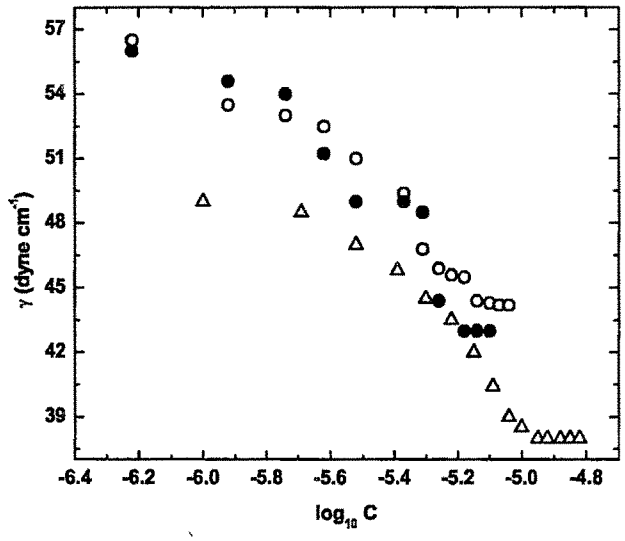

Figure VI.3 Surface tension *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.75 % Ethanol at different temperature (○) 30, (●) 35 and (△) 45°C.

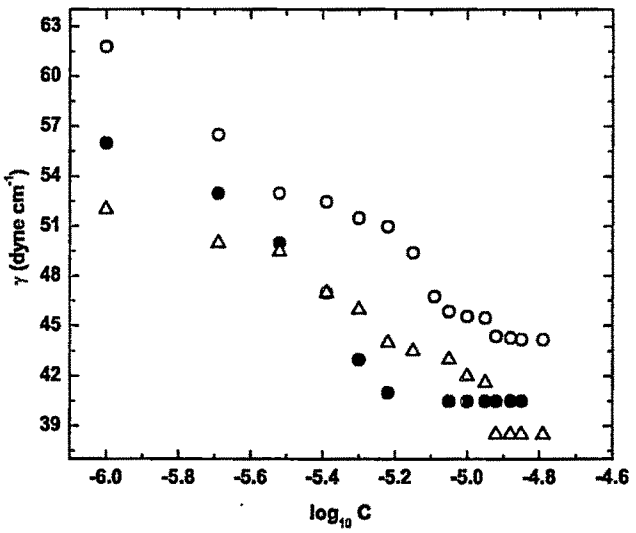

Figure VI. 4 Surface tension *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 1.0 % Ethanol at different temperature (○) 30, (●) 40 and (△) 45°C.

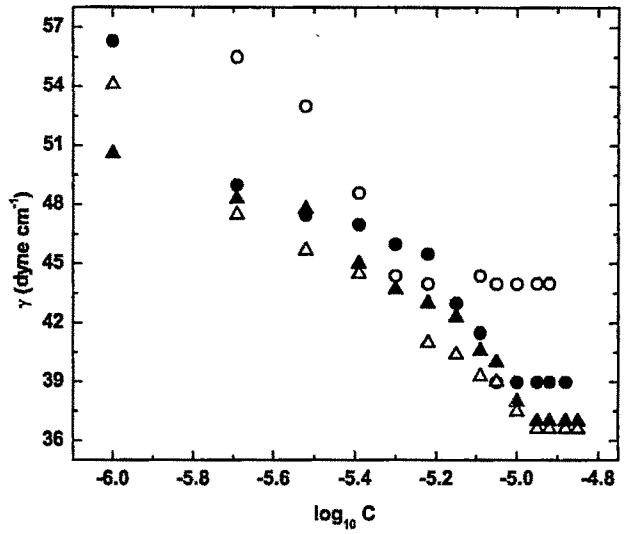

Figure VI. 5 Surface tension *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.25 % Propanol at different temperature (○) 30, (●) 35, (△) 40 and (▲) 45°C.

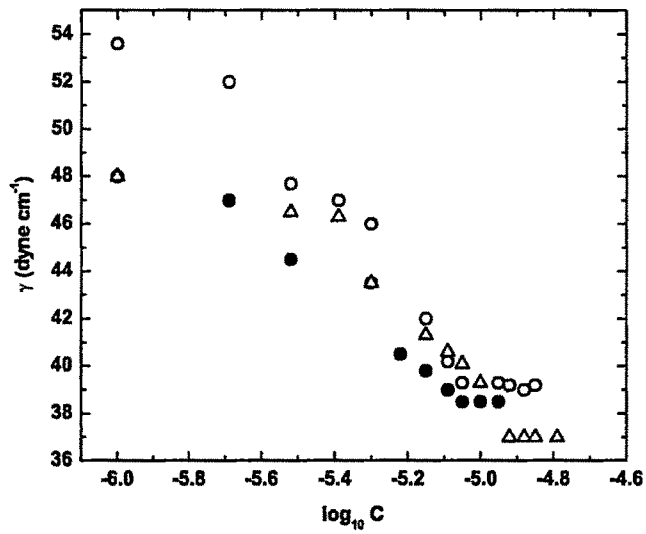

Figure VI. 6 Surface tension *vs.*$\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.50 % Propanol at different temperature (○) 35, (●) 40 and (△) 45°C.

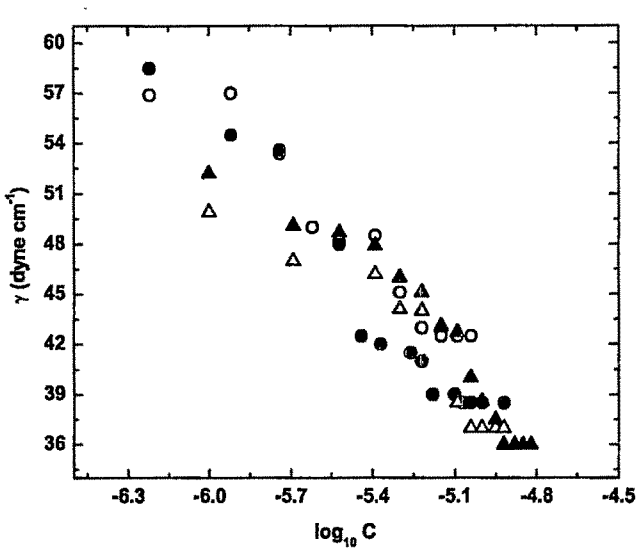

Figure VI. 7 Surface tension *vs.*$\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.75 % Propanol at different temperature (○) 30, (●) 35, (△) 40 and (▲) 45°C.

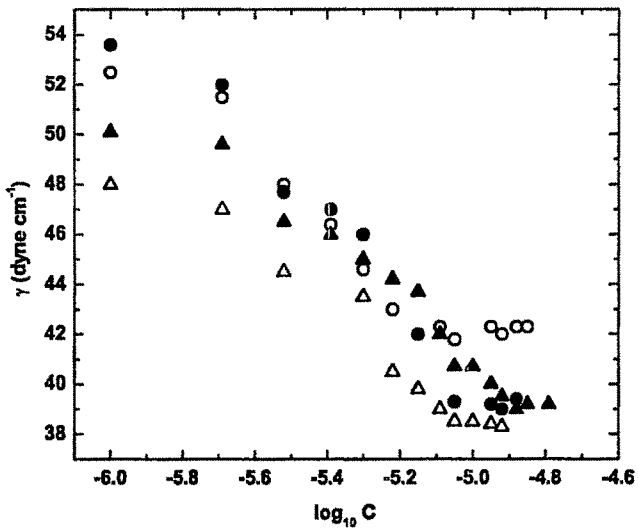

Figure VI. 8 Surface tension *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 1.0 % Propanol at different temperature (○) 30, (●) 35, (△) 40 and (▲) 45°C.

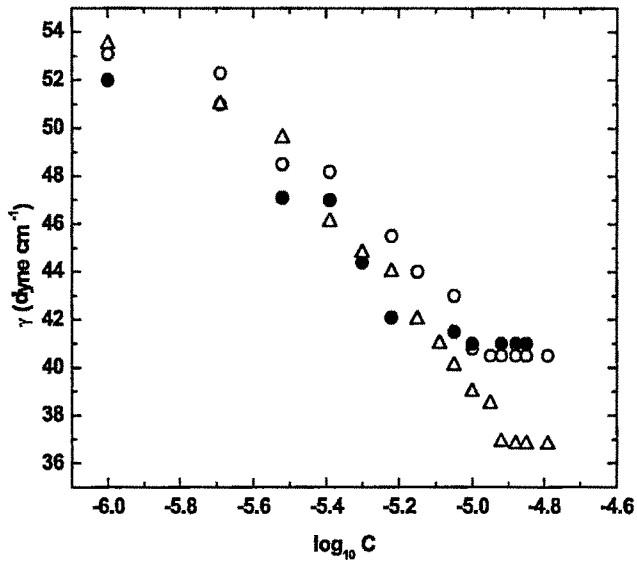

Figure VI. 9 Surface tension *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.25 % Butanol at different temperature (○) 35, (●) 40 and (△) 45°C.

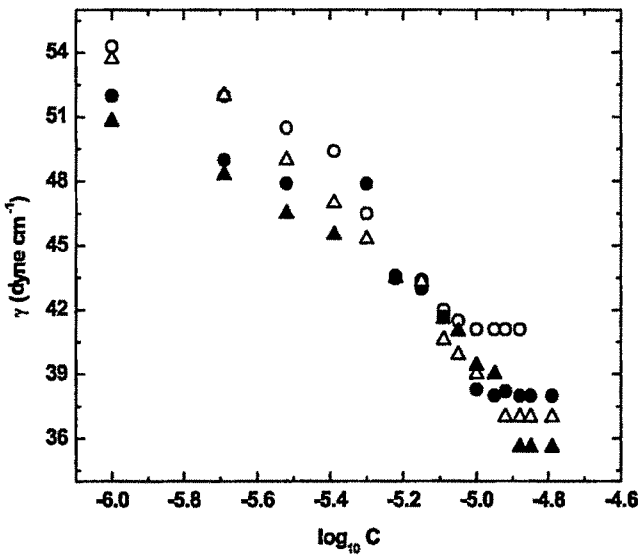

Figure VI. 10 Surface tension *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.10 % Butanol at different temperature (○) 30, (●) 35, (△) 40 and (▲) 45°C.

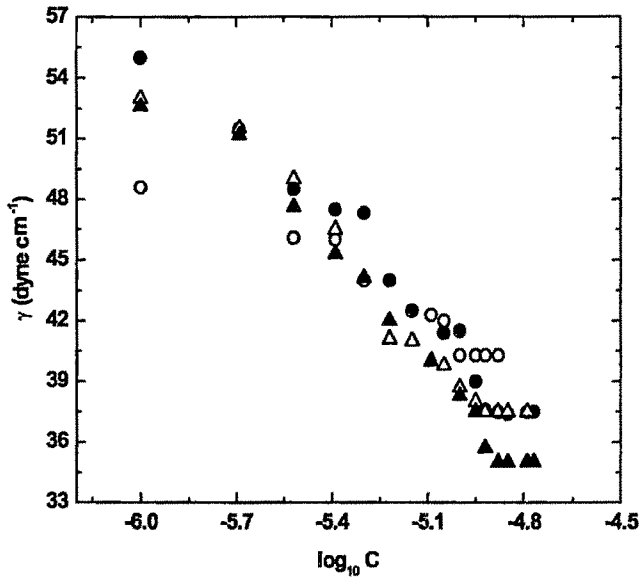

Figure VI. 11 Surface tension *vs.* $\log_{10}$ C (concentration of surfactant, M) of $C_{12}E_{10}$ in presence of 0.05 % Butanol at different temperature (○) 30, (●) 35, (△) 40 and (▲) 45°C.

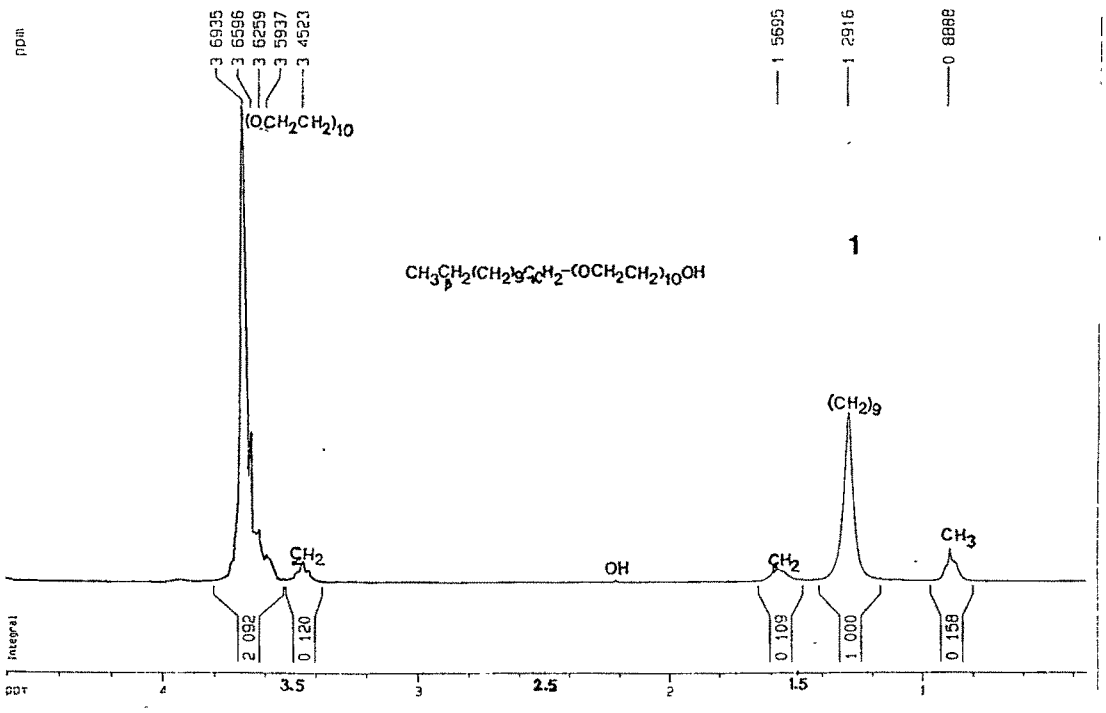

Figure VI. 12 ^{1}H NMR spectra of $C_{12}E_{10}$

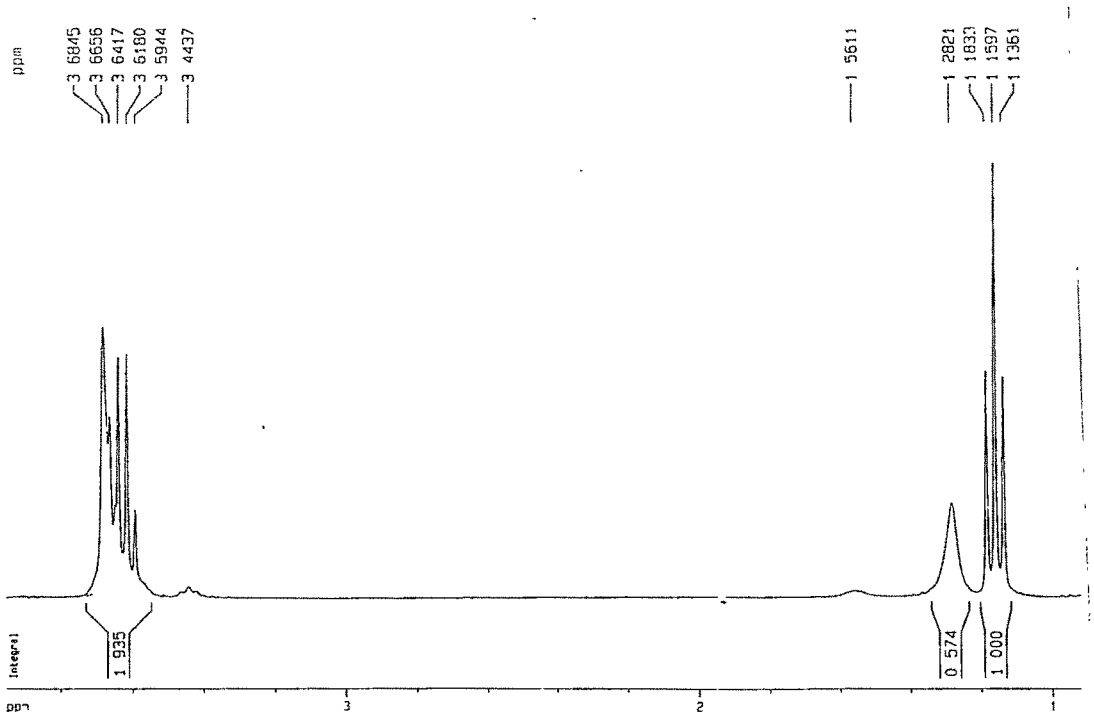

Figure VI. 13 ^{1}H NMR spectra of $C_{12}E_{10}$ · Ethanol (1·1)

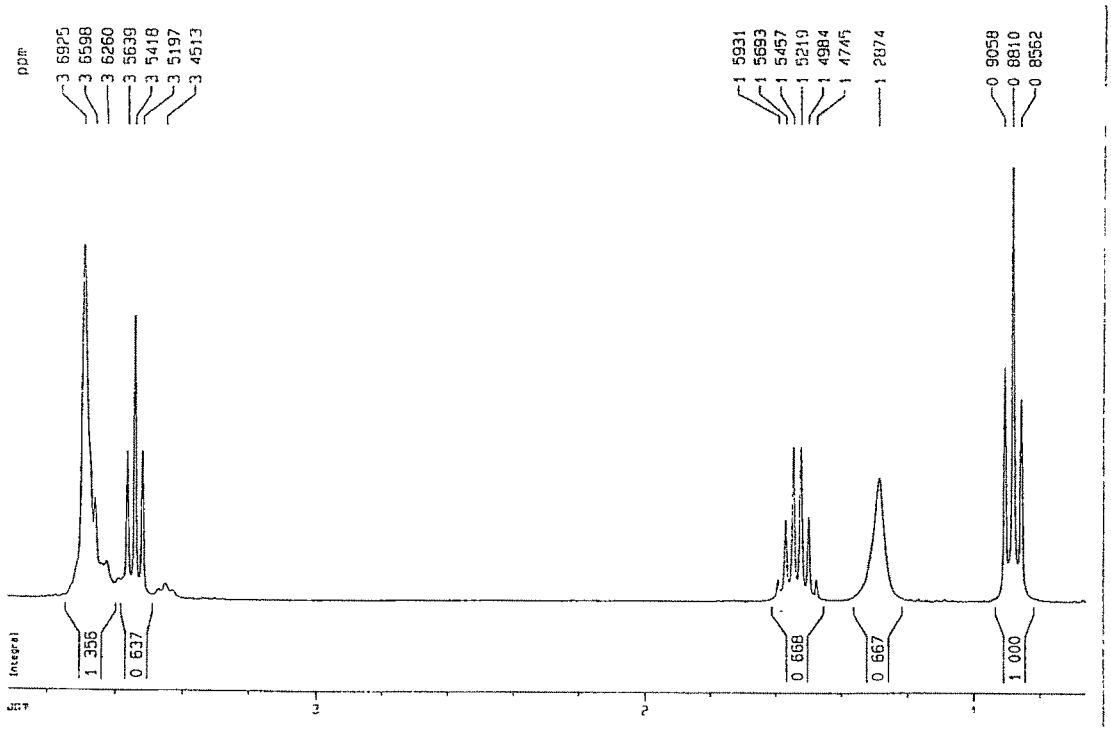

Figure VI. 14 ^{1}H NMR spectra of $C_{12}E_{10}$. Propanol (1:1).

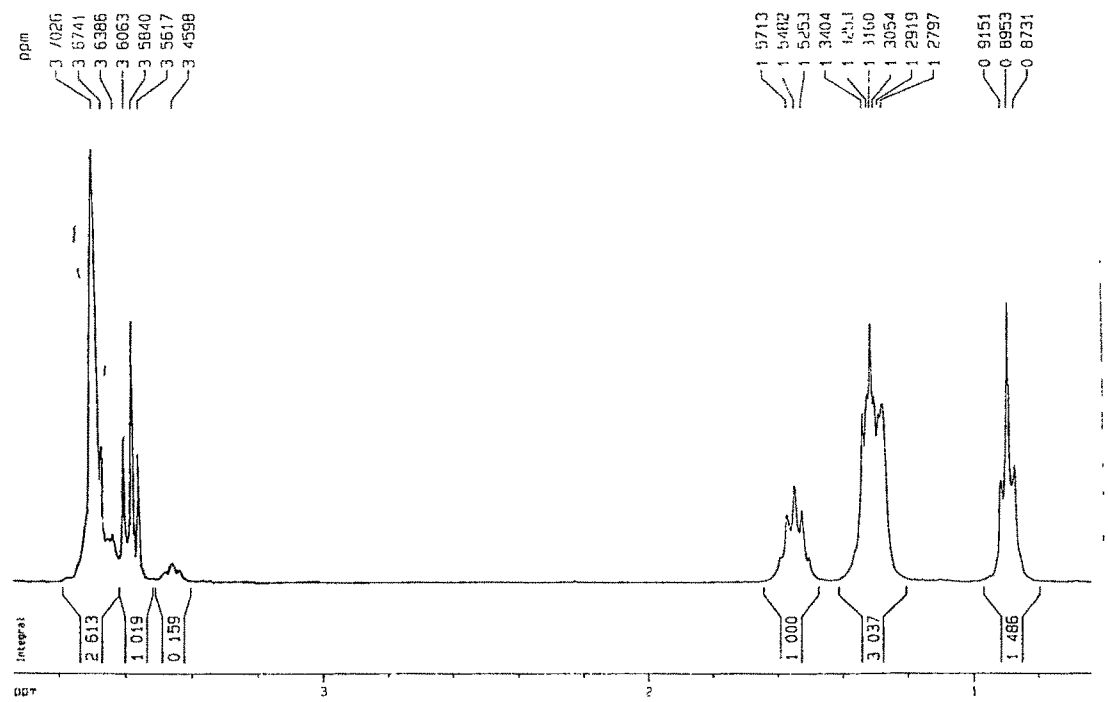

Figure VI. 15 ^{1}H NMR spectra of $C_{12}E_{10}$ Pentanol (1 1)

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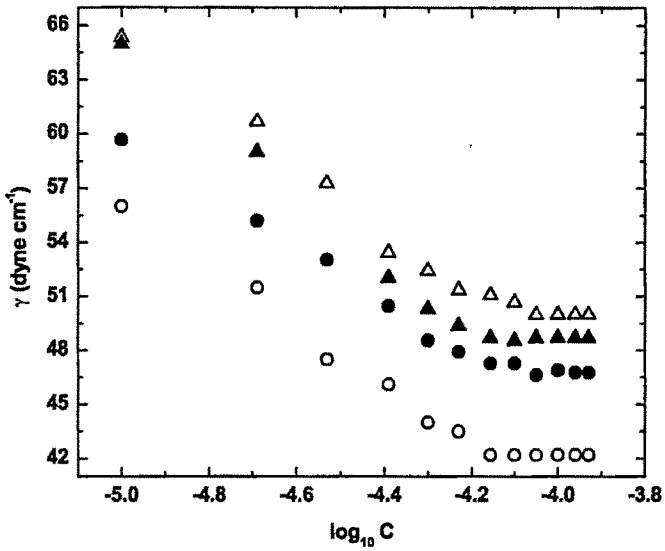

Figure VII. 1 Surface tension (γ) *vs.* $\log_{10}$ C (concentration, M) of $C_{12}E_9$ at 35°C in presence of different amount of glycine (○) 0.25 , (●) 0.50, (△) 0.75 and (▲) 1.0%.

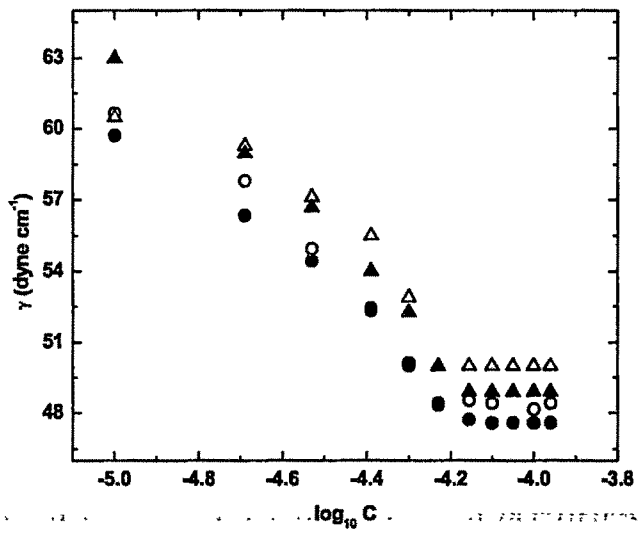

Figure VII. 2 Surface tension (γ) *vs.* $\log_{10}$ C (concentration, M) of $C_{12}E_9$ at 35°C in presence of different amount of alanine (○) 0.1 , (●) 0.25, (△) 0.50 and (▲) 1.0%.

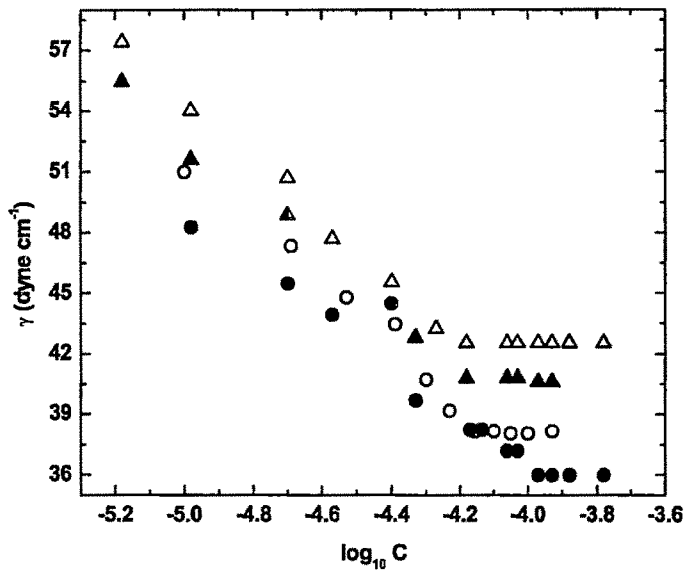

Figure VII. 3 Surface tension (γ) *vs.* $\log_{10}$ C (concentration, M) of $C_{12}E_9$ at 35°C in presence of different amount of valine (○) 0.1, (●) 0.50, (△) 0.75 and (▲) 1.0%.