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Short Communication

**The experimental study of reverse micellar phase in AOT/
Heptane/ (Water or aqueous) as nano template**

ABSTRACT

In this paper electrical conductivity measurements and optical investigations takes place in AOT/ heptane/ (water or aqueous) systems. The water in oil system prepared with adding water in 50% by weight of AOT/ heptane solution. In other systems instead of water, aqueous solutions of 1) zinc acetate and water 2) Potassium Hydroxide and water were used. In each phase, the trend of the electrical conductivity values changes at a proper water or aqueous solution concentration. The optical properties investigated through two crossed Polaroid. The different phases can be distinguished from each other; the phases characterized are as isotropic, anisotropic or mixed phase.

Keywords: *Electrical conductivity; Optical property; Phase transition; AOT.*

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INTRODUCTION

Surfactants contain polar head and alkyl chain. These molecules can organize their structures in solution like normal micellar, reverse micellar and liquid crystal [1]. In specific case reverse micellars have spherical shape, the self organize contains surfactant in nonpolar solutions but normal micellar organized spherical shape in reach water solutions [2]. The spherical reverse micelle structure has hydrophobic alkyl chains directed externally [3, 4]. The mixture of water, surfactant and oil fabricated reverse micelle which is used for synthesis of nanoparticles [2]. The size of reverse micelle increases with increasing water concentration. The shapes, kind of surfactant and water dependence of reverse micellars are specific properties of each system. The synthesis of inorganic nanoparticles takes place with mixing the two similar reverse micellar solutions which contain suitable counter ions in aqueous phases [5, 6].

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EXPERIMENTAL

The system AOT/ heptane/ water, were prepared by adding dropwise water in 50% by weight of AOT in heptane binary solution. The amount of AOT was 2 gr (from Across company) mixed with 2 gr heptane (from Merck) with magnetic stirrer. The clear solutions were prepared. The water concentration added to this mother solution in room temperature (298K). The specific conductivity measurement of the solution takes place step by step by electrical conductivity digital instrument (CHEMIE ZAG model ZCM 74C). Moreover optical properties of the samples were characterized through two crossed polaroids. Similarly the optical properties investigated by adding water in the binary solution. The phase transformation of the sample was checked through two crossed polaroids. Then aqueous solutions below used instead of water in microemulsion ternary system. The optical investigations characterized the isotropic, anisotropic and mixed phase.

1. 10% Zinc acetate (From Carlo Erba Company) in water
2. 10% KOH (From Panreac Company) in water

RESULTS AND DISCUSSION

The optical properties of the solutions were characterized through two crossed polaroids. The investigation takes place step by step by adding water concentration in the initial binary solution 50% by weight of AOT in heptane. Phase transformation were checked and marked in proper water concentrations (Figure 1).

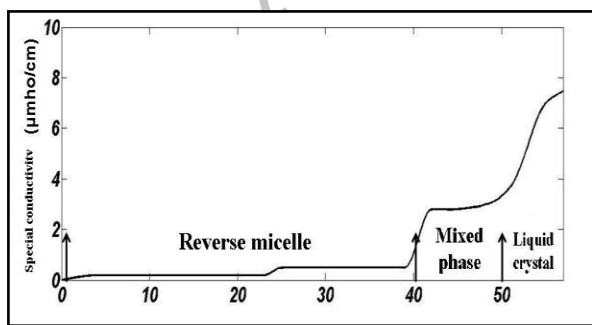


Fig. 1. Dependence of special electrical conductivity on the concentration of adding water in the initial binary solution 50% by weight of AOT in heptane.

The experiment repeated for another two aqueous solutions, used instead of water in microemulsion systems. The aqueous solutions were

- 1) 10% Zinc acetate in water
- 2) 10% Potassium Hydroxide in water.

The extensions of stable phases were characterized by a uniform trend in specific electrical conductivity values with increasing water concentration. The change in trend of specific electrical conductivity values with increasing water or aqueous solutions corresponds to phase transformations which are marked in proper aqueous solution (Figures 2, 3) [7].

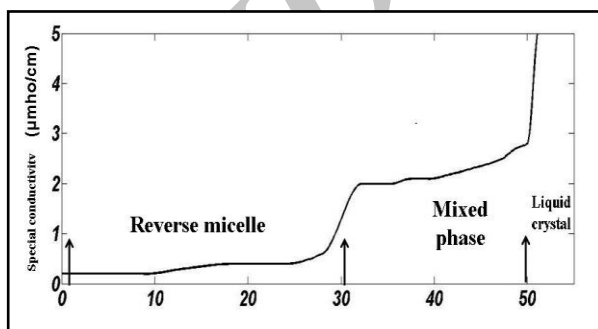


Fig. 2. Dependence of special electrical conductivity on the concentration of adding aqueous solution (10% Zinc acetate in Water) in the initial binary solution 50% by weight of AOT in heptane.

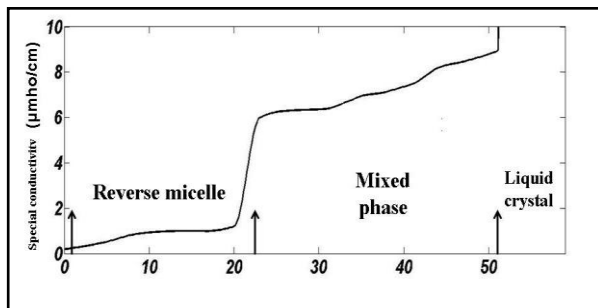


Fig. 3. Dependence of special electrical conductivity on the concentration of adding aqueous solution (10% Potassium Hydroxide in Water) in the initial binary solution 50% by weight of AOT in heptane.

CONCLUSION

The comparison of three microemulsion systems indicated that the addition of ionic impurities in the aqueous media affects the stability of reverse micelle. It reduces the extension of reverse micelle phase. If the abrupt change appears

in specific electrical conductivity value at proper water or aqueous concentration, it signifies the phase transformation in the system. The change of optical properties corresponded with the abrupt increase in electrical conductivity. In reverse micelle phase, by mixture of Zinc acetate and Potassium Hydroxide in aqueous solutions, ZnO nanoparticles were fabricated. The phase extensions in different microemulsion phases are indicated in Table 1.

Table1. The change of Optical property and Electrical conductivity by adding water or aqueous solutions in binary solution 50% by weight of AOT in heptane

number	system	phase	Optical property	Electrical conductivity
			The percent of determine with increasing water or aqueous solutions corresponding to phase transformation	
1	AOT/ heptane/ water	Reverse micelle	0 - 40	0 - 40
		Mixed phase	40 - 50	40 - 50
		Liquid crystal	> 50	> 50
2	AOT/ heptane/ aqueous solution 10% zinc acetate in water	Reverse micelle	0 - 30	0 - 31
		Mixed phase	30 - 50	31 - 50
		Liquid crystal	> 50	> 50
3	AOT/ heptane/ aqueous solution 10% potassium hydroxide in water	Reverse micelle	0 - 23	0 - 23
		Mixed phase	23 - 51	23 - 51
		Liquid crystal	> 51	> 51

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