

Aggregation in wormlike micelles of ternary lecithin, water, sodium deoxycholate systems in organic solvent

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Lecithin Organogels of wormlike micelles usually take place in organic solutions as primer to lecithin ratio increases towards a critical value, where the primer can be represented by water [1], bile salts [2] or other molecules[3].

The role of the primer in the self-assembly process observed in lecithin-primer organic solutions has been partially clarified [4] and only a few bile salts and water effects have been investigated separately[5].

This study wants to elucidate the phase behaviour and the formation of wormlike micelles gels in ternary mixtures of phosphatidylcholine, water, sodium deoxycholate in cyclohexane. The resultant appearance of wormlike micelles as a function of bile salt fraction B_0 and water fraction W_0 and the consequent induction of gel-like behaviour of the colloidal system have been analyzed by rotational rheometry. Structural analysis of the aggregates in solution have been performed by small angle X-ray scattering (SAXS) and Dynamic Light Scattering (DLS).

The main findings are: i) water and sodium deoxycholate, because of their peculiar polar properties, are capable to insert as intercalation agents between heads of lecithins, modifying the packing factor of the aggregation fundamental units, inducing a sphere-to-rod transition of the aggregates. ii) water and sodium deoxycholate give rise to a complementary interaction with the polar head of lecithin, as showed in fig.1. Indeed, a large primer mixture excess determines a phase separation in simple primer lecithin systems and the separation occurs at high B_0 if W_0 is kept low and viceversa. iii) A slight increase in the wormlike micelles cross section is observed by increasing W_0 . v) Despite organogels with two primers have rheological properties very similar to those of binary water lecithin and bile salts lecithin mixtures, still are present many differences when a more accurate investigation of relaxing times of the wormlike micelles network is taken into account.

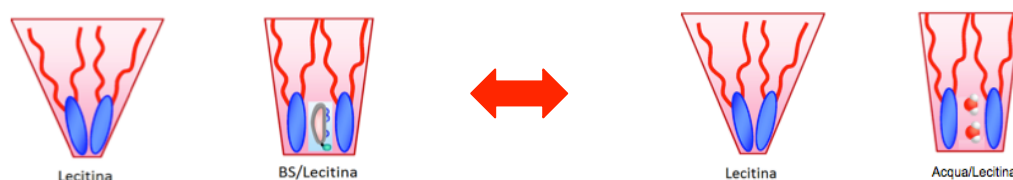


Figure 1 Complementary role of water and sodium deoxycholate as aggregation primer in lecithin wormlike micelles

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