I. Introduction

Motivation
Generate gas-phase micelles in laboratory, and use them as nano-sized carriers/reactors to study chemistry of biomolecules in gas-phase membrane-mimetic environments.

II. Apparatus & Methods

Home-made ESI Guided-Ion-Beam Tandem Quadrupole Mass Spectrometer

ESI of surfactant solution, followed by self-assembling of surfactants in the gas phase.

Surfactant: NaAOT sulfosuccinate

III. Results

1. Formation of multiply charged NaAOT micelles in the gas phase

2. Encapsulation of hydrophilic Gly into gas-phase NaAOT micelles

3. Solvation was only observed for small NaAOT aggregates

4. Encapsulation of hydrophobic Trp and protonated/deprotonated Trp in gas-phase AOT micelles

5. Selective encapsulation of different AAs by positively charged NaAOT reverse micelles

IV. Conclusions

- NaAOT surfactants are able to self-assemble into highly ordered micellar structures in the gas phase
- Charge state governs micellar structure in the gas phase. Positively charged aggregates form a reverse micelle-like structure, while negatively charged aggregates adopt a direct micelle-like structure.
- Amino acids can be selectively encapsulated and transported by NaAOT direct and reverse micelles.

Applications

- Gas-phase NaAOT micelles may act as
  1) nano-sized vehicles for transport of non-volatile biomolecules into the gas phase,
  2) nano-sized reactors for investigating single biomolecules encapsulation in gas-phase bio-membrane mimetic systems.

Related Publications:


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