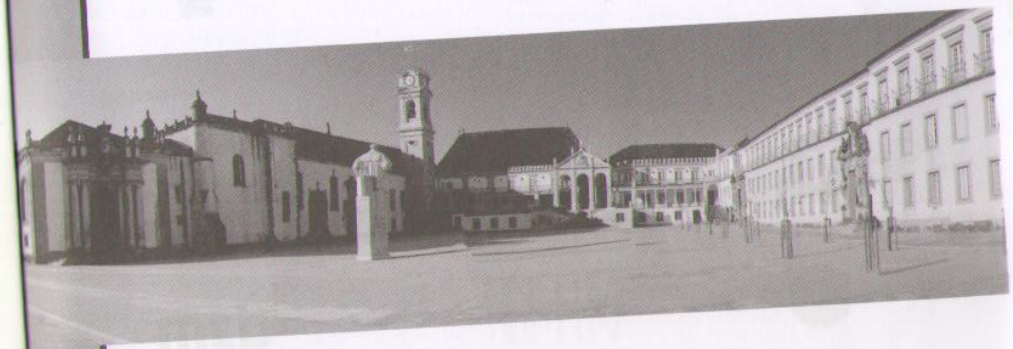
20th INTERNATIONAL SYMPOSIUM ON SURFACTANTS IN SOLUTION



SIS 2014

Book of Abstracts
20th International Symposium on Surfactants in Solution SIS2014
22-27 June 2014 Coimbra Portugal

Editors
Eduardo F. Marques
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Jorge M. Gonçalves

ISBN
978-972-99512-3-7

Legal Deposit
377388/14

Publisher
FCTUC and the Organizing Committee of 20th SIS

Printing
Tipografia Lousanense

Institutional Support

Sponsors

Secretariat

Official Carrier

[P11.10]

SDS effects upon the oligomeric stability of Glossoscolex paulistus hemoglobin by analytical ultracentrifugation

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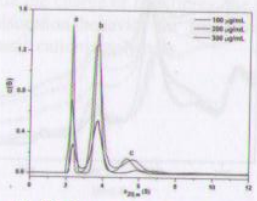
The extracellular hemoglobin of annelid Glossoscolex paulistus (HbGp) has a molecular mass of 3600 kDa and an oligomeric structure composed of heme-containing globin-like chains (144 subunits) and 36 additional polypeptide chains lacking a heme group, and named linkers. This work focuses on the characterization of dissociated species in equilibrium in the SDS-HbGp system, monitored by AUC. SDS induces HbGp oligomeric dissociation above 0.1 mmol/L of surfactant. At 0.1 mmol/L of SDS, in the presence of 200 and 300 µg/mL of oxy-HbGp, a single species is observed, characterized by sedimentation coefficient s20,w of 58.4 ± 0.5 S and molecular mass (MM) of 3,600 ± 80 kDa, assigned to the un-dissociated protein [1]. However, at 100 µg/mL of oxy-HbGp, the presence of abcd tetramer in the solution is noticed, suggesting that the oligomeric dissociation is dependent on the protein concentration. The increase of SDS concentration promotes the full oxy-HbGp oligomeric dissociation into smaller subunits, such as, monomer d, trimer abc, tetramer abcd. At 0.4 mmol/L of SDS s20,w values of 2.18 ± 0.07 S, 3.45 ± 0.07 S and 5.6 ± 0.5 S are assigned, respectively, to the monomer d, trimer abc and tetramer abcd species, with several SDS molecules bound to their structure (Fig. 1). The SDS effect upon the HbGp oligomeric stability is quite similar to that reported for the denaturant urea, and alkaline pH [2,3]. Thus, the order of oxy-HbGp dissociation, in the presence of SDS, is given by dodecamer (abdc)3, followed by tetramer abcd, trimer abc and monomer d. Our results are consistent with literature reports for HbGp in different conditions, as monitored by AUC and MALDI-TOF-MS [3,4].



Continuous sedimentation coefficient distribution c(S) curves for oxy-HbGp, in the presence of 0.4 mmol/L of SDS, at pH 7.0. The letters a, b and c are associated to the monomer d, trimer abc and tetramer abcd species, respectively.

Acknowledgements The authors thank FAPESP and CNPq for financial support

[1] Carvalho, F.A.O.; Santiago, P.S.; Borges, J.C.; Tabak, M., *Analytical Biochemistry* **2009**, 385, 257-263.
[2] Carvalho, F.A.O.; Carvalho, J.W.P.; Santiago, P.S.; Tabak, M., *International Journal Biological Macromolecules* **2013**, 52, 340-348.
[3] Carvalho, F.A.O.; Carvalho, J.W.P.; Alves, F.R.; Tabak, M., *International Journal Biological Macromolecules* **2013**, 59, 333-341.
[4] Carvalho, F. A. O.; Carvalho, J. W. P.; Tabak M., Characterization of the oligomeric extracellular hemoglobin of Glossoscolex paulistus and its subunits, in different solution conditions, by analytical ultracentrifugation (AUC). In *Recent Res. Devel. Anal. Biochem.*; Pandalai, S. G., Ed.; TRN: Kerala, 2013; Vol.5; pp 1-25.

[P11.11]

Surface-active polymers based on polymeric acids and hydrophobic surfactants

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Expanding of using of macromolecular surfactants (MMS) in the economy stimulates the researches for developing of new MMS.
The purpose of this work: Synthesis of associates of weak polymeric acids with hydrophobized cationic surfactants (SA) and study of surface-active properties of such associates .
Objects of research: polyacrylic (PAA), polymethacrylic (PMAA) acids, cationic surfactants: cetyltrimethylammonium bromide (CTAB), dimethyldioctadecylammonium chloride (DMDODAH).
Methods: Potentiometric, Spektroturbidometric, Viscozimetric titrations, determination of electric mobility of associate particles.
Results and discussion: Interaction of cationic surfactants with polyacids accompanied by a marked decreasing in pH (Fig.1) and an increasing in the optical density of the system. This is due to reacting of polyacid with surfactant, resulting in appearing of strong mineral acid.
Polyacids associates with the cationic surfactants have a high hydrophobicity (m-number of hydrophobic groups, related to 1 mole of functional groups (-COOH) of polyacids.
Increasing of hydrophobicity of the polymer chains during complexation of polyacides with SA leads to an increasing of compaction (Fig.3) and changing of ζ-potential of the associate particles (Fig.2). It was observed, that changes in the properties of polyacid associates with cationic SA contributes to their surface activity at the water/air interface.
Conclusion: Interaction of weak polymeric acids (PAA, PMAA) with hydrophobized surfactants leads to formation of compact surface-active associates.

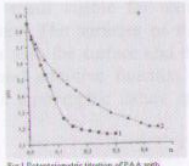

Fig.1 Potentiometric titration of PAA with CTAB (1) and DMDODAX (2)

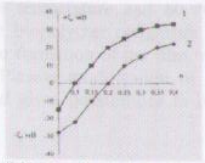

Fig.2 Dependence of ζ-potential of complexes of PAA with CTAB (1) and DMDODAH (2) on the surfactant's relative concentration (n)

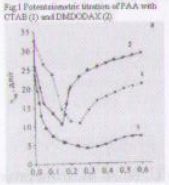

Fig.3 Viskozimetric titration of PAA with CTAB at 293 K (1) 313 K (3) and 333 K (3).

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