Random vs. Block Copolymers of Polyethylene Oxide and Polypropylene Oxide in Aqueous Solutions: Interaction with Ionic Surfactants
- Giauque Travel Award Presentation -

A. Niemiec[C, S] and W. Loh
Department of Physical Chemistry, Institute of Chemistry, Universidade Estadual de Campinas, Campinas, SP, Brazil
niemiec@iqm.unicamp.br

This project deals with interactions between polyethylene oxide and propylene oxide random copolymers of different architectures with ionic surfactants: SDS, CTAB, DTAB, DAC and also behavior of these copolymers has been compared with the properties of EO/PO block copolymers.

The interaction of SDS with non-aggregated block copolymers (investigated at 15 ^{o}C, below their c.m.t.), demonstrated a pattern similar to that observed in its interaction with PEO and other hydrophilic polymers, although with a lower c.a.c. This is consistent with the contribution from PO units since PPO displays a more intense interaction with SDS than with PEO. For random copolymers this contribution caused a decrease in c.a.c., as the PO content increased, because c.a.c is sensitive only to the polymer hydrophobic character, while C2 inceases with polymer concentration. Directly comparison of random and block copolymer with similar molar weight and composition of PO groups, reveals that c.a.c values are very different, for instance respectively 0.34 mmol/L and 2.60 mmol/L. This indicates that the distribution of PO groups in polymer chains plays an important role during the interaction with ionic surfactant. In addition, the experiment on the interaction of SDS and the mixture of a few ratios between PEO/PPO has been performed to check the difference in this interaction when considering random, block or that mixture. In the case of mixture with 1.0 wt % of neat PPO 2000 and 1.0 wt % of neat PEO 2000 or 600 in the solution, the c.a.c value was around 0.9 mmol/L, which is close to the c.a.c for the pure PPO 2000, 0.8 mmol/L. These results confirmed again that SDS first interacts with PPO groups and then with PEO moieties (in the case of mixture with PEO 2000, second endothermic peak is observed). Temperature was also found to affect the interaction (the higher the temperature, the more intense it was), which is in agreement with the previous findings for other hydrophilic polymers. This is due to a less intense polymer hydration because all these polymers display an LCST behaviour. Interestingly, however, these temperature effects are insignificant even up to a few degrees below the copolymers cloud points, suggesting that the most essential changes in their hydration, expected to occur during their clouding, take place in a narrow temperature range. As opposed to anionic surfactants, alkyltrimethylammonium ones do not display significant interactions with these copolymers, even at high temperatures (a more intense interaction is observed with dodecylammonium chloride).