

# **Synthesis and aqueous phase behaviour of homo- and co-polymers of 1,1-diallyl-4-formylpiperizinium chloride**

**Prof. SHAIKH ASROF ALI**

**Dept. of Chemistry , College of Science ,  
King Fahd University of Petroleum & Minerals**

<http://www.kfupm.edu.s>

## **ABSTRACT**

Amine-contg. acrylate latex has been widely used in fabricating water-borne adhesives and coatings because of its good desirable performances. Such latex is also a fundamental component for making ambient self-curable latex compns. During emulsion copolymn. amine-contg. monomer can polymerize in water phase due to its high water soly., and the polymer generated dissolves in water phase. This phenomenon is believed to have strong effect on the stability of latex colloids during polymn. stage and shelf stage. N,N-Dimethylaminoethyl methacrylate (DMAEMA) is a typical tertiary amino monomer employed in prepn. of amine-contg. latex. Its homopolymer (PDMAEMA) is water sol. and sensitive to temp. and pH. In the present study, phase transition behavior and colloid formation of PDMAEMA ( $M_w = 8.56 \times 10^4$ ) in aq. soln. were investigated by dynamic light scattering at different temps., pHs and ionic strength. The effect of emulsifier on the thermo-induced phase transition of PDMAEMA was also studied. It was found that: (1) 1% PDMAEMA aq. soln. showed no phase transition on heating at  $\text{pH} < 8.2$ . The lower crit. soln. temp. (LCST) of the soln. decreased sharply from  $67^\circ\text{C}$  to  $42.5^\circ\text{C}$  as pH increased from 8.2 to 9, and decreased slowly to  $40^\circ\text{C}$  when pH was further increased to 11; (2) A higher ionic strength (NaCl concn.) in the soln. resulted in a lower LCST; (3) The presence of emulsifier, sodium dodecyl sulfate at the concn. of 1.92%, in

PDMAEMA aq. soln. (pH 8.8) could keep the polymer sol. even on heating at 70°C (no phase transition occurred). Moreover, the relationship between the formation of homo-PDMAEMA or DMAEMA-rich copolymer in aq. phase during emulsion polymn. and the stability of the latex were also investigated. The results obtained suggest that the stability of DMAEMA-contg. polymer latex can be improved by selecting a proper emulsifier, designing optimized formulation and polymn. conditions.