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Comparison of Critical Adsorption Points of Ring Polymers with Linear Polymers YONGMEI WANG, The University of Memphis, TAIHYUN CHANG, Pohang University of Science and Technology — The Critical Adsorption Points (CAP) for ring and linear polymers are determined and compared using Monte Carlo simulations and liquid chromatography experiments. The CAP is defined as the co-elution point of ring or linear polymers with different molecular weights (MW). Computational studies show that the temperature at the CAP, TCAP, for rings is higher than TCAP for linear polymers regardless of whether the chains are modelled as random walks or self-avoiding walks. The difference in the CAP can be attributed to the architectural difference. Experimentally, four pairs of linear and ring polystyrenes (PS) of different MW were synthesized and purified. Elution of these polymers using a C18 bonded silica stationary phase and a CH₂Cl₂/CH₃CN mixed eluent were studied. The temperature at the co-elution point, TCAP, and the co-elution time at the CAP, t_{E,CAP} were determined for both ring and linear polymers. Experimentally it was found that T_{CAP} of linear PS is lower than TCAP of cyclic PS and t_{E,CAP} of linear PS is shorter than t_{E,CAP} of ring PS. Therefore, at the CAP of linear polymers, ring polymers elute later in order of increasing MW while, at the CAP of ring polymers, linear polymers elute earlier in order of decreasing MW. This is in excellent agreement with the Monte Carlo computer simulation results.

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