The van der Waals equation of state is used for the correlation and the prediction of the lower critical solution behavior or mixtures including a solvent and a polymer. The equation of state parameters for the polymer are estimated from experimental volumetric data at low pressures. The equation of state parameters for the solvent are estimated via the classical Soave method, i.e. using the critical properties and a generalized equation for the energy parameter. When extended to mixtures, the van der Waals one-fluid mixing rules along with the Berthelot combining rule for the molecular cross energy parameter are used. The arithmetic mean combining rule is used for the cross co-volume parameter. The deviations from the Berthelot combining rule are taken into account via a simple expression which has been previously obtained from vapor-liquid equilibrium data of athermal polymer solutions and has been successfully used for the prediction of upper critical solution temperatures for various binary polymer solutions. In this work, we demonstrate and explain some of the problems which cubic equations of state exhibit in describing the lower critical solution behavior for polymer solutions. These problems are overcome by using a temperature-dependent interaction parameter, even for small temperature ranges, leading to excellent results. Despite the problems, we have developed an empirical methodology in using the van der Waals equation of state with a single interaction parameter for predicting the lower critical solution behavior of polymer/solvent solutions. The results are satisfactory. Typically, the difference between the predicted and the experimental lower critical solution temperatures is between 10 and 35 degrees C.