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## The role of thermodynamic parameter on membrane morphology based on phase diagram

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### Abstract

There has been a lot of improvement in the purification and filtration industry in these decades and now membranes have a great role in those industries. In porous membranes, separation happens as a result of difference in particles and pores size, so prediction the morphology of membrane is so vital. For this purpose, a dimensionless thermodynamic parameter was defined to obtain the exchange rate between solvent and nonsolvent during membrane preparation. In fact, the effect of thermodynamic parameter was elucidated by constructing ternary and quadratic phase diagrams based on Flory Huggins theory. The effect of interaction parameters and molar volumes of components (solvent, nonsolvent, polymer and additives) on binodal line and membrane morphology was also checked. By increasing the dimensionless thermodynamic parameter, membranes become more porous and this situation happens when exchange rate between solvent and nonsolvent increases. Moreover, the effect of TiO<sub>2</sub> as an additive on phase diagram and the dimensionless parameter was experimentally studied and the results were confirmed by SEM images.

**Keywords:** Phase diagram, Thermodynamic parameter, Morphology, Titanium oxide

### 1- Introduction

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