# Extractive distillation of tert-butanol using triethylene glycol

tertiary butanol is mainly used as a gasoline octane booster, solvent, ingredient of paint remover, production of metal tertiary butyl ether. it is commercially obtained as a by product of isobutane to propylene oxide conversion. the process gives water containing tert-butanol which is further concentrated by distillation to form minimum boiling azeotrope .extractive distillation is the common method used for separation of azeotropic mixture i.e a third component is added into the system as entrainer to alter the relative volatility of the components to be separated . in this study typical effective entrainer triethylene glycol (TEG) is used as entrainer . thermodynamic model used is NRTL to describe the non ideality of the liquid phase while the vapour phase is assumed ideal . In the reference paper from flash calculations in aspen plus the relative volatility of 4 was obtained for entrainer to feed ratio of 2 at 0.3 atm pressure, the same have been used for ease in this simulation. binary envelopes in DWSIM generated the following graphs showing that three components can be separated at 0.3 atm in extractive distillation column(EDC) and 0.02 atm in entrainer recovery column(ERC) .
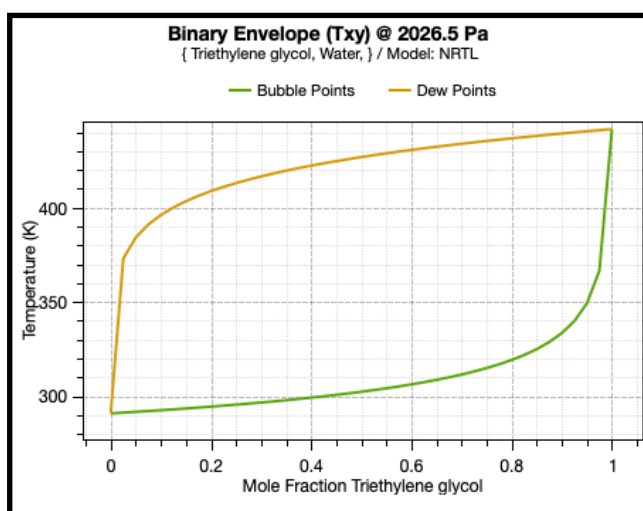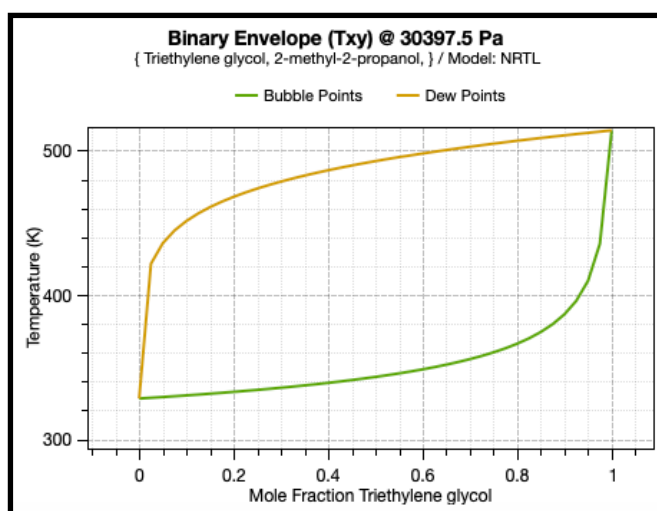
The feed fed to the column assembly is same as used in the reference paper for the ease of comparison of results.

The design of the process has the assumption that entrainer and the feed mixture are feed on the same stage in shortcut column for simulation purpose .the lower pressure in the columns have the effect of increasing the relative volatility of the system and hence ease of separation is increased and number of stages required is less. the results in dwsim are in agreement to the results published in experimental study, the deviations in the results maybe due to use of lower efficiency plates or difference in reflux ratio used in the two studies . upto my knowledge there is no available open literature available in which TEG is used as entrainer in two tower extractive distillation of TBA/WATER azeotrope.the following table summaries the results obtained in the simulation.

COMPONENT	MOLE FLOW RATE feed	MOLE FLOW RATE product EDC	MOLE FLOW RATE product EDC	MOLE FLOW RATE product ERC	MOLE FLOW RATE product ERC
		top	bottom	top	bottom
TBA	2.297	2.296	0.00094	nil	nil
WATER	1.667	0.12	1.547	1.547	0.007
TEG	7.927	0.00022	7.927	0.00015	7.927