INTRODUCTION:

Extractive distillation is generally used to separate Azeotropic mixture or close boiling mixture that cannot be separated with conventional distillation because its relative volatility is approximately unity. To separate such kind of mixture, an additional component is added as entrainer into the mixture.

Methylal or Dimethylmethane is widely used as intermediate in industries and also used in cosmetics, medicines, household goods, diesel fuel additive and pesticides. Methanol-Methylal mixture form minimum boiling azeotrope. Here methanol-methylal mixture is getting separated by extractive distillation using ethylene glycol as an entrainer.

PROCESS:

A mixture of methanol and methylal having mole fraction 0.95 and 0.05 respectively fed to the 7^{th} stage of 11 staged extractive distillation column with the solvent ethylene glycol fed to the 3^{rd} stage. Presence of ethylene glycol alters the relative volatility of methanol-methylal mixture and cause the methylal (0.9949 mol %) at the top of the extractive distillation column and remaining mixture move toward the bottom of the column. The mixture is fed to the 3^{rd} stage of 4 staged recovery column (distillation column) to get the almost pure ethylene glycol (0.997 mol %) and it recycled back to the extractive distillation column with makeup ethylene glycol.

RESULT:

	Recycle EG	Make up EG	Methylal	Methanol	Entrainer(EG)	Feed
Temperature(^{0}c)	25	25	42.239615	63.762692	25	25
Pressure(atm)	1	1	1	1	1	1
Mass Flow(kg/hr)	89.99599	0.003925	97.927916	2.0760943	90	100
Methylal	3.30674E-06	0	0.9949	0.024097738	3.306724E-06	0.95

Methanol	0.002996693	0	0.00509849	0.97490226	0.0029965626	0.05
Ethylene glycol	0.997	1	1.50659E-06	0.001	0.99700013	0.0

CONCLUSIONS:

1. Methanol-Methylal-ethylene glycol system is sensitive to the thermodynamic models chosen and the parameter applied on it.
2. There are several solvents which can be use as solvent in this process like water, dimethylformamide (DMF). DMF gives very pure methylal but it is not environment friendly.
3. Fig. shows the RCM for the methanol-methylal-EG ternary system calculated by the UNIFAC model. The direction of residual curve is from methylal and methanol (unstable node) to the ethylene glycol (stable node) as time for distillation is increases.

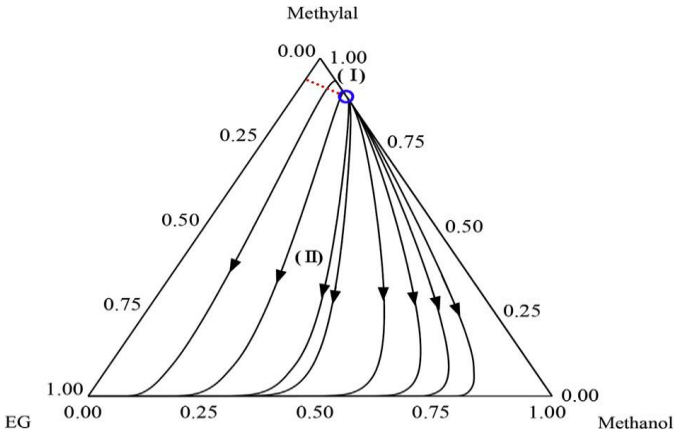

Fig.: Residue curve map for methanol-methylal-ethylene glycol system at 101.3kPa.

REFERENCES:

1. Extractive distillation of methylal/methanol mixture using ethylene glycol as entrainer, Yichun Dong, Chengna Dai, Zhigang Lei*
2. Residue curve map: fig.: 2 of Extractive distillation of methylal/methanol mixture using ethylene glycol as entrainer, Yichun Dong, Chengna Dai, Zhigang Lei*