

## **Kem-107.121 Process simulation II**

**Theory exam. 10.12.2002**

**Time: 8:00-9:00**

**(NO materials are allowed to use in the theory examination)**

Answer shortly the main aspects (in Finnish, Swedish or English):

1. Most important things affecting on the selection of VLE models
2. Explain:
  - a) Tear stream
  - b) When equation oriented simulator is most suitable
  - c) When to use a fuzzy model

## **Kem-107.121 Process simulation II**

**Calculation exam. 10.12.2002**

**Time: 9-11**

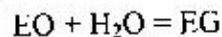
**Use Pro/2 simulator.**

**Give answers on a paper or in Word file.**

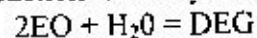
**Copy all PRO/2 files into a floppy and return with answers.**

**(Lecture materials can be used)**

1. Ethylene glycol (EG) is made from ethylene oxide (EO) and water at 95 °C in liquid phase:



Side reaction to diethylene glycol (DEG) is:



a) Calculate the boiling point of feed mixture at 95 °C (if mole ratio of EO / H<sub>2</sub>O is 1 mol / 1 mol).

b) Study how temperature and feed mole ratio affects the selectivity of EG formation.

2. Ethylene glycol (25 wt-%) / water mixture is to be purified:

a) Check, how pure ethylene glycol it is possible to make by evaporating continuously at 101 kPa, if the evaporated water may include max. 5 wt-% ethylene glycol.

b) Design a distillation column (calculate diameter and height) for distilling 25 wt-% ethylene glycol as feed to make 99 wt-% glycol and 97 wt-% water as products in a tray column (assume tray efficiency of 50 %). Feed rate is 20 t/h.

Hints: Use 4 theoretical trays, feed to the top, SRK-modified Panag-Reid thermodynamic method.