**Chemical Unit Operations II. exam, 15/01/2018**

**Name:**

**NEPTUN code:**

**Give the meaning of all notations, including dimensions. If you draw, don’t forget to explain as well.**

1. Define the following terms: heat transfer, distribution ratio, reaction enthalpy, Reynolds number, minimal reflux ratio. (15 points)
2. Explain the single stage batch distillation of a binary mixture. Set all balance equations. Derive the Rayleigh equation. How do you calculate the average composition of the distillate, if initial molar amount and the composition of the mixture is known, and the molar amount of the distillate is given? Express all needed equations and explain the steps of the solution. (30 points)
3. Please explain a single stage batch extraction. Set the balance equations (mass and component balances). Give the criteria or assumption of designing the mixing and the sedimentation parts. (15 pont)
4. Continuous stirred tank reactor, cooled through an internal coil. Set the component and heat balance equations at steady state operations. Graphical determination of possible working points (the reaction has first order kinetics). Discuss stability. (20 points)
5. Ideal isothermal plug flow reactor. Set all required balance equations for steady state operation in order to calculate the concentration of the T product at the outlet if the reaction type is A+B→T. Volume of the reactor, inlet concentrations of both A and B at the reaction rate coefficient at the reaction’s temperature is known. (20 points)

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