



## Final exam questions

Subject group name: **Process Engineering**

Neptun code: ZVEGEÉEBG51

Credit points: 4

Subject(s) in this subject group:

- **Transfer Processes (BMEGEÉEBG51)**

Program: Mechanical Engineering, BSc (2NAAG0)

Specialization(s): Process engineering

Responsible person(s):

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You can check the current subject forms at the Educational Portal of the Faculty of Mechanical Engineering.

<https://oktatas.gpk.bme.hu/>

Always check the for updates at [edu.gpk.bme.hu](http://edu.gpk.bme.hu) before preparing for the exam, especially if the subject group contains at least one subject from your final semester!

**Valid from 27 February 2023**

*Dr. László Hégyel*

associate professor

## I. Principles of diffusion

1. Applications of mass transfer, more important diffusion processes. Batch and continuous operation. Continuous and stagewise contact. Equilibrium stage.
2. Theory of diffusion, Fick's 1<sup>st</sup> law. Analogy with momentum and heat transfer.
3. Equimolar counterdiffusion. One way (unimolar) diffusion.
4. Prediction of diffusivities for gases, influence of pressure and temperature. Chapman-Enskog equation.
5. Mass transfer coefficients ( $k_y, k_x, k_g, k_c$ ). Theory of film. Effect of one way diffusion.
6. Two-film theory. The rate of mass transfer. Relation between the overall ( $K_y$ ) and film transfer coefficients ( $k_x, k_y$ ).
7. Determination of mass transfer coefficients. Measurement: wetted wall column. Correlations, Sherwood-number.

## II. Distillation

1. Vapour-liquid equilibrium of ideal mixtures. Relative volatility. Temperature-composition (T-x,y) and y-x equilibrium diagrams of ideal and azeotropic (minimum and maximum boiling point) mixtures.
2. Distillation methods. Flashing, total and component material balance equations.
3. Rectification. Determination of the number of theoretical plates (McCabe-Thiele method). Heat condition of feed (q). Heat balance of the column.
4. Total reflux, minimum number of plates. Minimum reflux ratio. Optimal reflux ratio.
5. Differential distillation, Rayleigh-equation.
6. Plate efficiencies (average (column) and Murphree).
7. Types of plates (bubble cap, sieve, valve, turbogrid).