

Questions for the diploma exam of the second-degree studies
Chemical Technology
Specialty: Innovative Chemical Technologies
2019/20

1. Numerical methods for a single-variable optimization
2. Numerical methods for large systems of linear equations
3. Mass balance of ideal flow chemical reactors
4. Methods for analysis of kinetic data and parameter estimation of a chemical reaction rate equation
5. Mathematical models for non-ideal flow chemical reactors
6. Solid-catalysed chemical reactions – steps determining the overall process rate.
7. Mass transport in porous catalyst pellets
8. Chemical equilibrium composition for liquid and gas phase reactions
9. Parallel and series reactions in batch reactor
10. Main types of chemical reactors and the differences between them
11. Stoichiometry and thermodynamics of chemical reactions
12. Catalysts and catalysis in chemical technology – main types and examples of catalysts and catalytic processes
13. Methods of catalysts preparation and characterisation
14. Bio-raw materials in chemical technology – typical resources, methods of isolation, characterisation and possible applications
15. Liquid biofuels as a replacement for traditional transportation fuels – methods of obtaining and basic requirements
16. Bioenergy and biofuels – main definitions, division and examples in the light of actual EU legislation
17. Oleochemistry – methods of obtaining, characterisation and transformation of fatty materials into chemical products
18. Environmental protection in the chemical industry – main types of pollutants and methods of reduction the emission of harmful substances into the environment
19. Economic evaluation of chemical processes in the light of LCA
20. The principles of green chemistry
21. Cleaner technology - concept and examples
22. Sustainable development - concept and technological examples
23. Circular economy – concept and technological examples
24. Waste as alternative raw materials for inorganic industry
25. Technologies for phosphorus recovery from wastewaters
26. Technologies for phosphorus recovery from sewage sludge ash
27. Wastewater treatment technologies
28. Phosphoric acid – production, assessment
29. Inorganic fertilisers – characteristic and production technologies.
30. Waste to energy - technological examples