



Syllabus of the educational component

Program of educational discipline

Technologies of production and using of surfactants for the processing of hydrocarbon feedstock

Code and name of specialty

161 – Chemical technologies and engineering

Institute

Educational and scientific institute for Chemical Technology and Engineering

Educational program

Technology of oil, gas and solid fuel refining processes

Department

Technology of oil, gas and solid fuel refining processes

Educational level

Bachelor

Type of discipline

Optional

Semester

8

Language of teaching

Ukrainian, English

Teachers, developers general information



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General information, amount of publications, main courses, etc.

[Learn more about the teacher on the department's website](#)

Abstract

The discipline introduces the modern features of the synthesis and use of surface-active substances for industrial oil and gas processing and pretreatment. The main schemes of the synthesis of surfactants are considered, the characteristics of the equipment are provided.

Purpose and objectives of the disciplines

Acquisition of knowledge by students in the field of production and use of surface-active substances in the processes of primary preparation and processing of oil and natural gas. The algorithm for calculating the material and heat balances of the surfactant synthesis processes is given

Dub format

Lectures, practical work, independent work, consultations. The final control is an exam.

Competences

Ability to demonstrate knowledge, understanding and skills to perform calculations of material and heat balances of surfactant synthesis processes

Learning outcomes

Be able to use modern software complexes for design and operational calculations of technological process parameters of primary and secondary oil processing using surfactants

Scope of the discipline

The total volume of the discipline is 120 hours. (4 ECTS credits): lectures – 32 hours, laboratory work – not provided, practical classes – 16 hours, independent work – 70 hours.

Prerequisites for studying the discipline (prerequisites)

Previous disciplines necessary for successful completion of the course:

Processes and devices of chemical technologies

Organic chemistry

Surface phenomena and dispersed systems

Physics and chemistry of fossil fuels

Features of the discipline, methods and technologies of education

The discipline is taught using the following traditional types of educational technologies and forms of organization of the educational process:

lecture;

practical training;

independent work;

individual calculation task;

consultations.

Classes activity is based on an learning method, in which students take an active part, not only listening to the teacher, but also answering their questions. The teacher prepares in advance a list of questions that stimulate associative thinking and the formation of logical connections with the previously taught material.

Program of educational discipline

Topics of lectures

Topic 1. General information about the production technology of surfactant demulsifiers

Topic 2. Theoretical foundations of the production of nonionic surface-active substances - block copolymers

Topic 3. Basic parameters of alkylene oxide joining processes

Topic 4. Design of capacity reactors. Calculation of device parameters. Material and heat balances

Topic 5. Basics of calculations of auxiliary equipment and determination of hydrodynamic characteristics of the reactor

Topic 6. Characteristics of the finished product (technical conditions). The composition of the commercial form.

Storage and transportation of finished products, their consumers.

Topic 7. Description of the technological scheme for the production of surface-active substances, the purpose of each stage of the process.

Topic 8. Theoretical and practical coefficients of consumption of raw materials, catalysts. Analysis of cost indicators, number of losses.

Topics of practical classes

Topic 1. Analysis of existing surfactants and the method of their production.

Topic 2. Chemical reactions of each stage of the process, conditions for their implementation. Thermal influence. Process mechanism.

Topic 3. Schematic technological scheme.

Topic 4. Design of the reactor unit (reactor), mode of operation.

Topic 5. Material balances by stages of the process, consolidated balance sheet of the plant.

Topic 6. Theoretical and practical coefficients of consumption of raw materials, catalysts. Analysis of cost indicators, number of losses.

Topic 7. Characterization and comparative analysis of existing production facilities

Topic 8. Control and measuring devices that register and regulate the main parameters of the technological process. . Laboratory control of production, location and periodicity of sampling, methods of analysis.

Topics of laboratory work

Independent work

Making of an individual calculation task with a graphic component.

Literature and educational materials

Basic literature

1. A.G. Tula Synopsis of lectures from the course " "

2. Solling T., Kamal MS, Hussain SM (Eds.) Surfactants in Upstream E&P. Springer, 2021. — 468 p. — ISBN 978-3-030-70025-6.

3. Mishra D., Singh R., Khare P. (ed.) Biochar-Based Nanocomposites for Contaminant Management: Synthesis, Contaminants Removal, and Environmental Sustainability. Springer Nature Switzerland AG, 2023. — 146 p. — ISBN: 978-3-031-28872-2. — Advances in Science, Technology & Innovation Series. Springer Nature Switzerland AG, 2023. — 146 p. — ISBN: 978-3-031-28872-2. — Advances in Science, Technology & Innovation Series.

Evaluation system

Criteria for evaluating student performance and distribution of points

Distribution of points for evaluating student performance:

Completion of the calculation task - 60

Attending practical classes - 40

Rating scale

Total points	National assessment	ECTS
90–100	Perfectly	A
82–89	Good	B
75–81	Good	C
64–74	Satisfactorily	D
60–63	Satisfactorily	E
35–59	Unsatisfactory (requires further study)	FX
1–34	Unsatisfactorily (re-study required)	F

Norms of academic ethics and policy of the course

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": show discipline, education, benevolence, honesty, responsibility. Conflict situations should be openly discussed in study groups with the teacher, and if it is impossible to resolve the conflict, it should be brought to the attention of the employees of the institute's directorate.

Regulatory and legal support for the implementation of the principles of academic integrity of NTU "KhPI" is posted on the website: <http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/>

Coordination

Syllabus agreed

Date of approval, signature

Head of Department

Denys MIROSHNYCHENKO

Date of approval, signature

Guarantor OP

Iryna SINKEVYCH