

**EXAM RULES**  
**BY DISCIPLINE “TECHNOLOGY OF PRODUCTION OF ORGANIC DYES AND PIGMENTS”**

**Format: Online, oral exam**

**Platform: Microsoft Teams**

**Link: [Press the link for join to conference](#)**

The process of passing an oral exam by a student involves the automatic creation of an examination ticket, to which the student must answer orally by the examination committee. During the oral examination, video recording is mandatory.

**Exam control**

The teacher or the examination committee:

- makes a video recording of the exam;
- saves the video of the exam within 3 months from the day of the end of the session.

**Duration**

The preparation time is decided by the examiner or the examination committee. The response time is decided by the examiners or the examination committee. It is recommended 15-20 to answer all questions on the ticket.

**LEARNING OUTCOMES FOR FINAL EXAM**  
**BY DISCIPLINE “TECHNOLOGY OF PRODUCTION OF ORGANIC DYES AND PIGMENTS”**

1. Definition of concepts colored substance, dye, pigment, paint.
2. The connection of the subject of chemistry and technology of dyes with other subjects of the specialty: the theory of chemical and technological processes of organic synthesis, the basics of scientific research, chemistry and technology of organic substances, etc.
3. A brief historical review of the development of chemistry and the production of dyes. The use of natural dyes.
4. Chemical classification of dyes. Technical classification of dyes. Nomenclature of dyes. Domestic rational nomenclature, its principles and advantages.
5. Natural and chemical fibers. Features of their structure, properties and ability to stain.
6. Pretreatment of natural fibrous materials. Selection of synthetic dyes for finishing fibers and fabrics.
7. Early chemical theories of the chromaticity of organic compounds: chromophore-auxochromic, the theory of coordination-unsaturated atoms, the quinoid theory.
8. The concept of the chromophore system of dyes. Formation of conjugated chromophore systems. Polarizing substituents, ionization, complexation, spatial factors and their influence on color. Complex (competing and overlapping) coupled systems.
9. Concept. Chromophoric system of polymethine dyes. The relationship between structure and color. Applications (cationic and dispersed dyes for synthetic textile materials, photosensitizers, dyes for laser technology, etc.).
10. Cyanines are symmetrical and asymmetrical, hemicyanines, merocyanines, quinophthalans.
11. Production methods and properties. Safety in the production of polymethine dyes.

12. Chromophoric system of azomethine dyes. Production methods and properties.
13. The relationship between structure and color.
14. Intracomplex compounds of azomethine dyes.
15. Azomethine dyes in color photography ("yellow" and "magenta" components). Safety in the production of azomethine dyes.
16. The value of azo dyes. Chromophore system of azo dyes. Methods of obtaining.
17. The structure and chemical properties of azo dyes. Azo-hydrazone tautomerism.

Classification of azo dyes.

18. Monoazo dyes. The relationship between structure and color. Influence of the structure of monoazo dyes on the lightfastness and brightness of colors, the affinity of dyes for cellulose, protein and other materials.
19. Mordant and metal-containing monoazo dyes, methods of their preparation and properties.
20. Dis- and polyazo dyes. Dyes with conjugated and uncoupled azo groups, color patterns. Primary, secondary and diamine dyes. Structure and properties, methods of obtaining them. Synthesis examples. Mordant and metal-containing dis- and polyazo dyes, methods of their preparation, structure and properties.
21. Classification of arylmethane dyes. Their chromophore systems. The relationship between structure and color. Diarylmethane dyes, their preparation and properties.
22. The history of the production of sulfur dyes and their place in the aniline paint production. Methods for obtaining sulfur dyes. Sulfurization reagents and process conditions. Influence of the structure of the original
23. The history of the production of sulfur dyes and their place in the aniline paint production. Methods for obtaining sulfur dyes. Sulfurization reagents and process conditions. Influence of the structure of the original
24. Hydroxyanthraquinone dyes. Their classification, methods of obtaining, properties. Structure and color. Di-, tri- and polyhydroxyanthraquinone dyes, the main methods for their preparation. Acid hydroxyanthraquinone dyes. Dyes of the alizarin blue group. Their synthesis, properties and applications. Aminoanthraquinone dyes - dispersed, cationic, acidic, carbolans, active, direct. Structure and color. Properties, methods of getting.
25. Acylaminoanthraquinone dyes. Structure and color. Production methods and properties. Features of the application.
26. Antrimides, simple and carbazolated (phthaloylcarbazoles). Production methods and properties. Structure and color. Basics of application. Safety in the production of anthraquinone dyes.
27. Isolation and washing of dyes, drying, grinding, setting on their type and their importance for standardizing the quality of dyes.
28. Analysis of dyes. The final forms of dyes are powders and pastes. The value of the degree of dispersion of dyes, the effect of surfactants.
29. Special production forms - printing pastes, powders for vat and suspension dyeing and for dyeing viscose in bulk. Non-dusting powders and granules. Liquid forms of dyes. Stable frost-resistant pastes.