

NJSC "KARAGANDA TECHNICAL UNIVERSITY"
NAMED AFTER ABYLKAS SAGINOV"

**THE PROGRAM
OF THE ENTRANCE EXAM**

for admission to specialized doctoral studies

Educational program (8D07204 – Geology and exploration of mineral deposits)

Department: Geology and exploration of mineral deposits

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Introduction

The main objectives of training doctoral students in the educational program 8D07204 “Geology and exploration of mineral deposits” are: training postgraduate education specialists with a high level of professionalism, a culture of professional communication, having a civic position, capable of formulating and practically solving modern practical problems in the field of geology.

Database of examination materials for entrance examinations to doctoral studies in the educational program 8D07204 “Geology and exploration of mineral deposits” for 2024-2025. academic year:

Structure and content of the exam according to the profile of the group of educational programs.

1. The electronic examination ticket consists of 3 questions:

Blocks	Nature of the question	Number of points
1st question	is theoretical - determines the level and consistency of theoretical knowledge	10
2nd question	is practical - reveals the degree of formation of functional competencies (the ability to apply methods, technologies and techniques in the subject area)	15
3rd question	reveals a systematic understanding of the subject area being studied, specialized knowledge in the field of research methodology (systemic competencies)	25
TOTAL		50

2 Materials for entrance exams

2.1 Questions for the first block –

50 - for state educational programs in natural and technical areas

1. Information on the work done on geological research in Kazakhstan over the past five years.

2. Analytical and synthetic directions of geotectonics.

3. Internal structure of the Earth.

4. Structure of the earth's crust.

5. Describe the structure of the lithosphere.

6. Vertical section of the earth's crust.

7. Structure of the Earth and the earth's crust.

8. Structure of the oceanic crust.

9. Structure of mid-ocean ridges.

10. Spreading.

11. Abyssal plains.

12. Main features of the relief of the Earth's surface.
13. Microcontinents.
14. Transform faults.
15. Oceanic (continental) margins.
16. Schematic diagram of the structure of the passive oceanic margin.
17. Scheme of the structure of the active continental margin.
18. General characteristics of the continental crust.
20. Construction of platforms.
21. Characteristic features of platforms.
22. Vertical section of the platform.
23. Structure of platform slabs.
24. Describe the structure of synclises, anteklises, aulacogens.
25. Structure of folded belts.
26. Accretion-fold belts.
27. Section through the Sunda Arc showing the miogeosyncline, eugeosyncline and deep-sea trench.
28. Characteristic features of folded belts.
29. Structural-tectonic complexes of fold belts.
30. Basic elements of fold belts.
31. Basic elements of folded belts.
32. Plate boundaries.
33. Divergent boundaries.
34. Boundaries of transform faults.
35. Convergent boundaries.
36. Diagram of the ocean floor.
37. Island volcanic arcs.
38. Subduction zone structure.
39. Process of obduction.
40. Ancient convergent boundaries.
41. Mantle plumes and hot spots.
42. Geodynamic conditions for the formation of deposits from the point of view of the mobilist concept (briefly).
43. Wilson's orogenic cycle.
44. Metallogeny of the intracontinental rift.
45. Metallogeny of the spreading zone.
46. Subduction zone metallogeny.
47. Metallogeny of the collision zone.
48. Metallogeny of the final period.
49. Metallogeny of the obduction period.
50. Ophiolite belts.

Recommended references

1. Khain V.E., Lomize M.G. Geotectonics with the basics of geodynamics. Textbook - 2nd ed., and additional - M.: KDU, 2005. - 560 p.

2.2 Questions on the second block –

50 – for state educational programs in natural and technical areas

1. According to the law “On Subsoil and Subsoil Use,” characterize the subsoil.
2. Types of subsoil use.
3. Describe the mining allotment.
4. Describe the geological allotment.
5. Grouping of deposits by complexity.
6. Stages of geological exploration work.
7. Geological study of the subsoil.
8. The task of searching for mineral deposits.
9. Geological criteria and signs of mineral deposits searches.
10. Methods for searching for mineral deposits.
11. Geological mapping methods.
12. Mineralogical sampling method.
13. Geochemical sampling method.
14. Characterize the primary scattering halos.
15. Describe secondary scattering halos.
16. Altered wall rocks.
17. Objectives and principles of intelligence.
18. Stages of exploration.
19. Technical means of reconnaissance.
20. Mining exploration system.
21. Borehole exploration system.
22. Exploration system for drilling and mining operations.
23. Types of testing.
24. Methodology and characteristics of spot testing.
25. Types of sampling methods.
26. Geophysical testing.
27. Describe the sample processing technique.
28. Technical testing.
29. Methodology and characteristics of technological testing.
30. What deposit indicators are determined when calculating reserves.
31. Scuff sampling method.
32. Methods and characteristics of furrow testing.
33. Gross sampling method.
34. Intelligence tasks.
35. Technical means of reconnaissance.
36. Intelligence networks.
37. Conditions.
38. Classification of deposit reserves.
39. Forecast resources of solid minerals.
40. Categories of mineral reserves.
41. On-balance sheet and off-balance sheet reserves.
42. Outlining mineral bodies.
43. Determining parameters for inventory calculation.

44. Methods for calculating mineral reserves.
45. The importance of the doctrine of prospecting and exploration of minerals.
46. Geological prerequisites for forecasting and exploration.
47. Methods of geochemical prospecting.
48. Geophysical prospecting methods.
49. Methods of mineralogical prospecting.
50. Methods of geological prospecting.

Recommended references

1. Avdonin V.V. Geology and exploration MPI - M: Academy, 2011.

2.3 Questions on the third block

50 – for state educational programs in natural and technical areas

1. Main features of tectonic structures of Kazakhstan.
2. The Caspian syncline as an integral part of the East European Platform.
3. Current state of geological knowledge of Kazakhstan.
4. The main structural elements of the earth's crust in Kazakhstan.
5. Tectonic (geological) zoning of the territory of Kazakhstan.
6. Fragments of the Alpine epiplatform orogenic belt on the territory of Kazakhstan.
7. Combustible minerals of Kazakhstan.
8. Ural-Mongolian fold belt: Caledonian fold systems.
9. Ural-Mongolian fold belt: Hercynian fold systems.
10. Mineral resources of Kazakhstan.
11. The main tasks of developing the KazRC code.
12. International organization CRIRSCO, main points on Kazakhstan's entry into this organization.
13. Theory of geosynclines. Describe.
14. Geosynclinal belts as geotectonic structures.
15. Orogenic tectonic movements.
16. Epiorogenic tectonic movements
17. Define lithospheric plates.
18. Name the largest tectonic structures.
19. Platform and its distinctive features.
20. Describe the structural features of the platforms.
21. Describe the positive structural elements of platforms.
22. Describe the negative structural elements of platforms.
23. Define the term Rift. Its distinctive features and examples.
24. Stages and stages of formation of geosynclines.
25. Continental drift.
26. Describe the process of rifting.
27. Development of the earth's crust from the point of view of geosynclinal theory (fixism).
28. Depending on the direction of tectonic movements, the geological structures of the earth's crust and intact lithosphere are divided into two types, which?
29. Tectonic movements are divided into what main types?

30. Ophiolite complexes of Kazakhstan.
31. Distinctive features of the Kokshetau-North Tien Shan fold system.
32. Describe the Mugojar system, main characteristics and features.
33. Describe the Zhongar-Balkhash system, main characteristics and features.
34. Describe the Chingiz-Tarbagatai system, main characteristics and features.
35. Describe the Kokshetau-North Tien Shan system, main characteristics and features.
36. Describe the Zaisan system, main characteristics and features.
37. Describe the East European Platform, main characteristics and features.
38. Describe the geotectonic features of the Caspian syncline.
39. Describe the geotectonic features of the Kholzun-Chu structure.
40. Describe the geotectonic features of the Altai-Sayan folded region.
41. Give a description of the Kazakh shield.
42. Characterize the Mugodzhjar anticlinorium.
43. Characterize the Turanian plate.
44. Characterize the Torgai trough.
45. Describe the most common principle of tectonic zoning of continental territories.
46. Epihercynian platforms of Kazakhstan.
47. Stages of development of epihercynian platforms.
48. Alpine epiplatform orogenic belt.
49. Minerals of Central Kazakhstan.
50. Minerals of Western Kazakhstan.

Recommended references

1. Geological structure of Kazakhstan / Bekzhanov G.R., Koshkin V.Ya., Nikitchenko I.I. and others – Almaty: Academy of Mineral Resources of the Republic of Kazakhstan, 2000.

3 Essay topics

1. The main task of state regulation of relations in subsoil use.
2. Earth's crust: structure, composition, age and evolution.
3. Factors and tasks of expanding the mineral resource base of Kazakhstan.
4. Plate tectonics: modern concepts.
5. Factors of rock weathering and their interaction in different climatic zones.
6. Evolution of magmatism in geotectonic cycles.
7. Hypotheses for the formation of mountain-fold structures (geosynclinal, plate tectonics).
8. Ore provinces and mineral deposits.
9. Geological structure of any region of Kazakhstan.
10. Varieties and origin of granites Igneous rocks and their modern classifications.
11. Factors of regional metamorphism.
12. Geological and industrial types of gold deposits.
13. Comparative analysis of methods for calculating mineral reserves.
14. Modern methods for determining the age of rocks.

15. Mineral resource potential of Kazakhstan.
16. The oldest rocks on Earth are gray gneisses.
17. Komatiites – modern and ancient ultramafic volcanics.
18. Basalts of continents and oceans.
19. Supervolcanoes, main geological role.
20. Experimental studies of mantle matter at ultra-high pressures.

4 Recommended references

1. Khain V.E., Lomise M.G. Geotectonics with the basics of geodynamics. Textbook – 2nd ed., and additional – M.: KDU, 2005. – 560 p.
2. Sklyarov B.V. Interpretation of geochemical data. Textbook manual / – M: Internet Engineering, 2001 – p. 288.
3. Khain V.E., Lomize M.G. Geotectonics with the basics of geodynamics. Textbook – 2nd ed., and additional – M.: KDU, 2005. – 560 p.
4. Khain V.E. Main problems of modern geology / Ros. acad. Sciences, Department of Geosciences, Institute of Surrounding and Internal Lithosphere. seas. – 2nd ed., add. – M.: Scientific. world, 2003. – 346 p.