AZƏRBAYCAN RESPUBLİKASI TƏHSİL NAZİRLİYİ
BAKI DÖVLƏT UNİVERSİTETİ

FƏNN SİLLABUSU

Təsdiq edirəm__k.e.d.,prof. F.M.Çıraqov_____
(kafedra müdiri)

İmza: _______

Tarix: "__12___" __09___2020__-cu il

Kafedra: ___Analitik kimya_____

Fakültə: ___Kimya______

I. Fənn haqqında məlumat

Fənnin adı:_____**Nadir elementlərin analizi**_____

Tədris yükü (saat) cəmi:__**_60_** mühazirə__30_seminar____ praktik (laboratoriya)___30___

Tədris ili ____**2020/21**_____ Semestr___**I_**____ Bölmə ____**i/b**_____

Kredit sayı (hər saata 1 kredit) _____

II. Müəllim haqqında məlumat:_____

_____**Əfəndiyeva Nərmin Tofiq qızı**_____

(Soyadı, adı, atasının adı, elmi adı və dərəcəsi)

Məsləhət günləri və saatları: _____

E-mail ünvanı: __ner_____

İş telefonu:_____4398561_____

III. Tələb olunan dərsliklər və dərs vəsaitləri:

Main: 1) A.I. Busev, V.G. Tiptsova, V.M. Ivanov. A Practical Guide to the Analytical Chemistry of Rare Elements. Publishing House Chemistry, M. 1966

2) Bulatov M.I., Kalinkin I.P. A practical guide to photometric analysis methods. 1986.

3) Alam S., Kim H., Neelameggham N.R., Ouchi T., Oosterhof H. (Eds.) Rare Metal Technology. John Wiley & Sons, Inc., Hoboken, New Jersey, Canada, 2016. – 224 p. – ISBN 1119231078.

Auxiliary:

1.Korenman I.I., Lisitskaya R.P. Workshop on analytical chemistry. Voronezh. 2002 .

IV. Fənnin təsviri və məqsədi:

Kursun qısa təsviri: In this subject, the basic properties of rare elements of the greatest practical interest are studied, and the information necessary to create analytical methods for determining the content of rare elements, remarks are given on the preparation of analysis schemes. Additional information related to the state of the ions of the elements is being studied in an aqueous solution. In some cases, it is necessary to dwell on the characterization of compounds of lower oxidation states of elements. Also, photometric, spectral, polarographic, potentiometric and other methods of analysis are studied. The description of practical work is preceded by a brief analytical characteristic of the element.

Kursun məqsədi: Methods of determination of scandium, vanadium, beryllium, titanium, tungsten, molybdenum, and other rare elements are studied.

Fənnin təqvim planı:

Həftələr	Mövzunun adı və qısa icmalı	Mühazirə	Məşğələ	Saat	Tarix
I	**Theme No. 1.** Familiarization with the laboratory. The study of instruments. **Summary:** Familiarization with the instruments used in physicochemical methods of analysis. Photoelectric colorimeters (FEK 56M), KFK-2, SF-26. Instrument diagram, principle of operation. Photometric determination of Sc in magnesium alloys using xylene orange. Reagents. Carrying out the determination. Xylene orange forms a red-violet soluble compound with scandium ions in an acidic environment (pH1.5-5). The sensitivity of the reagent is 0.1 μg Sc/ml. The method is applicable for determination of scandium in metallic magnesium and magnesium alloys without separation of alloy components. Note: when the content of scandium is more than 0.005%, the weight of the alloy is accordingly reduced; to determine scandium, an aliquot of the alloy solution containing 20–40 μg Sc is selected. **Literature :** 1) Bulatov M.I., Kalinkin I.P. A practical guide to photometric analysis methods.		**Lab.**	**2 h.**	**21.09**

	1986. 2) Gambarov D.H., Chiragov F.M., Nagiyev X. Photometric analysis. 1999. 3) A.I. Busev, V.G. Tiptsova, V.M. Ivanov. A Practical Guide to the Analytical Chemistry of Rare Elements. Publishing House Chemistry, M. 1966. 4) Korenman I.I., Lisitskaya R.P. Workshop on analytical chemistry. Voronezh. 2002 . 5) Alam S., Kim H., Neelameggham N.R., Ouchi T., Oosterhof H. (Eds.) Rare Metal Technology. John Wiley & Sons, Inc., Hoboken, New Jersey, Canada, 2016. – 224 p. – ISBN 1119231078.				
II-III	**Themes No 2, No 3** Construction of a calibration curve. **Summary:** Calibration curve. The role of the calibration curve in optical methods for quantitative determination. Interval of straightness of the calibration graph. Physical and chemical deviations from Beer's law in solutions. The choice of scale when building a calibration curve. Performance of control work on the basis of the constructed calibration curve. Calculation of errors and recording of received data. **Literature :** 1) Bulatov M.I., Kalinkin I.P. A practical guide to photometric analysis methods. 1986. 2) Gambarov D.H., Chiragov F.M., Nagiyev X. Photometric analysis. 1999. 3) A.I. Busev, V.G. Tiptsova, V.M. Ivanov. A Practical Guide to the Analytical Chemistry of Rare Elements. Publishing House Chemistry, M. 1966. 4) Korenman I.I., Lisitskaya R.P. Workshop on analytical chemistry. Voronezh. 2002 . 5) Alam S., Kim H., Neelameggham N.R., Ouchi T., Oosterhof H. (Eds.) Rare Metal Technology. John Wiley & Sons, Inc., Hoboken, New Jersey, Canada, 2016. – 224 p. – ISBN 1119231078.		**Lab.**	**4 h.**	**28.09 05.10**
IV	**Theme No 4.** Photometric determination of beryllium		**Lab.**	**2 h.**	**12.1**

	with aluminon. **Summary:** Aluminon forms a complex compound of red color with beryllium ions, the maximum light absorption of solutions of which is at 530 mm. The amount of beryllium is found from the calibration curve. Reagents. Carrying out the determination. **Literature :** 1) Bulatov M.I., Kalinkin I.P. A practical guide to photometric analysis methods. 1986. 2) Gambarov D.H., Chiragov F.M., Nagiyev X. Photometric analysis. 1999. 3) A.I. Busev, V.G. Tiptsova, V.M. Ivanov. A Practical Guide to the Analytical Chemistry of Rare Elements. Publishing House Chemistry, M. 1966. 4) Korenman I.I., Lisitskaya R.P. Workshop on analytical chemistry. Voronezh. 2002 . 5) Alam S., Kim H., Neelameggham N.R., Ouchi T., Oosterhof H. (Eds.) Rare Metal Technology. John Wiley & Sons, Inc., Hoboken, New Jersey, Canada, 2016. – 224 p. – ISBN 1119231078.				**0**
V-VI	**Theme No 5, No 6.** Construction of a calibration curve. **Summary:** Calibration curve. The role of the calibration curve in optical methods for quantitative determination. Interval of straightness of the calibration graph. Physical and chemical deviations from Beer's law in solutions. The choice of scale when building a calibration curve. Performance of control work on the basis of the constructed calibration curve. Calculation of errors and recording of received data. **Literature :** 1) Bulatov M.I., Kalinkin I.P. A practical guide to photometric analysis methods. 1986. 2) Gambarov D.H., Chiragov F.M., Nagiyev X. Photometric analysis. 1999. 3) A.I. Busev, V.G. Tiptsova, V.M. Ivanov. A Practical Guide to the Analytical Chemistry of Rare		**Lab.**	**4 h.**	**19.10 26.10**

	Elements. Publishing House Chemistry, M. 1966. 4) Korenman I.I., Lisitskaya R.P. Workshop on analytical chemistry. Voronezh. 2002 . 5) Alam S., Kim H., Neelameggham N.R., Ouchi T., Oosterhof H. (Eds.) Rare Metal Technology. John Wiley & Sons, Inc., Hoboken, New Jersey, Canada, 2016. – 224 p. – ISBN 1119231078.				
VII	**Theme No 7.** Photometric determination of titanium using diantipyrylmethane. **Summary:** Reagents. Carrying out the determination. Diantipyrylmethane forms a yellow soluble compound with titanium ions in an acidic medium with a maximum light absorption at 380 nm. The method is applicable for the determination of titanium in light, ferrous and non-ferrous alloys. **Literature :** 1) Bulatov M.I., Kalinkin I.P. A practical guide to photometric analysis methods. 1986. 2) Gambarov D.H., Chiragov F.M., Nagiyev X. Photometric analysis. 1999. 3) A.I. Busev, V.G. Tiptsova, V.M. Ivanov. A Practical Guide to the Analytical Chemistry of Rare Elements. Publishing House Chemistry, M. 1966. 4) Korenman I.I., Lisitskaya R.P. Workshop on analytical chemistry. Voronezh. 2002 . 5) Alam S., Kim H., Neelameggham N.R., Ouchi T., Oosterhof H. (Eds.) Rare Metal Technology. John Wiley & Sons, Inc., Hoboken, New Jersey, Canada, 2016. – 224 p. – ISBN 1119231078.		**Lab.**	**2 h.**	**02.11**
VIII-IX	**Themes No 8, No 9.** Construction of a calibration curve. **Summary:** Calibration curve. The role of the calibration curve in optical methods for quantitative determination. Interval of straightness of the calibration graph.		**Lab.**	**4 h.**	**09.11** **16.11**

	Physical and chemical deviations from Beer's law in solutions. The choice of scale when building a calibration curve. Performance of control work on the basis of the constructed calibration curve. Calculation of errors and recording of received data. **Literature :** 1) Bulatov M.I., Kalinkin I.P. A practical guide to photometric analysis methods. 1986. 2) Gambarov D.H., Chiragov F.M., Nagiyev X. Photometric analysis. 1999. 3) A.I. Busev, V.G. Tiptsova, V.M. Ivanov. A Practical Guide to the Analytical Chemistry of Rare Elements. Publishing House Chemistry, M. 1966. 4) Korenman I.I., Lisitskaya R.P. Workshop on analytical chemistry. Voronezh. 2002 . 5) Alam S., Kim H., Neelameggham N.R., Ouchi T., Oosterhof H. (Eds.) Rare Metal Technology. John Wiley & Sons, Inc., Hoboken, New Jersey, Canada, 2016. – 224 p. – ISBN 111 9231078.				
X	**Theme No 10.** Photometric determination of Mo by the rhodanide method. **Summary:** Reagents. Carrying out the determination. Rhodanides form colored compounds in an acidic solution with Mo, the composition of which depends on the concentration of rhodanide. Mo-rhodanide compounds are extracted with diethyl ether and other extractants. **Literature :** 1) Bulatov M.I., Kalinkin I.P. A practical guide to photometric analysis methods. 1986. 2) Gambarov D.H., Chiragov F.M., Nagiyev X. Photometric analysis. 1999. 3) A.I. Busev, V.G. Tiptsova, V.M. Ivanov. A Practical Guide to the Analytical Chemistry of Rare Elements. Publishing House Chemistry, M. 1966. 4) Korenman I.I., Lisitskaya R.P.		**Lab.**	**2 h.**	**23.11**

	Workshop on analytical chemistry. Voronezh. 2002 . 5) Alam S., Kim H., Neelameggham N.R., Ouchi T., Oosterhof H. (Eds.) Rare Metal Technology. John Wiley & Sons, Inc., Hoboken, New Jersey, Canada, 2016. – 224 p. – ISBN 1119231078.				
XI-XII	**Themes No 11, No 12 .** Construction of a calibration curve. **Summary:** Calibration curve. The role of the calibration curve in optical methods for quantitative determination. Interval of straightness of the calibration graph. Physical and chemical deviations from Beer's law in solutions. The choice of scale when building a calibration curve. Performance of control work on the basis of the constructed calibration curve. Calculation of errors and recording of received data. **Literature :** 1) Bulatov M.I., Kalinkin I.P. A practical guide to photometric analysis methods. 1986. 2) Gambarov D.H., Chiragov F.M., Nagiyev X. Photometric analysis. 1999. 3) A.I. Busev, V.G. Tiptsova, V.M. Ivanov. A Practical Guide to the Analytical Chemistry of Rare Elements. Publishing House Chemistry, M. 1966. 4) Korenman I.I., Lisitskaya R.P. Workshop on analytical chemistry. Voronezh. 2002 . 5) Alam S., Kim H., Neelameggham N.R., Ouchi T., Oosterhof H. (Eds.) Rare Metal Technology. John Wiley & Sons, Inc., Hoboken, New Jersey, Canada, 2016. – 224 p. – ISBN 1119231078.		**Lab.**	**4 h.**	**07.12 14.12**
XIII	**Theme No 13.** Photometric determination of W by the rhodanide method. **Summary:** Rhodanide ions form a greenish yellow complex compound with W. The molar absorption coefficient of the solution of the complex is 17600 at 398 mm.		**Lab.**	**2 h.**	**21.12**

	The method makes it possible to determine 1.5-0.003% of tungsten in mineral raw materials in the presence of arsenic, antimony, molybdenum, chromium, vanadium, selenium and tellurium. **Literature :** 1) Bulatov M.I., Kalinkin I.P. A practical guide to photometric analysis methods. 1986. 2) Gambarov D.H., Chiragov F.M., Nagiyev X. Photometric analysis. 1999. 3) A.I. Busev, V.G. Tiptsova, V.M. Ivanov. A Practical Guide to the Analytical Chemistry of Rare Elements. Publishing House Chemistry, M. 1966. 4) Korenman I.I., Lisitskaya R.P. Workshop on analytical chemistry. Voronezh. 2002 . 5) Alam S., Kim H., Neelameggham N.R., Ouchi T., Oosterhof H. (Eds.) Rare Metal Technology. John Wiley & Sons, Inc., Hoboken, New Jersey, Canada, 2016. – 224 p. – ISBN 1119231078.				
XIV-XV	**Themes No 14, No15.** Construction of a calibration curve. **Summary:** Calibration curve. The role of the calibration curve in optical methods for quantitative determination. Interval of straightness of the calibration graph. Physical and chemical deviations from Beer's law in solutions. The choice of scale when building a calibration curve. Performance of control work on the basis of the constructed calibration curve. Calculation of errors and recording of received data. **Literature :** 1) Bulatov M.I., Kalinkin I.P. A practical guide to photometric analysis methods. 1986. 2) Gambarov D.H., Chiragov F.M., Nagiyev X. Photometric analysis. 1999. 3) A.I. Busev, V.G. Tiptsova, V.M. Ivanov. A Practical Guide to the Analytical Chemistry of Rare Elements. Publishing House Chemistry, M. 1966. 4) Korenman I.I., Lisitskaya R.P.		**Lab.**	**4 h.**	**28.12** **28.12**

	Workshop on analytical chemistry. Voronezh. 2002 . 5) Alam S., Kim H., Neelameggham N.R., Ouchi T., Oosterhof H. (Eds.) Rare Metal Technology. John Wiley & Sons, Inc., Hoboken, New Jersey, Canada, 2016. – 224 p. – ISBN 1119231078.				

İmtahanın keçirilməsi forması -yazılı, şifahi, dialoq və ya test.

V. Semestr ərzində qiymətləndirmə və bal bölgüsü:

Balların maksimum miqdarı – 100 bal.

***A) Semestr ərzində toplanan maksimum bal* – 50 (imtahana keçid bal – 17)**

Dərsə davamiyyətə görə	10 bal
Tələbələrin sərbəst işinə (referat, prezentasiya, tədqiqat işi və s.) görə Qeyd: Plagiat halları qəti qadağandır! Sərbəst işlə əlaqədar bütün tapşırıqların qısa təsviri, təqdim olunma şərtləri, vaxtı və qiymətləndirmə üsulu dəqiq göstərilir.	10 bal
Seminar (məşğələ) və ya laboratoriya dərslərinin nəticələrinə görə (eyni fəndən həm seminar (məşğələ), həm də laboratoriya dərsləri nəzərdə tutulduğu halda onların hər birinə 10 bal ayrılır).	20 bal
Kurs işinin hazırlanmasına və müdafiəsinə görə (fənn üzrə kurs işi (layihəsi) nəzərdə tutulmayıbsa, ona ayrılan 10 bal seminar (məşğələ) və ya laboratoriya dərslərinə əlavə olunur).	10 bal

***B) Semestr imtahanı nəticəsinə görə* - maksimum 50 bal**

Hər biletdə – 5 sual, hər suala – 10 bal verilir

Qeyd: Tələbənin imtahandan topladığı balın miqdarı 17-dən az olmamalıdır.

C) Semestr nəticəsinə görə qiymətləndirmə (imtahan və imtahana qədər toplanan ballar əsasında):

91 – 100 bal	**əla**	**A**
81 – 90 bal	**çox yaxşı**	**B**
71 – 80 bal	**yaxşı**	**C**
61 – 70 bal	**kafi**	**D**
51 – 60 bal	**qənaətbəxş**	**E**
51 baldan aşağı	**qeyri-kafi**	**F**

Müəllim:__ Əfəndiyeva Nərmin Tofiq qızı_ İmza:_____

(soyadı, adı, atasının adı)

Tarix: _____