Code: QA218

Name: Química Analítica

Name in English: Analytical Chemistry

Name in Spanish: Química Analítica

Subject type: Weekly

Approval Type: Grade and frequency

Characteristic: Regular

Frequency: 75%

Period Type / Offering period: Semi-annual / Every period

Requires Final Exam: Yes

Vectors

T	L	P	O	PE	OE	SL	WEEKS	CREDITS
2	**3**	**1**	**0**	**0**	**0**	**6**	**15**	**6**

Occurrence on curriculum: 13, 43, 63

Pre requirement: QG101/QG109

Summary:
Chemical equilibrium. Acid-base equilibrium. Solubility equilibrium. Complex-Formation Equilibrium. Oxidation-reduction equilibrium. Qualitative and quantitative analysis. Gravimetry. Volumetry. Expression of analytical results.

Program:

THEORY: General aspects of qualitative analysis and quantitative analysis. Statistics in analytical chemistry: significant figures, errors and propagation of errors, data processing, rejection of results. Chemical equilibria. Buffer solutions. Volumetric analysis. Volumetry of neutralization. Indicators. Titrations of acids and bases. Titration curves. Oxidation-reduction reactions. Balancing. Batteries or galvanic cells. Salt bridge. Electrode potential. Nernst equation. Most used applications and reactions in redox titration. Redox volumetry. Indicators. Direct and indirect titrations. Titration curves. Complex-Formation Equilibria. EDTA. Applications. Complex-Formation volumetry. Indicators. Effects of pH, use of buffers. Interferences in titrations with EDTA. Masking agents. Titration curves. Solubility products. Fractional precipitation. Volumetry of precipitation. Indicators. Mohr method. Volhard method. Fajans method. Titration curves. Physical nature of precipitates. Contamination of precipitates. Gravimetric analysis: conventional precipitation and from homogeneous solution.

EXPERIMENTAL: Identification and separation reactions of cations and anions. Calibration of volumetric pipette. Gravimetric determination of nickel using dimethylglyoxime. Volumetric neutralization. Preparation and standardization of NaOH solution. Determination of HCl and acetic acid. Preparation and standardization of HCl solution. Determination of NaOH and NH_3. Precipitation Volumetry. Methods of Mohr and Volhard. Determination of chloride. Complex-Formation volumetry. Preparation of EDTA solution. Determination of Ca^{2+}. Interferences study. Redox volumetry. Permanganometry. Preparation and standardization of $KMnO_4$ solution. Analysis of commercial hydrogen peroxide.

Basic Bibliography

1) Baccan, N.; de Andrade, J.C.; Godinho, O.E.S.; Barone, J.S., **Química Analítica Quantitativa Elementar**, 3a Edição (3a reimpressão), Editora Edgard Blücher, São Paulo, 2005.
2) Skoog, D.A.; West, D.M.; Holler F.J.; Crouch, S.R., **Fundamentos de Química Analítica**, Tradução da 9aEdição Norte-Americana, Thomson Learning, São Paulo, 2014.
3) Harris, D.C., **Análise Química Quantitativa**, 8a Edição, LTC, Rio de Janeiro, RJ, 2012.

Supplementary Bibliography

1) Meier, P.C.; Zund, R.E., **Statistical methods in Analytical Chemistry**, John Wiley & Sons, New York, New York, 2000.
2) Baccan, N.; Godinho, O.E.S.; Aleixo, L.M.; Stein; E., **Introdução a Semimicroanálise Qualitativa**, 7a edição, Editora UNICAMP, Campinas, 1997.
3) Vogel, Arthur I. **Química Analítica Qualitativa**, 5a Edição, Mestre Jou, São Paulo, 1981.
4) Tissue, B.M., **Basics of Analytical Chemistry and Chemical Equilibria**, John Wiley & Sons, Hoboken, New Jersey, 2013.
5) Burgot, J.-L., **Ionic Equilibria in Analytical Chemistry**, Springer, New York, New York, 2012
