



**PROGRAMS AND BIBLIOGRAPHY**

<b>Subject</b>	
<b>Code</b>	<b>Name</b>
QA583	Sample preparation

<b>Vector</b>
OF:S-5 T:002 P:000 L:000 O:000 D:000 HS:002 SL:002 C:002 AV:N EX:S FM:75%

<b>Pre requirement</b>
QA381 QA383 QA481 QA483

<b>Summary</b>
Fundamentals of sample preparation techniques for organic and inorganic analytes.

<b>Program</b>
The analytical sequence. Sources of errors in sample preparation. Fundamentals of sample preparation techniques for inorganic analytes determination. Decomposition techniques: dry chemical decomposition, Schoniger flask test, fusion, combustion tube, Fenton, Kjeldahl and Carius methods. Decomposition using high pressure: decomposition pumps, high pressure incinerators, application of microwave radiation for decomposition/extraction. Application and discussion of auxiliary sources for sample conservation and preparation: lyophilization, ultrasound and laser. Fundamentals of sample preparation techniques for organic analytes determination. Phase transference processes: partition, adsorption and volatilization. Classification of sample preparation techniques for organic analytes. Liquid-liquid extraction. Solid-liquid extraction (Soxhlet; extraction with pressurized fluids; extraction with superheated water and with supercritical fluids; ultrasound-assisted extraction and microwave-assisted extraction; QuEChERS). Microextraction and correlated techniques. Headspace techniques.

<b>Bibliography</b>
<ol style="list-style-type: none"><li>1. Arruda, M.A.Z. (Ed) Trends in sample Preparation, 1<sup>st</sup> edition, Nova Science Co, 2007.</li><li>2. Bock, R. A handbook of decomposition methods in analytical chemistry, 1<sup>st</sup> edition, International Textbook Co., 1979.</li><li>3. Flores, E.M.M. (Ed.) Microwave-assisted sample preparation for trace element analysis, 1<sup>st</sup> edition, Elsevier, 2014.</li><li>4. Kingston, H.M. and Haswell, S.J. Microwave-Enhanced Chemistry – Fundamentals, Sample Preparation and Applications, 1<sup>st</sup> edition, ACS, 1997.</li><li>5. Sulcek, Z. and Povondra, P., Methods of Decomposition in Inorganic Analysis, 1<sup>st</sup> edition, CRC Press, 1989.</li><li>6. Pawliszyn, J. and Lord, H. (Ed.). Handbook of Sample Preparation. Wiley, New York, 2010.</li><li>7. Mitra, S. (Ed.). Sample Preparation Techniques in Analytical Chemistry. Wiley.; Hoboken, 2002.</li><li>8. Krug, F.J.; Rocha, F.R.P. (Ed.). Métodos de Preparo de Amostras para Análise Elementar, Ed. SBQ, São Paulo, 2016.</li><li>9. Skoog, D.A.; West, D.M.; Holler F.J.; Crouch, S.R., Fundamentos de Química Analítica, Translation from the 9<sup>th</sup> North american edition, CENGAGE Learning, São Paulo, 2015.</li></ol>

10. Figueiredo, E. C.; Borges, K.B.; Queiroz, M.E.C. Preparo de Amostras para Análise de Compostos Orgânicos , LTC-GEN, Rio de Janeiro, 2015.

**Evaluation criteria**

For grading policy, see: Regimento Geral de Graduação, Seção I – Normas Gerais, Capítulo V – Da Avaliação do Aluno na Disciplina. Students are required to attend 75 % of the lectures. For further details, see: Regimento Geral de Graduação, capítulo VI, seção X, artigo 72.