



PROGRAM AND BIBLIOGRAPHY

Subject	
Code	Name
QG464	Integrated Laboratory

Vector
OF:S-5 T:000 P:000 L:004 O:000 D:000 HS:004 SL:004 C:004 AV:N EX:S FM:75%

Pre Requirement	QG108 QG109
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Summary
Interdisciplinary experiments using different methods of preparation, characterization and analysis of phenomena involved in the preparation of products such as biodiesel and industrial solvent, synthesis and formulation of drugs, etc. using techniques and procedures such as IR spectroscopy , NMR, X-ray fluorescence, mass spectrometry, rheology, thermogravimetric analysis, surface area determination, among others

Program
<p>Development of experiments that integrate the different areas of Chemistry and illustrate the theoretical training acquired in the previous semesters. Use of chemical synthesis techniques, understanding of the phenomena involved, analysis and determination of structure and properties of chemical compounds including classical methods of purification (recrystallization, distillation and preparative chromatography), modern instrumental techniques (NMR and IR spectroscopy, mass spectrometry , microscopy, etc ...).</p> <p>Cement: a three week project involving the preparation of the cement from raw materials, involving formulation stages (different additives) and calcination. Characterization of test specimens by mechanical tests, factorial design, X-ray fluorescence, TGA, electron microscopy, etc.</p> <p>Personal use cream: Three-week project involving cream formulation steps and incorporation of a fragrance extracted by a soxhlet process, composition of the fragrance by GC-MS. Study on the stability of the colloidal system, determination of particle size and zeta potential.</p> <p>Preparation of active charcoal: A three-week project involving the preparation and activation of active charcoal for the purpose of water purification. Characterization through adsorption isotherms, BET, evaluation of performance in terms of adsorption of model effluents. Nanocomposites.</p> <p>Preparation, characterization and use of heterogeneous catalyst: preparation of palladium adsorbed on charcoal, characterization and dosage of adsorbed palladium content, use in catalytic hydrogenation reaction. Techniques to be used: electron microscopy, surface area, atomic absorption, GC-MS.</p> <p>Synthesis, formulation and characterization of a drug: preparation, characterization and formulation of paracetamol. Use of NMR, IR, MS, NIR techniques.</p> <p>Use of raw materials from renewable sources: production of biodiesel and green solvent. Reaction of transesterification of vegetable oils with methanol, physical-chemical</p>

characterization of biodiesel and industrial solvent obtained from glycerol and acetone. Techniques employed: CG-MS, NMR, NIR.

Use of raw materials from renewable sources: production of hydroxymethylfurfural from fructose. Fructose dehydration reaction using batch and flow processes to produce hydroxymethylfurfural. Use of separation methods (GC-MS, HPLC) and identification (EM, NMR, IV).

Natural Product Synthesis. In this experiment we propose the synthesis of the natural product goniotalamina, isolated from several plant species including Brazilian biodiversity, the discussion of the principles of organometallic chemistry (Grignard reaction), homogeneous catalysis (reaction of metathesis for ring closure), biosynthesis of this family of secondary metabolites and the biological action of this compound with respect to cellular apoptosis and neoplasias.

Bibliography

J. Chem. Educ. 2014, 91, 1966.
J. Chem. Educ. 2011, 89, 280.
J. Chem. Educ. 2013, 90, 1373).
J. Chem. Educ. 2015, 92, 179.

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.