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Instituto de Química
Graduate Program in Chemistry (Grade 7/CAPES)
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COURSE SYLLABUS

1. Identification

Code and title: QUP 148 – Special Topics in Nuclear Magnetic Resonance applied to polymers
Professor: Griselda Galland Barrera
Level: Master and Doctorate
Credit hours: 2
Revised: June_2020

2. Summary

1H and 13C Nuclear Magnetic Resonance applied to polymers in general and specially to polyolefins

3. Objective

Present the basic concepts about 1H and 13C Nuclear Magnetic Resonance applied to polymers

4. Contents

- Basic principles of NMR spectroscopy
- Characterization of polymers by 1H NMR
- Characterization of polymers by 13C NMR
- Quantitative analysis
- Optimization of instrumental parameters
- Vinyl polymers. Inversions. Tacticity
- Study of polymerization mechanisms. Statistical models
- Copolymers analysis. Calculation of the comonomer contents and the reactivity ratios
- Determination of terminal groups. Calculation of molecular weights.

5. Assessment

The course consists in eight presentations in video, after each one the student will receive a quiz and exercises to answer. The grades obtained in these eight evaluations will represent 40% of the final mark. The student will have to make a video explaining a paper in the area, previously approved by the professor. This video will represent 20% of the final mark. Finally, the students will receive a final test with problems to resolve. This test will have a weight of 40 % in the final grade. If a student does not attend 60% of approval in the three evaluations (8 quiz, video and test) he can have the opportunity to make a recuperation test, and the final mark will be the grade of this test.

Grades:
A: approved (excellent) 90-100%
B: approved (good) 75 -89%
C: approved (average) 60-74%
D: disapproved below 60%
FF: disapproved (participation inferior to 75%)

6. Methodology

Lectures, exercises lists, seminars and examinations.

7. Bibliography

- J. Keeler, Understanding NMR Spectroscopy, Ed. Wiley, 2005.
- T. D. W. Claridge, High-Resolution NMR Techniques in Organic Chemistry, Tetrahedron Organic Chemistry, 27, Ed. Elsevier, 2009.
- M. Balci, Basic ^{1}H-^{13}C-NMR Spectroscopy, Elsevier, Amsterdan, 2005.
- M. Levitt, Spin Dynamics: Basics of Nuclear Magnetic Resonance, Wiley, 2nd Ed., 2008.
- S. Braun, H. O Kalinowski and S. Berger, 150 and More Basic NMR Experiments Wiley VCH.
- T. D. W. Claridge, High-Resolution NMR Techniques in Organic Chemistry, Tetrahedron Organic Chemistry, 27, Ed. Elsevier, 2009.
- R. M. Silverstein, G. C. Bassler and T. C. Morril, Identificação Espectrométrica de Compostos Orgânicos, 7ª Ed. LCT, 2010.
- D. Pavia, G. Lampman, G. Kriz and J. Vyvyan, Introduction to Spectroscopy. 2ª Ed. Cengage Learning, 2015.