



PROGRAMS AND BIBLIOGRAPHY

Subject	
Code	Name
QO851	Application of Enabling Technologies in Synthetic Organic Chemistry

Vector
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%

Pre requirement
QO321 *QO521

Summary
Introduction. Green chemistry. Sonochemistry. Microwave Irradiation. Continuous FlowChemistry. Mechanochemistry.

Program
<ol style="list-style-type: none">1. Introduction<ul style="list-style-type: none">- Importance of new technologies for synthetic organic chemistry- New technologies and green chemistry- Laboratory of the future2. Sonochemistry<ul style="list-style-type: none">- Theoretical Aspects of Ultrasound- Ultrasound in synthetic organic chemistry3. Microwave Irradiation<ul style="list-style-type: none">- Theory of microwave irradiation and heating mechanisms- How does microwave irradiation accelerate chemical reactions?- Microwave effect versus thermal effect- Importance of solvents- Microwave-assisted organic synthesis- Microwave and the basics of green chemistry4. Continuous FlowChemistry<ul style="list-style-type: none">- Fundamentals of continuous flowchemistry.- Principles of flow control: importance of mixing and heating.- Types of reactors: spiral, chip and fixed bed. Equipment, devices and engineering aspects.- Multi-stage and multi-step flow reactions- Photochemical electrochemical flowreactions- Flash Chemistry- Increased scale, on-line analysis and process safety5. Mechanochemistry<ul style="list-style-type: none">- Fundamentals of mechanochemistry and types of mills- Solvent-free reactions in solid phase- Solvent-assisted mechanic chemistry- Applications of mechanochemistry in organic synthesis

Bibliography

1. Mason, T. J., Lorimer, J. P., "Sonochemistry, theory, applications and uses of ultrasound in chemistry", 1st Ed., Wiley-Interscience, 1989.
2. Mason, T. J., Peters, D., "Practical Sonochemistry: Power Ultrasound Uses and Applications", 2nd Ed., Hoorwood Publishing, 2003.
3. Tierney, J. P., Lidstrom, P., "Microwave Assisted Organic Synthesis", 1st Ed., Blackwell, 2005.
4. Wirth, T., "Microreactors in Organic Chemistry and Catalysis", 2nd Ed., Wiley-VCH, 2013.
5. Darvas, F., Volker, H., György, D., "Flow Chemistry – Fundamentals", Volume 1, 1st Ed, De Gruyter, 2014.
6. Darvas, F., Volker, H., György, D., "Flow Chemistry –Applications", Volume 2, 1st Ed, De Gruyter, 2014.
7. Todres, Z. V., "Organic Mechanochemistry and Its Practical Applications", 1st Ed., Taylor and Francis, 2006.

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.