



NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF CHEMICAL AND TEXTILE ENGINEERING
TEXTILE ENGINEERING PROGRAM

QU325 – LABORATORY OF ORGANIC CHEMISTRY I

I. GENERAL INFORMATION

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| CODE | : QU325 Laboratory of Organic Chemistry I |
| SEMESTER | : 5 |
| CREDITS | : 1 |
| HOURS PER WEEK | : 3 (Laboratory) |
| PREREQUISITES | : QU425 Physical Chemistry I QU426 Laboratory of Physical Chemistry I |
| CONDITION | : Compulsory |

II. COURSE DESCRIPTION

This course is complementary to theory course QU324 Organic Chemistry I. Students develop skills for the handling of chemical reactants, materials, laboratory instruments and equipment, applying safety norms. In this laboratory course, students experimentally verify the theoretical concepts and methods presented in course QU324 Organic Chemistry I.

III. COURSE OUTCOMES

At the end of the course, students:

1. Carefully use chemical reactants in proper quantity and concentration according to the experiment to be done.
2. Use instruments, devices and equipment proper of the experimental practice of chemical engineering.
3. Take care safety and security measures in the handling of chemical reactants, instruments and equipment.
4. Write laboratory reports clearly describing carried out experiments, analyzing results and presenting conclusions.

IV. COURSE CONTENTS

1. GOOD PRACTICES AT LABORATORY

Safety sheets of chemical reactants / Personal safety rules at chemistry laboratory / Proper use of equipment and instruments / Written reports

2. PURIFICATION OF SOLID SUBSTANCES AND PURITY CRITERIA

Purification of a solid by the method of recrystallization / Purification of a solid by sublimation method / Melting temperature as purity criteria.

3. PURIFICATION OF LIQUID SUBSTANCES AND PURITY CRITERIA

Recognition of distillation equipment / Simple distillation / Fractional distillation / Vacuum distillation / Steam distillation / Criteria for selecting distillation method / Boiling temperature as purity criteria.

4. PIGMENT EXTRACTION USING SOLVENTS

Recognition of solid-liquid and liquid-liquid extraction process / Setting and use of extraction equipment / Cold or heat extraction of pigments with solvents / Extract treatment for chromatography analysis.

5. CHROMATOGRAPHY

Recognition of different chromatography techniques / Setting and use of column chromatography and fine layer chromatography / Chromatography analysis of natural pigments obtained by extraction.

6. STEREOCHEMISTRY I

Conformational and configurational analysis of simple organic molecules using molecular models.

7. STEREOCHEMISTRY II

Isomerization reactions / Properties of geometric isomers / Use of polarimeter and determination of the optical rotation of some compounds.

8. ALKYL HALIDES

Synthesis of polymers alkyl halides / Aliphatic nucleophilic substitution reactions / Polymerization reactions.

9. ALKANES AND ALKENES

Alkanes and alkenes chemical reactions: with sulfuric acid, bromination, oxidation, combustion / Alkenes synthesis and isomerization.

10. ALKYNES

Alkyne synthesis / Chemical properties / Bromination, oxidation, acetylide formation.

11. QUALITATIVE CHEMICAL ANALYSIS

Determination of some elements in organic samples: C, H, N, S, halogens.

12. ALCOHOLS

Alcohol synthesis by carbohydrate fermentation / Monol chemical reactions: Lucas test, iodineform test, esterification, oxidation, sodium action / Properties of polyols.

13. WASTE MANAGEMENT

Elaboration of waste management plan / Treatment of waste generated at laboratory experiences.

VI. METHODOLOGY

There is a guide for every laboratory experience students should read before the experience. At the beginning of the experience, an entrance test is taken to verify the preparedness of students. Students carry out the experience working by teams and following guide indications and faculty advice. At the end of the experience, students submit a report summarizing main results, analysis and conclusions. Student active participation is promoted.

VII. GRADING SYSTEM

The Final Grade (FG) is calculated with the following formula:

$$FG = (10 PP + 1 C1 + 2 C2) / 13$$

PP: Average grade of five laboratory experience work and report

C1: Average of entrance quizzes C2: Average of final quizzes

VIII. BIBLIOGRAPHY

1. BREÑA J., NEYRA E., VIZA C.

Organic Chemistry I Laboratory Guide

National University of Engineering, Lima, Peru, 2010

2. FIESER Louis

Organic Chemistry Experiments, Reverte Editorial, Barcelona, Spain.