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

QU426 – LABORATORY OF PHYSICAL CHEMISTRY I

I. GENERAL INFORMATION

CODE	**:**	QU426 Laboratory of Physical Chemistry I
SEMESTER	**:**	4
CREDITS	**:**	1
HOURS PER WEEK	**:**	3 (Laboratory)
PREREQUISITES	**:**	MA133 Mathematics III QU119 Laboratory of Chemistry II
CONDITION	**:**	Compulsory

II. COURSE DESCRIPTION

This is course is complementary to theory course QU425 Physical-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 QU325 Physical-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. REAL GASES

Low pressure gases / High vacuum measurement techniques / Determination of gas molecular weight using Victor Meyer method / Measurement of gas second virial coefficient.

2. BOLTZMANN DISTRIBUTION

Particle sedimentation in an ultra-centrifugal / Determination of interatomic distance of hydrochloric acid through vibration-rotation absorption spectrum.

3. THERMODYNAMICS

Relationship of gas heat capacities / Determination of combustion enthalpy of benzoic acid / Reaction enthalpy of a substance / Determination of thermodynamic properties of hydrochloric acid by means of infrared spectrophotometry.

4. PHYSICAL CHEMICAL EQUILIBRIUM

Distribution of a solute in immiscible solvents / Equilibrium of solutions. Calorimetric method / Nitrogen tetroxide dissociation / Homogeneous equilibrium.

5. **LIQUIDS**
   Measurement of interphase tension / Surface tension with temperature change / Liquids viscosity / Descendant sphere method / Lubricant viscosity / Viscosity of polymer solutions / Viscosity with temperature change.

6. **UNIT SYSTEMS**
   Vapor pressure of a pure liquid / Dynamic method / Determination of solids sublimation pressure / Determination of vaporization latent heat of carbon tetrachloride-

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 = (5 PP + 1 C1 + 2 C2) / 8

PP: Average grade of five laboratory experience work and report
C1: Average grade of entrance quizzes C2: Average grade of final quizzes

VIII. BIBLIOGRAPHY

1. PHYSICAL-CHEMISTRY Laboratory Guide
   National University of Engineering, Lima, Peru, 2010
2. **ADAMSON ARTHUR W.**
   Physical Chemistry, Reverte Editorial, Barcelona, Spain.