



Course specification

University/Academy: Damanhour University

Faculty/Institute: Faculty of Science

Department: Chemistry

1. Course Data:

Course code: Chem. 406	Course title: Physical Chemistry 8	Academic year/level: 2010-2011 4 th year-2 nd term
Specialization: Special Chemistry	No. of instructional units: lecture <input type="text" value="2"/> tutorial <input type="text" value="1"/> practical <input type="text" value="-----"/>	

2. course

Aim

- This course is designed to give advanced ideas, suitable for rise level, on solution chemistry particularly chemical kinetics, the course is aimed to show light on the structure, electrical and physical properties of the solvent and show the great effect of these properties of a particular solvent on the reaction. The course develops in student s the ability to apply their chemical knowledge and skills to the solution of theoretical and practical problems.
- This course is aimed to study the properties of flames and the atmospheric pollution resulting from combustion.
- This course is aimed to deal with the design and operation of electrochemical processes that may be required by chemists in the course of their careers.

3. Intended learning outcome

Knowledge and understanding

- At the end of this course the students able to
- a1. This course will illustrate that students become conversant with the following main aspects of chemistry :
 - a2. Define chemical kinetics
 - a3. Define the different types of flam



	<p>a 4. give the difference between laminar and turbulent flames.</p> <p>a 5. Measure of burning velocity and flame temperature.</p> <p>a6 .draw the role of combustion in producing pollutant.</p> <p>a7 .Recognize some important industrial electrochemical processes , describe the design and operation of some processes as, electrode position of metals, electrowinning of metals, electrorefining of metals and metal finishing industry(electro plating)</p>
Intellectual skills	<p>At the end of this course the students able to</p> <p>b1 the students are able to demonstrate knowledge and understanding og essential facts, concepts, principles and theories relating to chemistry problems.</p> <p>b2- modify the flame speed and flame temperature.</p> <p>b 3. Contrast the effect of additives on burning velocity .</p> <p>b4. Interpret the role of combustion in producing Pollutant.</p> <p>b5. Demonstrate the automotive emission control.</p> <p>b6. Demonstrate knowledge and understanding of essential facts, concepts, principles and theories relating to electrochemical processes</p>
Professional skills	<p>At the end of this course the students will be able to</p> <p>c1. Examine skills that enable the solution of qualitative and quantitative problems of familiar and unfamiliar nature.</p> <p>c2. Present scientific material both orally and in writing in a scholarly.</p> <p>c 3. Prepare the Bunsen burner.</p> <p>c 4. Examine the mechanism of formation of pollutants in combustion processes.</p> <p>c5. Perform and operate electrolyte cells suitable for such processes.</p>
a) General skills	<p>At the end of this course, the students will have the ability to: deal in scientifically logical way with industrial problems.</p> <p>d1. Use information and communication technology.</p> <p>d2. Explain the life –long learning and consider the community –linked problem.</p>
4. course content	<ul style="list-style-type: none"> -Solvent types, properties and structure of water - dielectric constant , definition and its relation - ion – solvent interaction - theories of salvation and salvation in water



	<p>-selective salvation , determination of preferential component</p> <p>-the role of electrostatic effects</p> <p>-solvent effect on reaction rate</p> <p>-acidity function , definition and measurement</p> <p>-correlation of acidity function with reaction rate</p> <hr/> <p>-Flames –stationary flames</p> <p>–propagating flames</p> <p>-laminar flames -premixed and diffusion flames.</p> <p>the Bunsen burner</p> <p>-Turbulent flames-flame stability</p> <hr/> <p>Measurement of burning velocity and flame temperature.</p> <hr/> <p>Air pollution by combustion</p> <p>The mechanism of formation of oxides of nitrogen.</p> <hr/> <p>Two stage combustion, Three way catalytic converter.The formation of sulfur oxides.</p> <hr/> <p>-Soot formation. 5- Carbon – black process</p> <p>- electrolytic cell (chemical reactor)</p> <p>-physical changes and chemical changes taking placeduring electrolysis</p> <hr/> <p>Definition of current efficiency and causes of current in efficiency,</p> <hr/> <p>Definition of voltage efficiency and causes of in efficiency</p> <p>Definition of energy consumption</p> <hr/> <p>Electrolytic (ionic) conduction- cell resistance</p> <hr/> <p>Factor affecting specific resistance of solution and specific conductivity</p> <hr/> <p>Importance of studying ionic conductivity.</p> <hr/> <p>Polarization , concentration polarization and its causes , relation between concentration polarization and operating current density, the limiting current and methods of increasing it.</p> <hr/> <p>Activation polarization and its causes, factor affecting it , Mesurment of polarization</p>
<p>Teaching and learning methods</p>	<p>4.1. Lecture</p> <p>4.2. Contact hours</p> <p>5.3. Problem-Based Learning</p> <p>4.4. Encourage students to use online and library resources</p>
<p>Taching and learning methods for students with special needs</p>	<p>a. Computer hall to be used in visual labs and simulation experiments.</p> <p>b. Data show, overhead projector, Molecular models and chemistry computer programs.</p> <p>c. Changing to credit hours system, it is more effective.</p>



Student Assessment	Final-Term Examination to assess the student skill in presenting facts, applications, theories and calculations.
Procedures used:	Assessment 1 Final-Term Examination Week16
Schedule:	
a) Weighing of Assessment:	<p>Weighing of Assessments</p> <p>Mid-Term Examination: -</p> <p>Final-Term Examination: 100</p> <p>Oral Examination: -</p> <p>Practical Examination : -</p> <p>Semester Work: -</p> <hr/> <p>Total: 100</p>
List of Textbooks and References:	<ul style="list-style-type: none"> - Chemical kinetics, K.J. laidler , Tata Mehraw- Hill , New Dehli , (1975) - Advanced organic chemistry, Reactions, Mechanism, and structure, J. March, Megraw –Hill leogakusha LTD, (1977). -Flames by A.G.Gaydon and H.G wolffhard(4th edition chapmen and Hall - D.plrtcher and f .walsh, industrial electrochemistry, chapmen and Hall, (1990).
Course Notes	Lecture notes of physical chemistry for 4 th year students - faculty of science – Damanhour - University.
Required Books (Textbooks)	<ul style="list-style-type: none"> - Chemical kinetics, K.J. laidler , Tata Mehraw- Hill , New Dehli , (1975) - Advanced organic chemistry, Reactions, Mechanism, and structure, J. March, Megraw –Hill leogakusha LTD, (1977). -Flames by A.G.Gaydon and H.G wolffhard(4th edition chapmen and Hall - D.plrtcher and f .walsh, industrial electrochemistry, chapmen and Hall, (1990).
Recommended Books	Solvent effects in organic chemistry, Christian Reinhardt, VCH, Weinheim, 1990.



	<p>-Modern electrochemistry, J .OM. Boekris, and A.K.V. Reddy , Plenum cor. New York, 1977.</p> <p>- Metal ions in solution, J.Burgess, John Willy& sons inc. , 1978.</p> <p>Air pollution and climatechange by A.R .wellbun (2th edition) john wileysons , 1994 ,new york.</p> <p>-G. Prentice, electrochemical engineering , Prentice,Hall, london (1991).</p>
b) Periodicals, web sites,....,etc	<p>Web sites , science direct</p> <p>www. anode .org</p> <p>www. electrochem.cwru. edu/ ed/ dict/</p>

Course Instructor

Dr. Medhat A. Shaker

Head of Department

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