T.R
MUNZUR UNIVERSITY
GRADUATE EDUCATION INSTITUTE DEPARTMENT OF CHEMICAL TECHNOLOGIES
PhD PROGRAM COURSES

Course							
Code	**Name**	**T**	**P**	**L**	**Credit**	**ECTS**	**C/E**
DİJ111	Digital Literacy	2	0	0	2	3	C
GON111	Volunteering Activities	1	2	0	2	4	E
KT6001	Specialty Field Course	6	0	0	0	10	C
KT6002	Doctoral Seminar	0	2	0	0	5	C
KT6003	PhD Thesis	0	1	0	0	20	C
KT6004	Project Management	2	0	0	2	3	E
KT6005	Intellectual And Industrial Property Rights	2	0	0	2	3	E
KT6006	Entrepreneurship	2	0	0	2	3	E
KT6007	Scientific Research And Publication Ethic	3	0	0	3	5	C
KT6008	Inorganic Electronic Spectroscopy	3	0	0	3	5	E
KT6009	Organometals Chemistry	3	0	0	3	5	E
KT6010	Selected Topics In Physical Chemistry	3	0	0	3	5	E
KT6011	Advanced Polymer Chemistry I	3	0	0	3	5	E
KT6012	Advanced Polymer Chemistry II	3	0	0	3	5	E
KT6013	Polymeric Composites And Characterization	3	0	0	3	5	E
KT6014	Polymer Technology I	3	0	0	3	5	E
KT6015	Polymer Technology II	3	0	0	3	5	E
KT6016	Thermal Analysis Methods	3	0	0	3	5	E
KT6017	New And Renewable Energy Sources	3	0	0	3	5	E
KT6018	Numerical Analysis And Computer Applications	3	0	0	3	5	E
KT6019	Drying Technology	3	0	0	3	5	E
KT6020	Advanced Electrochemistry	3	0	0	3	5	E
KT6021	Electrochemical Sensors	3	0	0	3	5	E
KT6022	Thin Film Coating Techniques	3	3	0	3	5	E
KT6023	Advanced Fluid Mechanics	3	0	0	3	5	E
KT6024	Biopolymer	3	0	0	3	5	E
KT6025	Food Packaging	3	0	0	3	5	E
KT6026	Nano-Synthesis And Characterization	3	0	0	3	5	E
KT6027	Polymers Degradation	3	0	0	3	5	E
KT6028	Nanoscience And Nanotechnology	3	0	0	3	5	E
KT6029	Nanotechnology And Application Areas	3	0	0	3	5	E
KT6030	Green Chemistry And Sustainability	3	0	0	3	5	E
KT6031	Separation Methods in Analytical Chemistry	3	0	0	3	5	E
KT6032	Sample Preparation Techniques in Analytical Chemistry	3	0	0	3	5	E
KT6033	Biofuels	3	0	0	3	5	E
KT6034	Coordination Polymers	3	0	0	3	5	E
KT6035	Symmetry and Group Theory in Molecules	3	0	0	3	5	E

KT6036	Polymer Synthesis and Characterization	3	0	0	3	5	E
KT6037	Polymer Characterization I	3	0	0	3	5	E
KT6038	Polymer Characterization II	3	0	0	3	5	E
KT6039	Polymer Composites	3	0	0	3	5	E
KT6040	Advanced Heat Transfer	3	0	0	3	5	E
KT6041	Advanced Coordination Chemistry	3	0	0	33	5	E
KT6042	Foundations of Advanced Analytical Chemistry I	3	0	0	3	5	E
KT6043	Foundations of Advanced Analytical Chemistry II	3	0	0	3	5	E
KT6044	Electrochemistry	3	0	0	3	5	E
KT6045	Inorganic Polymers	3	0	0	3	5	E
KT6046	Inorganic Reaction Mechanism	3	0	0	3	5	E
KT6047	Advanced Kinetic	3	0	0	3	5	E
KT6048	Colloid Chemistry	3	0	0	3	5	E
KT6049	Antimicrobial Polymers	3	0	0	3	5	E
KT6050	Conductive Polymers	3	0	0	3	5	E
KT6051	Polymer Production And Processing	3	0	0	3	5	E
C: Compulsory / E: Elective, T: Theoretical, P: Practical, L: Laboratory							

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PhD PROGRAM COURSE CONTENTS

DİJ111 Dijital Okuryazarlık

Internet Technologies, Portable Technologies, Social Networks, Technology, Society and Human, Information Ethics, Technology and Lifelong Learning, Cloud Computing, Future Technologies.

GON111 Volunteering Activities

Management and Organization Concepts; Concept of Volunteering and Volunteer Management; Basic Volunteering Fields (Disaster and Emergency, Environment, Education and Culture, Sports, Health and Social Services, etc.); Project Development Related to Voluntary Work and Participation in Voluntary Work in the Field; Ethical, Moral, Religious, Traditional Values and Principles in Voluntary Work; Participation in Voluntary Work in Public Institutions, Local Governments and Non-Governmental Organizations (NGOs); Risk Groups and Volunteering in Society; Immigrants and Volunteering

KT 6001 Specialty Field Course

Determining a research question that is academically consistent and worth examining, Putting forward a critical approach to the research topic, Determining the literature in the relevant field, Preparing a thesis proposal, Creating a thesis content outline, Preparing a timetable, Developing data collection tools suitable for the problem, Collecting and analysing data, Interpreting the findings, Drawing conclusions from the research findings, Making suggestions according to the research results, Reporting the results of the research, Checking the compliance of the research with scientific principles, Conducting the writing of the research as a thesis / project.

KT6002 Doktoral Seminar

Determination of the subject for doctoral seminar work, Selection of the subject to be studied, Literature search, Listing of literature studies on the subject, Determination of the method about the subject, Application of preliminary preparations according to the method determined, Putting the study into practice, Doctoral seminar work, Interpretation and presentation of the results of the doctoral seminar work

KT6003 PhD Thesis

PhD thesis work

KT6004 Project Management

Project Management: Introduction, Project management cycle, logical framework, Project life cycle and organisation, Project management processes, Project integration management, Project plan development, Resource scheduling, Project time management, Project cost management, Project procurement management, Project human resources management, Project communication management, Project risk management, Application with computer software support.

KT6005 Intellectual And Industrial Property Rights

Intellectual property law in general, Basic concepts, Main elements of intellectual property system, Intellectual and artistic works, Moral rights, Trademarks, Patent concept and application processes, Design and application processes, Geographical indication application processes, New plant varieties-Integrated circuit topographies, Know-how (technical and commercial knowledge) concept, protection of know-how, Patent databases, Freedom of activity search and patent mapping concept, Technology transfer concept.

KT6006 Entrepreneurship

General characteristics of entrepreneurship and entrepreneurs in practice, Creativity and innovation concepts and applications, Innovation models, Innovative business ideas and applications, Scope and content of business plan for new ventures, Marketing planning in entrepreneurship, Production and financial planning in entrepreneurship, Strategic planning applications for new ventures, Marketing plan applications for new ventures, Production planning applications for new ventures, Financial planning for new ventures, Intellectual asset management, Writing and presentation of business plans.

KT6007 Scientific Research And Publication Ethic

Introduction to ethics and scientific research methods in science and technology, Ethics and rules in scientific research, Behaviours contrary to scientific ethics, Ethics education in scientist training, Ethical responsibilities of scientists, Science, society and ethics relations, Ethical principles in scientific publications, Ethics in scientific knowledge production, plagiarism and ethics, survey ethics in field research, Legal regulations related to ethics of YÖK, TÜBİTAK, UNIVERSITIES,

KT6008 Inorganic Electronic Spectroscopy

Absorption of light and Beer-Lambert law, Quantum numbers of multi-electron atoms, Spin-orbit coupling and term symbols, Electronic transitions in molecules and selection rules, Tanabe-Sugana diagrams and d^2-d^8 electron configurations, Jahn-Teller decay and spectra ($d^1$and d^9 electron configurations), Splitting of terms in the crystal field, Orgel diagrams and 10 Dq, Examples of the use of Tanabe-Sugana diagrams, Determination of Δo from spectra, Charge transfer bands, Interpretation of electronic spectra of complexes.

KT6009 Organometals Chemistry

General properties of organometallic compounds, history and recent developments, Organic ligands and nomenclature, Electron rule (electron counting), 18 electron rule, square plane complexes, Ligands, Organometallic compounds of transition elements, Nomenclature of organometallic compounds, Bonding between metal atoms and organic π systems, Synthesis and reactions of organometallic compounds, Reactions in which ligands transform into a new structure, Organometallic catalysts.

KT6010 Selected Topics In Physical Chemistry

Physicochemical Concepts and Thermodynamics I. Law of Thermodynamics, Second and third laws of thermodynamics, Phase diagrams of pure substances and phase transformations, Viscosity and surface tension, Partial molar properties, Rault and Henry's laws, Introduction to phase diagrams of two-component mixtures, Application of thermodynamic laws to reactions and chemical equilibrium, A general application and question solutions, Thermodynamics of ions and electrolytic conductivity, Reaction rates, rate expressions, reaction order, Chromatographic methods, Reaction mechanisms, catalyst, Question solutions.

KT6011 Advanced Polymer Chemistry I

Classification and nomenclature of polymers, Physical and chemical properties of polymers, Thermal transitions of polymers, Molecular weight and distribution of polymers, Molecular weight determination methods, Fractionation of polymers and fractionation methods, Stepwise polymerisation, Stepwise polymerisation kinetics, Radical addition polymerisation, Kinetics of radical addition polymerisation, Determination of rate constants in free radical chain polymerisation, Anionic polymerisation and kinetics, Cationic polymerisation and kinetics

KT6012 Advanced Polymer Chemistry II

Coordination polymerisation, Ring opening polymerisation, Atom transfer polymerisation, Copolymerisation, Copolymerisation types and kinetics, Monomer reactivity ratios, Block copolymers, Graft copolymers, Conducting polymers, Properties of some conducting polymers, Polymerisation systems, Polymer properties and applications.

KT6013 Polymeric Composites And Characterization

General definition and classification of composite materials, Application areas of composite materials, Matrices, Fillers, Production methods of polymeric based composite materials, General definition and classification of nanocomposite materials, Methods used in the characterisation of composite and nanocomposite materials, XRD, SEM and TEM analysis of composite and nanocomposite materials, Thermal properties of composite and nanocomposite materials, Mechanical properties of composite and nanocomposite materials, Physical properties of composite and nanocomposite materials, Examples of selected studies in the literature in recent years, Properties and application areas of clay-based polymeric composites, Properties and application areas of PMMA-based composites

KT6014 Polymer Technology I

General definitions and concepts, Inputs used in polymer production, Polymerisation techniques, Thermoplastics and thermoplastic technology, Thermosets and thermoset technology, Thermosets and thermoset technology, Elastomers elastomer technology, Elastomers elastomer technology, Fibres and fibre technology, Fibres and fibre technology, Additives used in polymers, Processing techniques of polymers

KT6015 Polymer Technology II

Physical and Chemical Properties of Polymers, Effect of Environment on Polymers, Solubility in Polymers, Combustion of Polymers, Electrical Properties, Optical Properties, Mechanical Properties of Polymers, Types of Forces, Deformation, Stress and Strain, Elastic Deformation, Viscous Deformation, Viscoelastic Deformation, Stress-Strain Relationships in Polymers.

KT6016 Thermal Analysis Methods

Differential Thermal Analysis (DTA), Differential Scanning Calorimeter (DSC), Calibration and Sample Preparation, temperature gradient, Thermogravimetry (TGA), Temperature Calibration, Thermal Analysis Applications, Reaction Rate and Kinetics, Polymer glass transition temperature, Purity Analysis with DSC, Crystalline Determination, Experimental Procedures, Other Thermal Analysis Methods.

KT6017 New And Renewable Energy Sources

Energy, energy sources and clean energy concept, Non-renewable and renewable energy sources, Fossil energy sources and environment, Solar Energy, Wind Energy, Hydraulic energy and marine energy, Hydrogen Energy and Fuel Cells, Biomass energy, Current status of renewable energy sources and technologies, Future of renewable energy sources and technologies, Comparison of non-renewable and renewable energy sources, Importance of renewable energy sources in energy policies.

KT6018 Numerical Analysis And Computer Applications

The importance of numerical analysis techniques, solution of algebraic equations and equation sets, numerical interpolation techniques, digital derivative and integral techniques, numerical solution methods of differential equations and computer applications.

KT6019 Drying Technology

Importance of drying, Water activity, Water sorption isotherms, Physical properties of air-water mixtures, Basic principles of drying, Drying rate and its calculation, Factors affecting drying rate, Fruit and vegetable drying, Changes in the structure of dried products and quality elements, Drying methods, Natural and artificial drying, Modelling of drying data.

KT6020 Advanced Electrochemistry

Fundamentals of analytical electrochemistry, Carbon electrodes, Film electrodes, Mercury electrodes, Chemically modified electrodes, Solvent and support electrolytes, Electroorganic synthesis, Coatings, Batteries

KT6021 Electrochemical Sensors

Electrochemistry and basic concepts, electrochemical cell, reference electrode and potential, galvanic cell and electrolytic cell, potentiometry, electroanalytical methods, electrochemical sensors and voltammetry, electroimpedance spectroscopy (eis) and chronoamperometry, Electrochemical sensor cell design, calculated properties of electrochemical sensors, electrochemical sensor examples.

KT6022 Thin Film Coating Techniques

Thin film concept; physical vapor deposition method (resistance evaporation, inductive evaporation, arc evaporation, electron beam evaporation and laser evaporation), Magnetron sputtering technique coating,

Sol-gel and spin coating technique, Langmuir-Blodgett technique coating, Electrochemical coating and electroplating.

KT6023 Advanced Fluid Mechanics

Introduction. Basic concepts of fluid mechanics, Conservation of mass, energy and momentum, Non-viscous flow, Viscous flow, Lagrange approximation, Euler approximation, Fluid properties, Rheology, Fluid kinematics and deformation, Boundary layer, Turbulence, Drift, Dynamics of rotating fluids and torque, Drift, Dynamics of rotating fluids and torque, Current separation, Basic problems in fluid mechanics.

KT6024 Biopolymer

Synthetic and natural polymers, information about biopolymers, usage areas of biopolymers, modification of polymers, mechanical properties of polymers, barrier properties of polymers, smart polymers

KT6025 Food Packaging

Introduction to food packaging, paper, glass, metal, plastic and cardboard packaging, smart packaging, areas of use of synthetic and biodegradable polymers in food packaging, optical properties, mechanical and barrier properties of biodegradable polymers in food packaging.

KT6026 Nano-Synthesis And Characterization

Main Nano-Synthesis Methods, Transmission Electron Microscope (TEM), Scanning Electron Microscope (SEM), Atomic Force Microscope (AFM), Scanning Tunneling Microscope (STM), X-Ray Diffraction (XRD) Spectroscopy, Fourier Transform Infrared (FT-IR) Spectroscopy, Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS), Ultraviolet-Visible (UV-Vis) Spectroscopy, Other Characterization Techniques Used

KT6027 Polymers Degradation

Thermal degradation, mechanical degradation, photodegradation, enzymatic degradation, biodegradation, mechanical and barrier properties in biodegradation of polymers, biodegradation in a controlled compost environment

KT6028 Nanoscience And Nanotechnology

Nano-science, nano-engineering and nano-technology in the light of developing and transforming science, Current developments in nano-science and nano-technology, Nano-engineering and application areas, Relationship between nano-material properties and measurement methods, Characterization of nanoparticles, Synthesis of nano-particles: Biosynthesis, Synthesis of nano-particles: Chemical synthesis methods, Metal-based nanoparticles, Carbon-based nanostructures, Hybrid nanostructures, Future of nanotechnology

KT6029 Nanotechnology And Application Areas

Development process of nanotechnology, Nanotechnological developments in basic sciences, Applications of nanotechnology: Science and education, Applications of nanotechnology: Biotechnology and agriculture, Applications of nanotechnology: Nanoelectronics and computers, Applications of nanotechnology: Aviation and space, Applications of nanotechnology: Pharmacy and nanomedicine, New areas of nanotechnology

KT6030 Green Chemistry And Sustainability

Green chemistry and sustainability, Green chemistry and green engineering, Green chemistry principles, Green chemistry; environment, health and safety integration, How do we know it is green?, Path and chemistry selection in green chemistry and green engineering, Material selection; solvents, catalysts and reagents, Reaction conditions and green chemistry, Bioprocesses, From laboratory to facility

KT6031 Separation Methods in Analytical Chemistry

Introduction to separation methods: Nature of the separation process, recovery and enrichment factor, classification of chemical separation methods, Separation based on selective precipitation and selective evaporation, Extraction: Technique of liquid-liquid extraction, Solid phase extraction, Supercritical fluid extraction, **Chromatography:** basic principles of chromatographic separation, classification of chromatographic methods, **Chromatographic Concepts:** Peak shapes, column efficiency, Van Deemter equation, relative retention rate, qualitative and quantitative analysis, **Gas chromatography:** Basic principles of GC analysis, GC instrument, Stationary phases and detector types, **Liquid chromatography:** Basic principles of HPLC analysis, HPLC instrument, column and detector types, **Types of retention mechanisms of liquid chromatography:** adsorption, (normal phase and reverse phase), dispersion, ion exchange, Basic principles of paper chromatography (PC) and thin layer chromatography (TLC), Basic principles of electrophoresis and electrophoretic separation

KT6032 Sample Preparation Techniques in Analytical Chemistry

Measurement process, qualitative and quantitative analysis, errors in quantitative analysis, method precision, method validation, sample storage, extraction and enrichment in sample preparation, extraction principles, liquid-liquid extraction, liquid-solid extraction, solid phase extraction, sorbent selection and recovery, Recent developments in solid phase extraction, sorbents, sorbent selection, recent developments in the technique, Method comparison, Extraction of organic compounds from solid matrices, Extraction of volatile organic compounds from solids and liquids, Preparation of samples for metal analysis, Homework presentation.

KT6033 Biofuels

History of Biomass Energy, Biomass Energy, Types of Biomass Energy, Obtaining Energy from Biomass, Biofuels, Importance of Biofuels in the Sector, Factors Triggering Biofuel Production, World Biofuel Production, Biofuel Technology Raw Materials Used in Biofuel Production and Production Process Literature Research.

KT6034 Coordination Polymers

Definition of coordination polymers and synthesis methods, Classification according to bonding patterns, Supramolecular isomerism, Building blocks, Solvent effect, Guest-host structures, Complementary anions, Intramolecular and intermolecular weak interactions, Transition metal coordination polymers, Bridge ligands, Neutral and ionic auxiliary ligands properties, Uses of coordination polymers.

KT6035 Symmetry and Group Theory in Molecules

Concept of symmetry, symmetry elements and symmetry operations, Point groups and their existence, Classification of symmetry operations, Introduction to group theory and character tables, Creation of character tables, Creation and reduction of reducible symmetry representations, Polarity and chirality

according to symmetry, Symmetry applications related to hybridization, Molecular orbitals related symmetry applications, symmetry applications related to molecular movements

KT6036 Polymer Synthesis and Characterization

Introduction to polymer synthesis and characterisation, calculation of electrical and optical properties of conducting polymers by quantum mechanical methods, Emulsion and suspension polymerisation of styrene, FTIR spectroscopy-ultraviolet spectroscopy, NMR spectroscopy, Thermal analysis, DSC, TGA, Redox polymerisation in aqueous systems, Dynamic mechanical analysis, Fluorescence spectroscopy, Mechanical properties of polymers, Gel permeation chromatography, Condensation polymerisation-phenol formaldehyde resins, Electropolymerisation: Conducting polymers, Investigation of flow properties of polymeric materials.

KT6037 Polymer Characterization I

Characterisation techniques, Molecular mass in polymers, Molecular mass distribution and determination methods, End group analysis, Colligative properties, Light scattering, Diffusion, Ultracentrifugation, sedimentation equilibrium and sedimentation rate, Viscometry, GPC methods, Thermal characterisation of polymers DTA, DSC, TGA- Dynamic and mechanical thermal analysis- Dynamic light scattering.

KT6038 Polymer Characterization II

Spectroscopic characterisation, ultraviolet spectroscopy and its application to polymers, Fourier transform infrared spectroscopy and its application to polymers, ^{1}H and ^{13}C-NMR spectroscopy and its application to polymers, ^{1}H and ^{13}C-NMR spectroscopy and its application to polymers, Raman spectroscopy, Electron spectroscopy for chemical analysis (ESCA), Electron spectroscopy for chemical analysis (ESCA), Use of electron spin resonance in the characterisation of polymerisation and polymer degradation reactions, Use of X-ray diffraction in the characterisation of polymers, Crystallinity of polymers, Mechanical characterisation, Microscopic characterisation Light microscopy, Scanning electron microscopy (SEM), Atomic force microscopy (AFM)

KT6039 Polymer Composites

Introduction to polymers, Production, characterisation, physical, mechanical and application areas of polymer blends, Preparation and production of polymer composites, Application areas of polymer composites, Mechanical properties of polymer composites, Stress and strain curves in polymers, Thermoplastic, thermoset and elastomer materials, Polymer composites obtained from renewable resources and application areas, Production and properties of chitosan and cellulose based composites, Production and properties of starch based composites, Physical properties of polymer composites, Production and characterisation of nano-filled polymer nanocomposites, Production, physical and mechanical properties of plant oil extract added composite materials

KT6040 Advanced Heat Transfer

Heat transfer by conduction. Derivation of one-dimensional, two-dimensional, three-dimensional heat transfer equations (steady state), Conduction heat transfer. Derivation of one-dimensional, two-dimensional, three-dimensional heat transfer equations (unsteady state), Heat transfer by conduction. Derivation of one-dimensional, two-dimensional, three-dimensional heat transfer equations (unsteady state), Analytical solution methods of conduction problems in steady state and unsteady state, Heat transfer by convection, Natural convection, Heat transfer by convection, Forced convection, Thermal radiation,

Boiling and condensation, Thermal boundary layer problems, Approximate solution of heat transfer problems by finite difference method

KT6041 Advanced Coordination Chemistry

Definition of coordination compound, examples in life and industry, Werner Theory, Nomenclature of coordination compounds, Isomerism, Coordination numbers and structures, VSEPR theory, Coordinative bonds; Molecular Orbital theory, Valence bond theory, Crystal-field theory, Ligand-field theory, Ligand types and properties, Usage areas of coordination compounds

KT6042 Foundations of Advanced Analytical Chemistry I

Introduction to chemical analysis, Errors in chemical analysis, Random errors in analysis, Application of statistics in examining and evaluating data, Solutions and solution concentrations, Chemical equilibrium, equilibrium constant, systematic solution in equilibrium systems, Strong acids and bases and titration curves, Buffer solutions, Complex acid-base systems and titration curves, Buffer solutions obtained from complex acid-base systems

KT6043 Foundations of Advanced Analytical Chemistry II

Aqueous solutions and chemical equilibrium, Effect of electrolytes on solubility balances, Solution of solubility balance problems and solubility calculations in complex systems, Solubility of precipitates in the presence of complexing reagents, Gravimetric analysis methods, Precipitation titrimetry, Complexation titrations, Structure and properties of EDTA, Indicators for EDTA, EDTA titration methods, Introduction to electrochemistry, Applications of standard potentials, Electrode potentials in redox titrations, Applications of redox titrations

KT6044 Electrochemistry

Introduction to electrochemistry, electrochemical cells and types, Electrode potentials, Nernst equation and limitations, formal potential, Applications of standard potentials, calculation of E (cell), calculation of redox, formation and solubility equilibrium constants, Applications of standard potentials, calculation of E (cell), calculation of redox, formation and solubility equilibrium constants. Electrode potentials in redox titrations, redox titration curves, redox indicators, Electrode potentials in redox titrations, redox titration curves, redox indicators.

KT6045 Inorganic Polymers

Definition of inorganic polymers and their differences from other polymers, synthesis methods and industrial applications of polymers.

KT6046 Inorganic Reaction Mechanism

Chemical kinetics: Rate laws, integrated rate equations, Activation parameters, Basic concepts, Stability and inertness, Kinetic techniques, Classification of mechanisms, Kinetic results of reaction pathways, Substitution Reactions in Square Planar Complexes, Substitution Reactions in Tetrahedral Complexes, Substitution reactions in octahedral complexes, Chelate and ligand effects, Metal Effect, Acid and Base Catalysis, Stereochemistry of Octahedral Substitution reactions, Organometallic Substitution Reactions, Synthesis of coordination compounds using substitution reactions, Thermodynamic stability of coordination compounds

KT6047 Advanced Kinetic

Kinetics, Reaction Rate, Factors Affecting Reaction Rate, Reaction Order, Reaction order determination methods, Effect of temperature on reaction rate (Arhenius Relation), Chemical Reactions (Collision theory), Reaction mechanisms, Application of These Theories on Reaction Rate

KT6048 Colloid Chemistry

Introduction to Colloid Chemistry/ Methods of Obtaining Colloids/ Their Colloids Particle Shapes/ Thin Filtering and Semi-permeable Membrane/ The movements of Colloids/ Optical Properties of Colloids/ Viscosity, Surface Voltage/ Tyndall Effect/ Adsorption of Colloids/ Electrical Properties/ Sol-gel Formation of Colloids/ Sol-gel Formation

KT6049 Antimicrobial Polymers

Overview of antimicrobial polymers; Antimicrobial natural polymers I; Antimicrobial natural polymers II; Synthesis and characterisation of antimicrobial polymers; Synthetic oligomers and polymers similar to natural peptide derivatives I (amphiphilic structure, importance of hydrophobic/hydrophilic ratio, structure/activity relationship); Synthetic oligomers and polymers similar to natural peptide derivatives II (amphiphilic structure, importance of hydrophobic/hydrophilic ratio, structure/activity relationship); Antimicrobial nanoparticles I (synthesis of Ag^{+}, TiO_2, ZnO based nanoparticles, synthesis of polymer/nanoparticle colloid structures and surface applications) I; Antimicrobial nanoparticles II (synthesis of Ag^{+}, TiO_2, ZnO based nanoparticles, synthesis of polymer/nanoparticle colloid structures and surface applications) II; Investigation of bacterial / antimicrobial polymer mechanism I; Investigation of bacterial / antimicrobial polymer mechanism II; Industrial applications of antimicrobial polymers (water treatment, food packaging, implant materials such as catheters, textiles, paints)

KT6050 Conductive Polymers

Introduction to conducting polymers, Classification of electrochemically active polymers, Electrical and electrochemical properties of conducting polymers, Conductivity theory and conductivity in conducting polymers, Doping and conductivity, Solubility of conducting polymers, Characterisation of conducting polymers, Synthesis methods of conducting polymers, Conductivity measurement techniques, Application areas of conducting polymers.

KT6051 Polymer Production And Processing

Introduction to Polymers: Basic Concepts and Definitions, Place and Importance of Polymers in Our Life, Chemical Structure and Classification of Polymers, Polymerisation Mechanisms, Polymer Production Methods, Physical, Chemical, Mechanical, Thermal, Rheological and Morphological Properties of Polymers, Structure-Property Relationship, Characterisation Methods Applied to Polymers, Thermoplastic Materials: Structures and Properties, Important Industrial Thermoplastics and Uses, Thermoset Materials: Structures and Properties, Important Industrial Thermoset Polymers and Uses, Elastomeric Materials and Fibres: Structures, Properties and Uses, Important Industrial Elastomers, Shaping Methods of Polymeric Materials, Polymeric Composite Materials: Classification, Preparation Methods, Application Areas.

KT6052 ADVANCED SPECTROSCOPIC METHODS

Acquisition of the fundamentals, theoretical aspects, practical examples, and applications of UV/Vis Spectroscopy. Acquisition of the fundamentals, theoretical aspects, practical examples, and applications of Infrared (IR) Spectroscopy. Acquisition of the fundamentals, theoretical aspects, practical examples, and applications of Nuclear Magnetic Resonance (NMR) Spectroscopy.