

Video lectures based on these study materials can be found at : <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>

### Semester-2 Notes (Paper CC-3)

*Thermodynamics and kinetics of organic reactions:*

Study Material-1 is available [here](#). (Thermodynamics and kinetics of organic reactions – basics, domains of thermodynamics and kinetics in the reaction energy profile diagram, how is a energy profile diagram constructed from a three dimensional potential energy surface (PES), concept of thermodynamic functions, free energy, enthalpy and entropy, calculating the enthalpy from BDE, entropy change in qualitative terms, factors controlling the reaction rate, single step reaction, concept of activation energy and its dependence on temp., concept of order and molecularity, multistep reactions – concept of rate-determining step (RDS) – case studies, principle of microscopic reversibility (PMR), concept of catalysis, Hammond's postulate and its applications, reactivity-selectivity principle (RSP) from Hammond's postulate). (uploaded on 12.03.2022) [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-2 is available [here](#). (Thermodynamic and kinetic control of organic reactions, examples: 1,2- and 1,4-addition of HBr to conjugated dienes, HCN addition to enones, kinetic and thermodynamic enolates from ketones, sulfonation of naphthalene, semicarbazone formation with cyclohexanone and furfural). (uploaded on 12.03.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-3 is available [here](#). (Thermodynamic analysis of intermolecular and intramolecular reactions, role of enthalpy and entropy, thermodynamic and kinetic preference for small to medium ring formations in comparison to corresponding intermolecular variants, crossover experiment to distinguish between inter and intramolecular reactions). (uploaded on 01.04.2021). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-4 is available [here](#). (Kinetic isotope effect (KIE), primary KIE (PKIE) and secondary KIE (SKIE), definition, examples, application in identifying the RDS in case of multistep reactions like elimination, halogenation of carbonyl compounds, oxidation of secondary alcohols to ketones and aromatic electrophilic substitutions). (uploaded on 03.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

*Acidity and basicity in organic chemistry:*

Study Material-1 is available [here](#). (Introduction to Bronsted-Lowry concept of acids and bases, concept of conjugate acids and conjugate bases, effect of solvents in regulating the dissociation of acids – the Leveling effect, quantifying relative acidity – the concept of acid ionization constant,  $K_a$ , and  $pK_a$  and  $pK_aH$ , logical outline to approach the problem of predicting relative acidity / basicity of organic molecules). (uploaded on 05.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-2 is available [here](#). (Factors affecting acidity and basicity of organic molecules – Periodic table correlations, effect of hybridization, inductive effect, field effect). (uploaded on 05.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-3 is available [here](#). (Factors affecting acidity and basicity of organic molecules – resonance effect, part-1). (uploaded on 10.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-4 is available [here](#). (Factors affecting acidity and basicity of organic molecules – resonance effect, part-2). (uploaded on 10.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-5 is available [here](#). (Factors affecting acidity and basicity of organic molecules – hydrogen bonding). (uploaded on 14.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-6 is available [here](#). (Factors affecting acidity and basicity of organic molecules – aromaticity). (uploaded on 16.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-7 is available [here](#). (Factors affecting acidity and basicity of organic molecules – solvent effects). (uploaded on 16.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

### *Tautomerism in organic chemistry:*

Study Material-1 is available [here](#). (Basic concepts, definition, characteristics and salient features of tautomerism, classification, valence tautomerism – definition, examples, comparison and difference with the concept of resonance; classic tautomerism, cationotropy and anionotropy – special case of prototropy- keto-enol / oxo-enol tautomerism, dominance of keto based on bond energy calculations, concept of  $pK_E$ , relation with  $pK_a$ , effect of structure on keto-enol tautomeric equilibrium – i) aldehyde versus ketone, ii) increasing the number of alkyls on alpha-carbon, iii) introducing aryl groups at the alpha-carbon, iv) introducing another carbonyl at the alpha-carbon – the 1,3-dicarbonyl system, part-1). (uploaded on 24.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-2 is available [here](#). (Effect of structure on keto-enol tautomeric equilibrium (contd.) – iv) introducing another carbonyl at the alpha-carbon – the 1,3-dicarbonyl system, part-2, v) steric factor in controlling the enol content, Fuson's enols, vi) Molecular geometry restrictions in controlling the enol content, vii) 1,2-dicarbonyl – the issue of dipolar repulsion; the effect of solvent on keto-enol tautomeric equilibrium; the effect of entropy on keto-enol tautomeric equilibrium; mechanism of keto-enol tautomerism – acid- and base-catalyzed enolization; consequences of enolization – olefinic double bond moving to come into conjugation with the carbonyl, racemization of chiral carbonyl compounds bearing stereocentre at alpha-carbon, functionalization of alpha-position through enol/enolate int.). (uploaded on 26.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-3 is available [here](#). (Phenol-keto tautomerism – overwhelming preference for the enol form and the reason behind it; factors controlling the keto content for a phenolic compound; nitro-*aci* tautomerism, imine-enamine tautomerism, tautomerism in diazoamino compounds, nitroso-oxime tautomerism including tautomeric equilibrium between nitrosophenols and quinoximes). (uploaded on 26.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-4 is available [here](#). (Ring-chain tautomerism – hydroxyaldehydes and hydroxyketones in equilibrium with lactols – stereochemical implications of ring-chain tautomerism, consideration of factors favouring the ring or the chain tautomer). (uploaded on 01.05.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

### *Halogenation of Alkanes*

Study Material are available [here](#). (Halogenation of alkanes, salient features, experimental observation and plausible mechanism, thermodynamic and kinetic analysis of chlorination and bromination of alkanes, regioselectivity of halogenation, reactivity-selectivity principle as applied for chlorination and bromination). (uploaded on 01.05.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

### *Elimination reactions in organic chemistry:*

Study Material-1 is available [here](#). (Introduction to elimination reactions, three variants of 1,2- or beta-elimination reactions – the E2, the E1 and the E1cB; mechanistic outlines, rate laws; base nucleophile dichotomy in E2 reaction; relation between the three variants, E2 with E1- and E1cB characters – More O'Ferrall-Jencks plot; Elimination, bimolecular, E2 reaction, effect of substrate structure, relative rates of E2 for different organohalides, the issue of regioselectivity – Saytzeff / Zaitsev product versus Hofmann product; reason for Zaitsev product's dominance – TS argument; effect of steric size of the base – reversal of regioselectivity). (uploaded on 07.05.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-2 is available [here](#). (Elimination, bimolecular, E2 reaction, effect of the leaving group – dominance of Hofmann products for organofluorides and onium substrates – TS arguments; Stereoselectivity – origin, anti and syn periplanar arrangement, the stereoelectronic requirement of E2, the outcome of stereoselective nature of E2 reactions). (uploaded on 07.05.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-3 is available [here](#). (Elimination, bimolecular, E2 reaction, stereoselectivity (contd.); Stereospecificity – origin, outcome, dehydrobromination of meso and active stilbene dibromide with sodium ethoxide, dehydrobromination versus debromination with pyridine, demonstration of E2 reactions that are not stereospecific). (uploaded on 07.05.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-4 is available [here](#). (Elimination, unimolecular, E1 reaction, recap of mechanism, rate law, competition with SN1 reaction, evidence of same RDS with SN1, RDS and product-determining steps of SN1-E1 reactions, dehydration of alcohols and hydration of alkenes, regioselectivity and stereoselectivity of E1

reactions). (uploaded on 13.05.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-5 is available [here](#). (The interplay between elimination and substitution reactions – SN1, E1, SN2 and E2 reactions – role of reagent – base or nucleophile, role of substrates, role of solvent polarity and temperature, summary of regiochemical and stereochemical outcome of bi- and unimolecular substitution and elimination reactions). (uploaded on 13.05.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-6 is available [here](#). (Pyrolytic *syn*-eliminations – mechanism, regio- and stereoselectivity of acetate pyrolysis, xanthate pyrolysis (aka Chugaev reaction), Cope elimination (*N*-oxide pyrolysis), synthetic applications of pyrolytic eliminations including seleno-Cope aka selenoxide elimination). (uploaded on 13.05.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

#### Semester-4 Notes (paper CC-8)

*Molecular rearrangement lecture series:*

Study Material-1 is available [here](#). (Detailed analysis of migration from carbon to electron-deficient carbon-based rearrangements : Wagner-Meerwein rearrangement.) (uploaded on 13.02.2022).

Study Material-2 is available [here](#). (Detailed analysis of migration from carbon to electron-deficient carbon-based rearrangements : Dienone-phenol and benzil-benzilic acid rearrangement.) (uploaded on 20.02.2022).

Study Material-3 is available [here](#). (Detailed analysis of migration from carbon to electron-deficient carbon-based rearrangements : Arndt-Eistert reaction (Wolff rearrangement) and pinacol-pinacolone rearrangement.) (uploaded on 23.02.2022).

Study Material-4 is available [here](#). (Detailed analysis of migration from carbon to electron-deficient nitrogen-based rearrangements : Hofmann, Curtius and Lossen rearrangement.) (uploaded on 26.02.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-5 is available [here](#). (Detailed analysis of migration from carbon to electron-deficient nitrogen-based rearrangements : Schmidt and Beckmann rearrangement.) (uploaded on 01.03.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-6 is available [here](#). (Detailed analysis of migration from carbon to electron-deficient oxygen-based rearrangements : Bayer-Villiger oxidation, cumene-phenol process and Dakin oxidation.) (uploaded on 01.03.2022).

Study Material-7 is available [here](#). (Detailed analysis of migration from side chain to an aromatic ring : Fries rearrangement, Claisen rearrangement [aromatic variant].) (uploaded on 01.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-8 is available [here](#). (Detailed analysis of migration from side chain to an aromatic ring : Fischer-Hepp, Hofmann-Martius, Orton, Bamberger, Benzidine, N-azo to C-azo (diazoamino to aminoazo), Sommelet-Hauser rearrangement.) (uploaded on 08.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

*Organonitrogen chemistry lecture series:*

Study Material-1 is available [here](#). (Synthesis of aliphatic amines (primary, secondary and tertiary), Gabriel's phthalimide synthesis, use of azide ion, cyanamide ion, reduction of amides and cyanides, reductive amination, Eschweiler-Clarke methylation, Leuckart reaction, exploiting the acidity of nitromethane in connection to synthesis of tertiary aliphatic amines, Hinsberg's separation of amines, identification and distinction between three classes of aliphatic amines by reaction with nitrous acid, Liebermann nitroso test.) (uploaded on 13.02.2022).

Study Material-2 is available [here](#). (Synthesis of primary aromatic amines – nitration of aromatic rings and subsequent reduction strategy, reduction of aromatic nitro group under different conditions, influence of pH, intermediates involved in the reduction of nitro to amines, partial reduction of dinitrocompounds and synthetic application of this strategy, exploring the orientation effect of nitro group in SEAr reactions and solving the regioselectivity issues with its help, synthesis of aromatic primary amines with the aid of rearrangement reactions.) (uploaded on 15.02.2022).

Study Material-3 is available [here](#). (Chemistry of aliphatic nitro compounds, synthesis of aliphatic nitro compounds – nucleophilic substitution with nitrite ion, decarboxylation of alpha-nitrocarboxylic acid, oxidation of nitroso compounds, synthesis using the acidity of nitromethane; reactions of nitroalkanes – reduction, reaction with HCl, nitro-aci tautomerism, Nef carbonyl synthesis, modern modifications, McMurry reaction, use of McMurry reaction in organic synthesis, nitronate anion as an acyl anion equivalent, Henry reaction and conjugate addition of nitronates, chemical distinction between three classes of aliphatic nitro compounds.) (uploaded on 01.03.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-4 is available [here](#). (Chemistry of organocyanides, preparation by nucleophilic substitution of alkyl halides – controlling the ambident nature of the cyanide ion, by dehydration of amides, from Grignard reagents, Sandmeyer reactions and assorted methods; reactions of organocyanide – hydrolysis in acid and in base medium, partial hydrolysis in alkaline hydrogen peroxide, reduction of cyanide to amine and to aldehyde – Stephen's aldehyde synthesis / reduction, reactions with Grignard reagents, Houben-Hoesch synthesis, Pinner reaction, Ritter reaction, Thorpe nitrile condensation – Thorpe-Ziegler reaction, von Richter reaction; chemistry of organic isocyanides, preparation by nucleophilic substitution of alkyl halides – controlling the ambident nature of the cyanide ion, by carbylamine reaction, by dehydration of *N*-alkylformamides, by deoxygenation of isocyanates; reactions of organic isocyanides – reaction with electrophiles, hydrolysis in acid medium, reduction of isocyanide, reaction with organolithiums to generate imidoyllithiums – use as acyl anion equivalent.) (uploaded on 03.03.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-5 is available [here](#). (Chemistry of aromatic diazonium salts, replacement of nitrogen by different nucleophiles, SN1 and radical mechanism, Schiemann reaction, Sandmeyer reaction, Gomberg-Bachmann reaction, Meerwein arylation, Japp-Klingemann reaction, application of diazonium salts in functionalising aromatic moieties.) (uploaded on 30.03.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-6 is available [here](#). (Chemistry of diazomethane and diazoacetic ester aka ethyl diazoacetate, synthesis of diazomethane and diazoacetic ester, reactions: methylation of carboxylic acids, methylation of phenols and alcohols, Arndt-Eistert homologation (detailed discussion done previously), homologation of ketones using diazomethane, conversion of aldehydes to methylketones, cycloaddition reactions of diazomethane and diazoacetic ester – formation of heterocyclic compounds, photochemical reactions of diazomethane and diazoacetic ester.) (uploaded on 30.03.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study Material-7 is available [here](#). diazotization of aromatic primary amines, synthetic utility of diazonium salts, diazo-coupling and its applications, influence of pH on diazo-coupling reactions, synthesis of secondary and tertiary aromatic amines, formation and reactions of diphenyleneamines.) (uploaded on 03.04.2022). [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

#### *The Logic of Organic Synthesis:*

Study material-1 is available [here](#). (Introduction to retrosynthesis, TM, synthon, synthetic equivalents, transforms – disconnection, Functional Group Interconversion (FGI), concept of latent polarity, rules of alternating polarity, Evans' classification of functional groups – E class, G class and A class functional groups, consonant and dissonant systems, logical and illogical synthons, illustration with relevant examples.) (uploaded on 18.04.2022) [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study material-2 is available [here](#). (Retrosynthetic analysis of bifunctional compounds – 1,2 bifunctional (dissonant) systems, strategies and examples.) (uploaded on 18.04.2022) [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study material-3 is available [here](#). (Retrosynthetic analysis of bifunctional compounds – 1,3 bifunctional (consonant) systems, strategies and examples.) (uploaded on 18.04.2022) [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study material-4 is available [here](#). (Retrosynthetic analysis of bifunctional compounds – 1,4 bifunctional (dissonant) systems, strategies and examples.) (uploaded on 24.04.2022) [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study material-5 is available [here](#). (Retrosynthetic analysis of bifunctional compounds – 1,5 bifunctional (consonant) systems, strategies and examples.) (uploaded on 26.04.2022) [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study material-6 is available [here](#). (Retrosynthetic analysis of bifunctional compounds – 1,6 bifunctional (dissonant) systems, strategies and examples.) (uploaded on 01.05.2022) [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study material-7 is available [here](#). (The strategy of protecting groups (PGs), merits and demerits of the strategy, protecting groups as necessary evil, basic requirement for acting as a protecting group; protection of alcohols – i) as ethers – methyl, *t*-butyl, benzyl, trityl (selective protection of primary alcohol in presence of secondary / tertiary alcohols) and silyl ethers, ii) as acetals – tetrahydropyranyl ether, methoxymethyl ether (RO-MOM), 2-methoxyethoxymethyl ether (RO-MEM), iii) as esters – acetates, benzoates and pivalates; protection of diols as acetals – 1,3-dioxane and 1,3-dioxolanes, selectivity in forming benzylidene and acetonide derivatives, functionalizing the primary and the secondary hydroxyl group of a typical 1,2,3-triol – glycerol.) (uploaded on 07.05.2022) [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

Study material-8 is available [here](#). (The strategy of protecting groups (PGs) – protection of carbonyl compounds – as acetals, *O,O*- and *S,S*-acetals, protection and deprotection protocols, features of carbonyl acetalization, examples; protection of amines – as benzyl derivatives, amides and carbamates – the BOC, CBZ and Fmoc protections and their complementary nature (orthogonality); protection of carboxylic acids – as alkyl esters, oxazoline derivatives and orthoesters, protection and deprotection protocols, examples.) (uploaded on 08.05.2022) [Video Lectures available here: <http://www.spcmc.ac.in/video-lecture-even-semester-cema-2022/>]

## Semester-6 Notes

### *Polymer Chemistry (DSE B3)*

Study material-1 is available [here](#). (Introduction, few definitions: polymer, monomer, end groups, degree of polymerisation, homopolymer, copolymer, types of copolymer; structural features of polymer; classification of polymers; concept of tacticity – isotactic, syndiotactic and atactic polymers, worked-out problems on molecular weight and degree of polymerisation.) (uploaded on 14.02.2022).

Study material-2 is available [here](#). (Nomenclature of polymers – common nomenclature, IUPAC structure-based nomenclature – concept of constitutional repeating unit [CRU], selected polymer nomenclature problems and solutions, worked-out problems on nomenclature, molecular forces and chemical bonding in polymer, cohesive energy density, critical chain length, chain entanglement, texture of polymers, interrelations of the states of bulk polymer.) (uploaded on 20.02.2022).

Study material-3 is available [here](#). (Concept of functionality: bifunctional, trifunctional, polyfunctional monomers, average functionality, latent functionality, vulcanization and epoxy polymers in relation to latent functionality, worked-out problems, classification of polymerization process – detailed discussion on addition / chain-growth and condensation / step-growth polymerization, mechanism, salient features, polymer types produced in the two processes, difference between the two types of polymerization methods.) (uploaded on 01.03.2022).

Study material-4 is available [here](#). (Relationship between average functionality, extent of reaction and number average degree of polymerization, Carothers equation, bifunctional and polyfunctional systems, problem set on Carothers equation, detailed look into the number average molecular weight and number average degree of polymerization, use of Carothers equation in determining the onset of gel point for non-linear step growth reactions, control of molecular weight in linear step-growth polymerization reaction by stoichiometric imbalance and addition of monofunctional monomers.) (uploaded on 06.03.2022).

Study material-5 is available [here](#). (Requirements of step-growth polymerization; kinetics of polymerization, derivation of rate expression for self-catalyzed polyesterification and polyesterification in presence of a strong acid catalyst.) (uploaded on 22.03.2022).

Study material-6 is available [here](#). (Kinetics of radical chain-growth polymerization: overall kinetic scheme, kinetics of chain polymerization using a radical initiator, rate of decomposition of initiator and chain initiation, rate of chain termination, overall rate of polymerization, analysis of rate expression, kinetic chain length, relationship with number average degree of polymerization, numerical problems on kinetics of free radical polymerization. initiators and their classification, inhibition and retardation.) (uploaded on 27.03.2021).

Study material-7 is available [here](#). (Kinetics of ionic chain growth polymerization: concept of monomer selectivity, relative reactivities of different monomers towards cationic and anionic chain initiators; comparison with free radical chain polymerization; details of cationic chain growth polymerization, derivation of kinetic equation, expression for number average degree of polymerization, effect of temperature and medium on polymerization rate, problems and answers) (uploaded on 27.03.2021).

Study material-8 is available [here](#). (Kinetics of ionic chain growth polymerization: details of anionic chain growth polymerization, derivation of kinetic equation, expression for number average degree of polymerization, effect of reaction medium and counterion on overall polymerization rate.) (uploaded on 05.04.2022).

Study material-9 is available [here](#). (Kinetics of coordination addition polymerization: details of Zeigler-Natta catalysis, catalyst composition, mechanism of stereoselective placement, mechanism of Zeigler-Natta

polymerization, derivation of kinetic equation, expression for number average degree of polymerization.) (uploaded on 19.04.2022).

Study material-10 is available [here](#). (Kinetics of copolymerization: details of Binary chain copolymerization: setting up the Markov or terminal model of copolymerization, reactivity ratio and its significance, deriving the copolymer composition equation and its applicability, types of copolymerization behaviour – ideal, alternating (including azeotropic copolymerization) and block copolymerization.) (uploaded on 17.05.2022).

Study material-11 is available [here](#). (Kinetics of copolymerization (contd.): rate expression for binary chain copolymerization: chemistry of copolymerization – monomer reactivity, radical reactivity, steric effects and alteration-polar effects, the Q-e scheme; numerical problems and their solutions.) (uploaded on 17.05.2022).

Study material-12 is available [here](#). (Techniques of polymerization: Bulk or mass polymerization – types, method, advantages, disadvantages; description of autoacceleration or Norris-Trommsdorff or gel effect; Solution polymerization -types, method, advantages, disadvantages; description of interfacial polymerization; Suspension polymerization – method, advantages, disadvantages; ; Emulsion polymerization – method, different stages, advantages, disadvantages; summary of the four polymerization techniques.) (uploaded on 19.05.2022).

Study material-13 is available [here](#). (Morphology of polymers: Crystallinity in polymer, development of crystallinity, degree of crystallinity, crystalline behaviour, fringed-micelle theory, folded-chain lamella theory, spherulites, determinants of crystallinity; Thermal transitions – Crystalline melting temperature ( $T_m$ ) and Glass transition temperature ( $T_g$ ), Determination of crystalline melting temperature, glass transition temperature and degree of crystallinity by Differential Scanning Calorimetry (DSC) – quick primer on DSC, crystallisation, glass transition and melting – their signature in DSC, DSC plot of a semi-crystalline polymer, determination of degree of crystallinity by x-ray diffraction – Wide-Angle X-ray Scattering (WAXS).) (uploaded on 19.05.2022).

Study material-14 is available [here](#). (Morphology of polymers (contd.): Factors affecting crystallinity and crystalline melting temperature,  $T_m$ ; symmetry, intermolecular non-covalent interactions, tacticity, branching and molar mass.) (uploaded on 24.05.2022).

Study material-15 is available [here](#). (Molecular weight determination – end-group determination and number average molecular weight, viscosity and viscosity average molecular weight – Mark-Houwink equation.) (uploaded on 31.05.2022).

Study material-16 is available [here](#). (Nature and structure of polymers: structure-property relationships – discussion on factors affecting different properties of polymers – molecular weight, linearity or lack of it in polymer chain, molar cohesion, polarity and crystallinity, temperature, property demand and polymer end-use, nature of intermolecular forces.) (uploaded on 31.05.2022)