[I] Lecture Notes / Study Materials for Chemistry Honours Students (CEMA), CBCS, DSE-B3 , POLYMER CHEMISTRY

1. PROPERTIES OF POLYMERS

(i) Study Material-1 (Part-1, PPT-1) is available here. **Contents:** Properties of Polymer: Introduction; (i) Low-Density Polyethylene (LDPE); (ii) High-Density Polyethylene (HDPE; (iii) Linear Low-Density Polyethylene (LLDPE); Differences among LDPE, LLDPE, and HDPE; Crosslinked Polyethylene [uploaded on 14. 04. 2021; revised on 05. 05. 2021]

(ii) Study Material-2 (Part-2, PPT-2) is available here. **Contents:** Properties of Polymer: Structure and properties of polyethylene; Uses and applications of polyethylenes; Polystyrene: A thermoplastic polymer; Structure and properties of polystyrene; Processing, uses and applications of polystyrene [uploaded on 26. 04. 2021; revised on 05. 05. 2021]

(iii) Study Material-3 (Part-3, PPT-3) is available here. **Contents:** Properties of Polymer: Styrene based copolymers; Poly(Vinyl Chloride): A thermoplastic polymer [uploaded on 29. 04. 2021; revised on 05. 05. 2021]

(iv) Study Material-4 (Part-4, PPT-4) is available here. **Contents:** Properties of Polymer: Poly(Vinyl Acetate): A thermoplastic polymer; polymers derived from poly(vinyl acetate): (i) poly(vinyl alcohol); (ii) Poly(vinyl acetals); Degree of alcoholysis of poly(vinyl acetate); Copolymers of vinyl chloride [uploaded on 05. 05. 2021]

(v) Study Material-5 (Part-5, PPT-5) is available here. **Contents:** Properties of Polymer: Polypropylene: A thermoplastic polymer; Acrylic polymers: Poly(methyl methacrylate); Acrylic fibres [uploaded on 13. 05. 2021]

(vi) Study Material-6 (Part-6, PPT-6) is available here. **Contents:** Properties of Polymer: Fluoropolymers (i) Polytetrafluoroethylene (PTFE); (ii) Polychlorotrifluoroethylene; (iii) Poly(viny1 fluoride); (iv) Poly(viny1idene fluoride); (v) Polyamides and related polymers (a) Nylon 6 (b) Nylon 11 (c) Nylon 12 (d) Nylon 66 (e) Nylon 610 [uploaded on 23. 05. 2021]

(vii) Study Material-7 (Part-7, PPT-7) is available here. **Contents:** Properties of Polymer: Aromatic polyamides; Phenolic resins (i) Novolac; (ii) Resole; (iii) Resitol; (iv) Bakelite [uploaded on 27. 05. 2021]

(viii) Study Material-8 (Part-8, PPT-8) is available here. **Contents:** Properties of Polymer: (i) Polyurethanes; (ii) Silicones [uploaded on 30. 05. 2021]

(ix) Study Material-8 (Part-9, PPT-9) is available here. **Contents:** Properties of Polymer: (i) Polydienes; (ii) Polycarbonates [uploaded on 30. 05. 2021]

(x) Study Material-10 (Part-10, PPT-10) is available here. **Contents:** Properties of Polymer: Conducting polymers: (i) Polyacetylene; (ii) Polyaniline; (iii) Poly(*p*-phenylene); (iv) Poly(*p*-phenylene sulphide); (v) Polypyrrole, and (vi) Polythiophene [uploaded on 13. 06. 2021]

(xi) Study Material-11 (Part-11, PPT-11) is available here. **Contents:** Conformation of Polymers: Crystallinity: An introduction; Chain dimensions, structures, and conformations; Conformational analysis of (i) Polyethylene; (ii) Polyisobutylene, (iii) Polypropylene [uploaded on 13. 06. 2021]

(xii) Study Material-12 (Part-12, PPT-12) is available here. **Contents:** Isomerism in polymers: Sequence isomerism; Constitutional isomerism; Stereoisomerism: Geometrical isomerism and optical isomerism [uploaded on 13. 06. 2021]

2. GLASS TRANSITION TEMPERATURE (T_g) AND DETERMINATION *Tg*

(i) Study Material-1 (Part-1, PPT-13) is available here. **Contents:** Transition phenomena in polymers: Glass transitions-I: Glass-rubber transition behaviour; Mechanical relationships; Five regions of viscoelastic behaviour; Thermal transitions in polymers: T_g and T_m [uploaded on 30. 06. 2021]

(ii) Study Material-2 (Part-2, PPT-14) is available here. **Contents:** Transition phenomena in polymers: Glass transitions-II: Transition phenomena in high polymers: First-order and second-order transitions; Relation between T_g and T_m; T_g, T_m and properties of polymers[uploaded on 30. 06. 2021]

(iii) Study Material-3 (Part-3, PPT-15) is available here. **Contents:** Transition phenomena in polymers: Theories of glass transitions-I: Theories of the Glass Transition: Introduction; Free volume theory; Iso-free-volume state theory; Mathematical analysis[uploaded on 30. 06. 2021]

(iv) Study Material-3 (Part-4, PPT-16) is available here. **Contents:** Transition phenomena in polymers: Theories of the glass transitions-II: WLF equation; Mathematical analysis[uploaded on 01. 07. 2021]

(v) Study Material-3 (Part-5, PPT-17) is available here. **Contents:** Transition phenomena in polymers: Factors affecting glass transition temperature (T_g) Problems on T_g [uploaded on 01. 07. 2021]

3. POLYMER SOLUTION

(i) Study Material-1 (Part-1, PPT-18) is available here. **Contents:** Polymer Solution: Polymer size and shape; The molecular weight of polymer; Theory of polymer solubility; The solubility parameter[uploaded on 01. 07. 2021]

(ii) Study Material-2 (Part-2, PPT-19) is available here. **Contents:** Polymer Solution: Theoretical calculation of solubility parameter; Thermodynamics of mixing; Types of solution: Ideal solution[uploaded on 01. 07. 2021]

(iii) Study Material-3 (Part-3, PPT-20) is available here. **Contents:** Polymer Solution: Regular and athermal solutions; Low-molecular-weight mixtures: van Laar model; Statistical thermodynamics of mixing[uploaded on 01. 07. 2021]

(iv) Study Material-1 (Part-4, PPT-21) is available here. **Contents:** Polymer Solution: Polymer-solvent mixtures: Flory-Huggins model; Values for the Flory-Huggins χ parameter; Mathematical analysis; Lower and upper critical solution temperatures[uploaded on 10. 07. 2021]

4. DETERMINATION OF MOLECULAR WEIGHT OF POLYMERS

(i) Study Material-2 (Part-1, PPT-22) is available here. **Contents:** Molecular weight of polymers: Polymer molecular weights: Introduction; Molecular Weight Distribution; Molecular weight and properties of the polymer; Molecular weight averages; Polydispersity Index (PDI) [uploaded on 15. 07. 2021]

(ii) Study Material-3 (Part-2, PPT-23) is available here. **Contents:** Molecular weight of polymers: The number-average molecular weight ( ); The weight-average molecular weight ( ); Viscosity-average molecular weight ( ); Molecular weight averages; Determination of the number-average molecular weight: Colligative properties: Osmotic pressure [uploaded on 15. 07. 2021]

(iii) Study Material-1 (Part-3, PPT-24) is available here. **Contents:** Molecular weight of polymers: Weight-average molecular weights; Radii of gyration [uploaded on 16. 07. 2021]