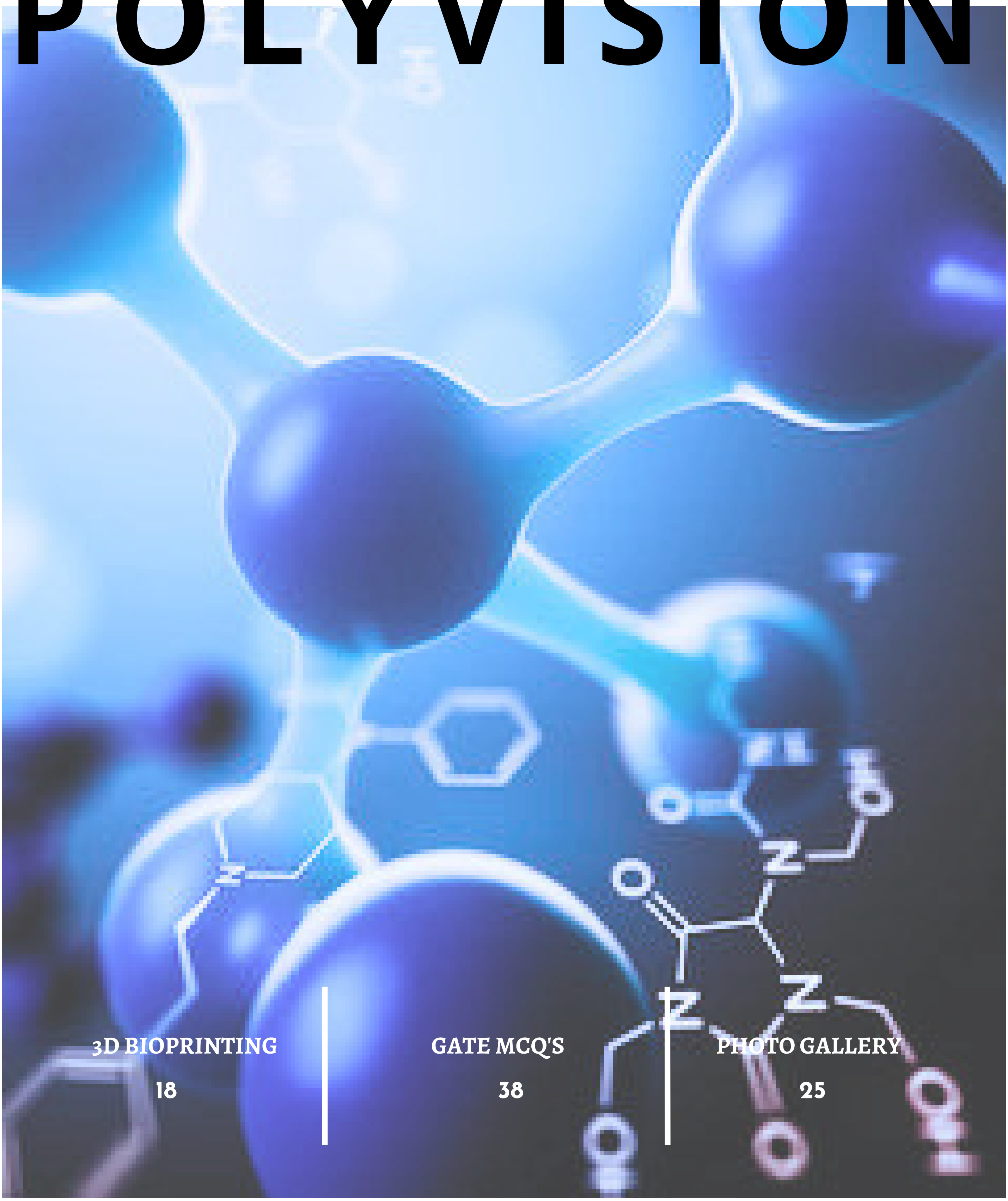
MAHARASHTRA INSTITUE OF TECHNOLOGY AURANGABAD

(AN AUTONOMOUS INSTITUTE)

DEPARTMENT OF PLASTIC AND POLYMER ENGINEERING

POLYVISION



HOD's Message

Dr. Suranjana Mandal
Associate Professor and HoD

It is a great pleasure that our Department of Plastic and Polymer Engineering is releasing Issue VI of "POLYVISION", for the academic year 2022-23 to explore the creative ideas and activities of our students. In an era of digitization and e- learning, it is apt to go digital for expressing our views on different socio-economic, political or cultural issues. It is an active platform for both staff and students to share information, latest technical knowledge and imaginations in all dimensions. This magazine would not have been possible without the enthusiastic and hard work of all student participants, editorial board members and all faculty members. I register my sincere appreciation to the students and editorial team for their timely effort to bring this issue of magazine. I wish all the staff members and students for success in their future endeavors.

EDITORIAL MESSAGE

Dr. Saurabh Tayde
Assistant Professor

It gives us immense pleasure and satisfaction to introduce our fourth issue of 'E-POLYVISION' Magazine for the academic session 2022-23. So this time we have attempted to bring out the talent concealed within our student community, which would help to enhance the practical value of Plastic and Polymer Engineering. This issue includes informative technical as well as nontechnical articles and many other things. Plastic and Polymers have given the speed and flexibility to humans to perform their day-to-day task. I express my happiness towards the steps taken by the Institute and the Department in strengthening.

Engineering and Technology through such a type of activity. We hope you will enjoy reading this issue as much as we have enjoyed while making it. I thank my editorial team, technical team, authors and well-wishers, who are promoting this magazine and making it informative.

STUDENT ISSUE EDITORS

SIDDESH NIRMAL
B.Tech TYPPE

VASISTHA ERANDE
B.Tech TYPPE

SHWETA VAIDYA
B.Tech TYPPE

Dear readers in your hand you have “POLYVISON” official E-magazine, Vol. 6. Magazine plays an essential part in where the hidden talents of the students as well as faculty members can expose. It is a time of Thanksgiving to our almighty for his abundant blessings and for leading the college to come thus far. It is also a time of retrospection, to appreciate the good things and resolve to do better. We thank the College Committee Board for giving me the opportunity to send this greeting and wish the publication a grand success.

MIT-Centre for Industry Relevance in Polymer Science and Technology (M-CIP)

TEAM M-CIP

Objectives

- Establish Training Centre for all Plastic manufacturing processes.
- Provide maximum facility to new comers in advanced industrial research and innovation.
- Provide support to the industry to student & industrial people.

Features of MCIP

- Skill Development
- Mould Testing
- Trial Runs
- Industrial
- Consultancy Material
- Testing In-Plant for Student

Student of B.Tech PPE learning Mould change in MCIP

TRAINING PROGRAMS @ M-CIP

FULL TIME PROGRAM

- Plastic molding supervisor
- Plastic molding operator/ technician
- Plastic molding helper
- Duration:2 to 6 months

SPECIALIZED SHORT TERM COURSE

- Injection machine operator
- Stretch blow machine operator
- Roto molding machine operator
- Industrial safety
- 3D Printing Technology
- Duration:7 to 30 days

OTHER TRAINING PROGRAMS

Other than above mentioned training programs, M-CIP can develop tailor made training programs as per the requirement of industries

M-CIP ROTO MOLDING MACHINE EN-1000X2 CAPACITY

EQUIPMENTS @ MCIP

INJECTION MACHINE

Injection moulding machine moulds can be fastened in either a horizontal or vertical position. The majority of machines are horizontally oriented, but vertical machines are used in some niche applications such as insert moulding, allowing the machine to take advantage of gravity. Some vertical machines also do not require the mould to be fastened. There are many ways to fasten the tools to the platens, the most common being manual clamps (both halves are bolted to the platens).

ROTATION MOULDING M/C

Rotational moulding machines are made in a wide range of sizes. They normally consist of moulds, an oven, a cooling chamber, and mould spindles. The spindles are mounted on a rotating axis, which provides a uniform coating of the plastic inside each mould. Moulds (or tooling) are fabricated either from welded sheet steel or from cast. The fabrication method is often driven by part size and complexity; most intricate parts are likely made out of cast tooling.

3D Printing

3D printing, or additive manufacturing, is the construction of a three-dimensional object from a CAD model or a digital 3D model. The term “3D printing” can refer to a variety of processes in which material is deposited, joined or solidified under computer control to create a three-dimensional object, with material being added together (such as liquid molecules or powder grains being fused together), typically layer by layer.

M-CIP PLASTIC RECYLING UNIT

"OFTEN WHEN YOU THINK YOU'RE AT THE END OF SOMETHING, YOU'RE AT THE BEGINNING OF SOMETHING ELSE."

We at MIT strongly believe in this and hence to reduce the wastage done by the processing units at MCIP a recycling plant has been put in place to keep a check on the amount of waste discarded

M-CIP PLASTIC RECYCLING SECTION

M-CIP PLASTIC RECYCLING SECTION

EXTRUSION PLANT M-CIP RECYCLING SECTION

HIGH SPEED MIXER M-CIP RECYCLING SECTION

MIT-CENTRE FOR ADVANCED MATERIALS RESEARCH AND TECHNOLOGY LAB (M-CAMRT)

FACILITES AT MCAMRT

Processing

- Two roll mill
- Compression Moulding
- Single screw extruder
- Muffle furnace
- Vacuum furnace

Sample Preparation and Testing

- Ultrasonicator
- Notch cutter
- Tensile test specimen
- Universal tensile testing Machine
- Hardness tester
- Mooney viscometer tester

Characterization

- FTIR
- UV-Vis spectrophotometer
- Differential scanning
- Calorimeter
- Thermogravimetric Analyser
- Dynamic light scattering

OUR PRIORITIES

OBJECTIVES

- Facilitate
- Support
- Solve
- Develop Skills

SERVICES

- Training & Testing
- Research
- Safety Management
- Consultancy
- Customer Satisfaction

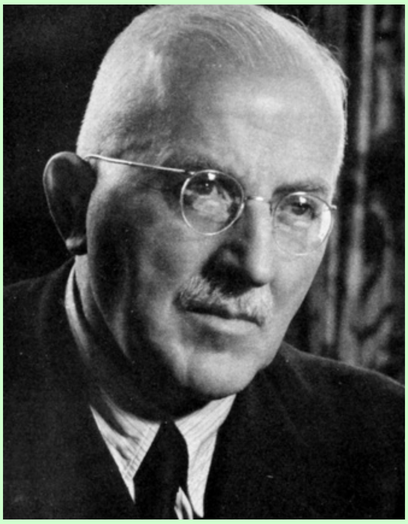
ISO CERTIFICATION

We at MIT believe in quality and what's better than an ISO certification to prove it.
ISO 9001:2015 Certification to M-CAMRT & M-CIP

STUDENTS SECTION

THE RENOWNED POLYMER SCIENTIST

Hermann Staudinger



Staudinger was born in 1881 in Worms. Staudinger, who initially wanted to become a botanist, studied chemistry at the University of Halle, at the TH Darmstadt and at the LMU Munich. He received his "Verbandsexamen" (comparable to Master's degree) from TH Darmstadt. After receiving his Ph.D. from the University of Halle in 1903, Staudinger qualified as an academic lecturer at the University of Strasbourg in 1907.He was supported in his work by new his wife Dora Staudinger who wrote up his lectures. The general structure of a ketene. R is any group. It was here that he discovered the ketenes, a family of molecules characterized by the general form depict. Ketenes would prove a synthetically important intermediate for the production of yet-to-be-discovered antibiotics such as penicillin and amoxicillin.

In 1907, Staudinger began an assistant professorship at the Technical University of Karlsruhe. Here, he successfully isolated a number of useful organic compounds (including a synthetic coffee flavoring) as more completely reviewed by Rolf Mülhaupt. Here too he guided future Nobel laureates Leopold Ružička (1910) and Tadeusz Reichstein to their doctorates.

Contrary to prevailing ideas (see below), Staudinger proposed in a landmark While at Karlsruhe and later, Zurich, Staudinger began research in the chemistry of rubber, for which very high molecular weights had been measured by the physical methods of Raoult and van 't Hoff. paper published in 1920 that rubber and other polymers such as starch, cellulose and proteins are long chains of short repeating molecular units linked by covalent bonds. In other words, polymers are like chains of paper clips, made up of small constituent parts linked from end to end. A chain of paper clips (above) is a good model for a polymer such as polylactic acid (below). The polymer chain is composed of small pieces linked together in a head-to-tail fashion.

At the time, leading organic chemists such as Emil Fischer and Heinrich Wieland believed that the measured high molecular weights were only apparent values caused by the aggregation of small molecules into colloids. At first, the majority of Staudinger's colleagues refused to accept the possibility that small molecules could link together covalently to form high-molecular weight compounds. As Mülhaupt aptly notes, this is due in part to the fact that molecular structure and bonding theory were not fully understood in the early 20th century.

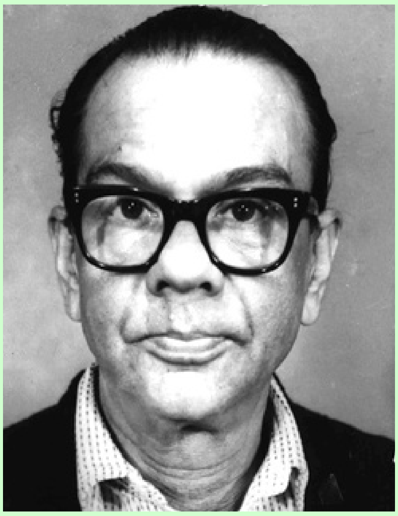
In 1926, he was appointed lecturer of chemistry at the University of Freiburg at Freiburg im Breisgau (Germany), where he spent the rest of his career. In 1927, he married the Latvian botanist, Magda Voita (also shown as; German: Magda Woit), who was a collaborator with him until his death and whose contributions he acknowledged in his Nobel Prize acceptance. Further evidence to support his polymer hypothesis emerged in the 1930s. High molecular weights of polymers were confirmed by membrane osmometry, and also by Staudinger's measurements of viscosity in solution.

The X-ray diffraction studies of polymers by Herman Mark provided direct evidence for long chains of repeating molecular units. And the synthetic work led by Carothers demonstrated that polymers such as nylon and polyester could be prepared by well-understood organic reactions. His theory opened up the subject to further development, and helped place polymer science on a sound basis.

AWARDS AND HONORS

For this work he received the 1953 Nobel Prize in Chemistry.

SADHAN BASU



Basu was born on 2 January 1922 in Kolkata (then Calcutta), to Jyotish Chandra Basu and Sarajubala.Educated in the city, he graduated with a B.Sc. from the University of Calcutta in 1942, obtaining an M.Sc. from the same university in Rajabazar Science College campus in 1944.
He then conducted research into the properties of shellac at the Indian Lac Research Institute (now the Indian Institute of Natural Resins and Gums) under the supervision of noted chemist Prafulla Kumar Bose (1898-1983), for which he earned a D.Sc. from Rajabazar Science College, Calcutta University in 1948. In 1948, Basu joined the faculty of the Indian Association for the Cultivation of Science, where he conducted pioneering research on chain transfer in radical polymerisation and established a standard procedure for estimating the molecular weight of polymers. From 1951 to 1953, he was a postdoctoral Fulbright fellow in chemistry at Indiana University Bloomington, where he developed an interest in the emerging field of quantum chemistry; upon returning to India, he published six papers on free electron molecular orbital calculations.
In 1954, Basu joined the faculty of the University of Calcutta as a reader; he would remain at the university for the next three decades. One of the pioneers of polymer chemistry in India, his studies were primarily in the fields of charge transfer interactions, ligand field spectra, hydrogen bonding, quantum chemistry and photochemistry. Focusing on the detection, and analysis of charge transfer band of molecular complexes and through experimental assignment of its vibrational structure, he supported the quantum mechanical model of the complexes originally propounded by Robert S. Mulliken, the winner of 1966 Nobel Prize for Chemistry.

In order to determine the -NH2 group in nylon, he developed a methodology which has since been accepted as a standard industrial procedure. He calculated the transition energies and oscillator strengths of aromatic polyhydrocarbons using the gas model prescribed by Shin'ichirō Tomonaga in 1950, demonstrated that extended catacondensed planar structures could be derived only by using 3-4-6 membered rings and employing Hartree-Fock-Bogolyubov, illustrated that, unlike triplet transitions, the longest wavelength singlet transitions in linear polyenes converge to a limit.[1] Basu's researches were published in a number of articles and the article, Degree of Polymerization and Chain Transfer in Methyl Methacrylate, he and his co-authors, J. N. Sen and S. R. Palit, published in 1950 was the first Indian article on polymer chemistry.[11] He was associated with International Journal of Quantum Chemistry, the Indian Journal of Chemistry and the Proceedings of the Proceedings of Indian National Science Academy as their associate editor and mentored a number of students in their doctoral researches.

AWARDS AND HONORS

The Indian National Science Academy elected Basu as a fellow in 1962 and the Council of Scientific and Industrial Research awarded him the Shanti Swarup Bhatnagar Prize, one of the highest Indian science awards, in 1965. A UGC National Professor during 1972-73, he became an elected fellow of the Indian Academy of Sciences in 1975 and was a recipient of the Acharya J. C. Ghosh Gold Medal of Indian Chemical Society (1984) and the C. V. Raman Birth Centenary Commemoration Medal of the Indian Science Congress Association (1988). In 1957, he was appointed a Fellow of the Royal Institute of Chemistry (FRIC), which merged with the Chemical Society in 1980 to become the Royal Society for Chemistry.

LIQUID SILICONE RUBBER INJECTION MOLDING

JANHAVI HIWALE
B.Tech TYPPE

Liquid silicon injection moulding has been steadily gaining importance in many areas due to its ability to produce intricate elastomeric components with relatively shorter cycle time. Injection moulding of liquid silicone rubber is a newly developed process primarily helps in the areas of application where thermoplastic elastomers and rubber reach their limits.

LSRM requires the following equipments of suitable technical specifications :

- Dosing pump
- Mixing unit with static mixer
- Injection moulding machine
- Mould
- Brushes and Removal devices

The primary function of the dosing pump is to feed the two different material components (Component A contains a catalyst , component B contains cross linking constitutes) into the mixing segment in the ratio of 1;1 at a constant pressure. The catalyst is a platinum curing agent which will cause cross linking at room temperature hence the necessity of separately two parts before processing. Component A contains an inhibitor which slows the cross linking action below a certain temperature. Even the smallest differences in the dosing volume lead to incompletely filled or flashed products and so care to be taken for ensuring 1;1 ratio. The static mixer homogenizes the mixture and pumps it to the plasticizing unit with the help of static mixing tube.

The additives and colourants required are added before the mixture was fed into the mixing segment.Processing of LSR requires special mould technology and most of the product are directly gated with cold runners. The needle shut off system with appropriate temperature separation preventscross linking of the material inside the gates this eliminate the possibilities of visible gate marks.

To avoid flashing trapped air and burn smallest gap dimensions are necessary because LSR becomes very easy flowing at higher shear rates and the moulds are evacuated before the injection process. The moulds are normally heated electrically to approximately 180-220 cel.

Depending on the mould temperature the cross linking time amounts to approximately 3 to 7 sec per millimeter wall thickness of the moulded part.

Advantages

- LSR based products offers constant rubber mechanical properties over a wide temperature range.
- Labour intensive preparation of rubber based product is eliminated by the injection moulding of LSR.
- Shorter cycle time and injection pressure .
- Products of LSR are good ozone UV and weather resistance &excellent chemical resistance properties.

3D BIO-PRINTING

VASISTHA ERANDE
B.Tech TYPPE

Three dimensional bioprinting is the utilization of 3D printing-like techniques to combine cells, growth factors, and biomaterials to fabricate biomedical parts. Generally, 3D bioprinting can utilize a layer-by-layer method to deposit materials known as bio-inks to create tissue-like structures that are later used in various medical and tissue engineering fields.3D bioprinting covers a broad range of bioprinting techniques and biomaterials. Currently, bioprinting can be used to print tissue and organ models to help research drugs and potential treatments. Translation of bio-printed living cellular constructs into clinical application is met with several challenges due to the complexity and number of cells needed to create functional organs. However, recent innovations include bioprinting of extracellular matrix, mixing cells with hydrogels deposited layer by layer to produce the desired tissue, and printing scaffolds to regenerate joints and ligaments.
While the technology has a lot of potential, it is still in its early stages and could greatly improve the quality of life for people with a range of diseases. For example, people with diabetes may be able to grow their own insulin-producing cells and reduce their reliance on injections. This potential improvement to the mechanical properties of medical devices is still in its infancy, but it has the potential to make a huge difference to the lives of many people .

GROUND TYRE RUBBER & ITS PROCESS

SIDDESH NIRMAL
B.Tech TYPPE

The increasing amount of waste tyre rubber constitutes a considerable problem worldwide. Among other methods of recycling, the physical way is of high interest, consisting of the grinding or milling of scrapped tyres and the utilisation of the produced ground tyre rubber (GTR) as a component of fresh rubber compounds for producing new tyres. Three main methods of rubber milling have been developed: ambient, cryogenic, and wet.

The ambient process involves fragmentation of the rubber in knife mills. The product is a rubber powder consisting of particles with an irregular shape and rough surface that are tenths of a millimetre or larger in size. The milling can also be conducted in twin-screw extruders, which is a continuous process.

In the cryogenic process, the preliminary shredded tyres are cooled below the glass transition temperature of the rubber with liquid nitrogen and then milled in hammer mills, which is less energy-consuming than ambient grinding. The procedure creates a rubber powder consisting of very fine particles with smooth surfaces and sharp edges.

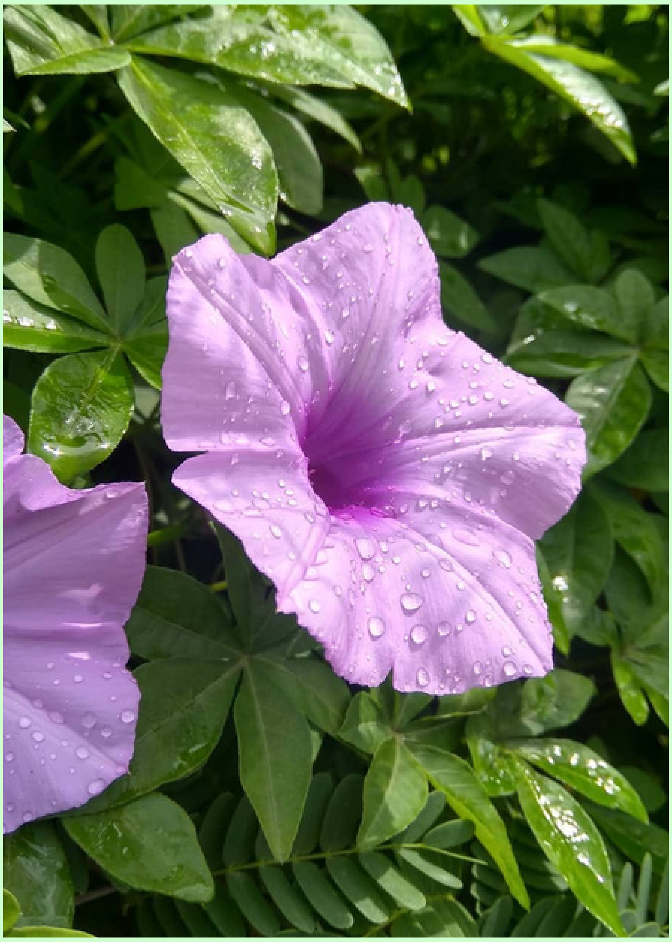
In the waterjet process, water at high pressure (more than 200 MPa) is the only milling element. Rubber strips are selectively separated from the steel cord that remains intact. Such a process produces rubber powder of high purity with fine particles having a convex-concave microstructure and highly specific surface.Ground rubber from scrapped tyres and other rubber waste is frequently blended with common rubbers such as NR, SBR, BR, EPDM, and NBR because of their good compatibility. The maximum concentration of GTR is considerably limited, however, due to the quality and strength requirements for such products.

The particle size of GTR influences the properties of GTR-containing rubbers as well. As the particle size of GTR increases, the tensile strength, hardness, abrasion resistance, and crosslink density deteriorate whereas the swelling degree increases.

Qitaab Teri Meri

YEH KITAAB HAI TERI MERI;
AAPNE HAR LAMHE KI AUR YAADON KI;
MEIN SHAAYAR HOON TERA;
ISME KI HAR SHAAYARI HAI TERI;
JAB HUM RAHE YA NA RAHE;
YE KITAAB JARROOR RAHEGI;
KYUNKI YE KITAAB HAI TERI MERI;
AAPNE HAR LAMHE KI AUR YAADON KI;
JAB TU MERI JINDAGI ME NAHI THI;
TAB MERI JINDAGI KI KITAAB SAAF THI;
TERE AANE SE, BAS AANE SE HE;
MERE JINDAGI KI KITAAB,
KA HAR EAK PANNA BAHARNE LAGA;
MERE DIL KE HAR EAK PANNE PE BAS TERA HE NAAM HAI;
KYUN KI TU HE TO MERA AARMAAN HAI;
JAB BHI HUM RAHE YA NA RAHE;
YE KITAAB JARROR RAHEGI;
KYUNKI YE KITAAB HAI TERI MERI;
AAPNE HAR LAMHE KI AUR YAADON KI;
AB JAB TUM MERI JINDAGI SE CHALI JAONGI;
TAB ME MERI DIL KI KITAAB KHOLKE;
USME KI SAARI YAADEIN PADHUNGA;
KYUNKI ME TERE JAISA PYAAR PHIRSE NAHI MILA PAUNGA;
ME JO KEHTA THA KI TU MERI JINDAGI HAI;
AUR JAB MERE SAATH TU HI NAHI TO MERE PAAS JINDAGI HE, KAHA HAI;
TUZHE KYA ME BATAAU KYA HAI ISME;
ISMEIN JO HAI WOH KABHI NAHI DEKHA KISINE;
TERI MERI YE KITAAB HAI KHAAS;
KYUNKI AAPNA HAR SAPNA AUR KHWAAB HAI ISKE PAAS;
YEH KITAAB HAI TERI MERI;
AAPNE HAR LAMHE KI AUR YAADON KI.

- Tejas Pawar
SYPPE



PHOTOGRAPH'S BY SIDDESH NIRMAL

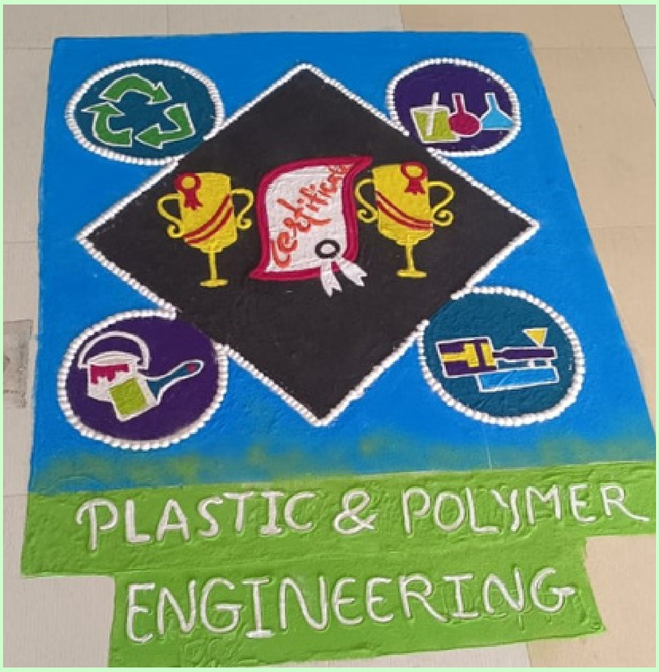
PHOTOGRAPH BY SHARDUAL LANJEKAR

DRAWING BY SHARDUAL LANJEKAR

An image of Ganpati

DRAWING BY PRATIKSHA PATIL

An image of Shambahji Maharaj



RONGOLI BY PPE 3rd YEAR GIRLS

PHOTO GALLERY

Felicitation Of Topper by Dr. Ashtaputre Award

PHOTO GALLERY

Plast India 2K23 Visit at Pragati Maidan New Delhi

Fresher Welcome 2023

PHOTO GALLERY

Aptitude and Technical Test For TY PPED

Expert talk on CAE for Plastic Product Design

PHOTO GALLERY

Social Activity Club Social Work at Railway Station and Old Age Home, Aurangabad

PHOTO GALLERY

POLYEXPLORE 2023

MOCK PLACEMENT DRIVE

The Polymer Campus Drive is a career-focused event that offers students the opportunity to connect with professionals in the polymer industry. At this event, students can learn more about the industry, explore employment opportunities, and connect with potential employers. It is an excellent opportunity for students to enhance their career prospects in the polymer industry.

The ludo evnt is a non technical but its a strategy board event for two to four participants, in which the participants race their four tokens from start to finish according to the rolls of a single die.

LUDO COMPETITION

POLYEXPLORE 2023

POSTER PRESENTATION COMPETITION

Polymer Poster Presentation is a visual representation of research findings or innovative ideas related to polymer materials. This event provides an opportunity for participants to demonstrate their creativity and present their ideas in a professional and engaging manner.

· The CAD War is a competition in which participants must design and optimize a polymer component using computer-aided design software (CAD). This event will test participants' knowledge and skills in using the software CAD and their ability to apply design principles to create an efficient and effective polymer part.

CAD WAR

INSTANT MEMORY COMPETITION

Polymer Instant Memory is a memory competition that requires participants to memorize information about polymers in a limited amount of time. This event helps participants develop their memory skills and improve their understanding of polymer materials.


Maharashtra Institute of Technology
Chh. Sambhaji Nagar
(An Autonomous Institute)
Plastic & Polymer Engineering Department
MIT
Quest for Excellence
Our Recent Placement 2023
Amit Rahangdale
Reliance Industries Ltd.,
Mumbai
CTC : 7.5 LPA
Tirth Deokar
Reliance Industries Ltd.,
Mumbai
CTC : 7.5 LPA
Gaurav Kasar
Reliance Industries Ltd.,
Mumbai
CTC : 7.5 LPA
Nirmay Raibaghkar
Supreme Petrochem Ltd.
Mumbai
CTC : 5 LPA
Chintan Jadhav
Supreme Petrochem Ltd.
Mumba
CTC : 5 LPA
Pravin Neharkar
Supreme Petrochem Ltd.
Mumbai
CTC : 5 LPA
Yash Walla
Godrej & Boyce Mfg.
Co. Ltd., Mumbai
CTC : 4.32 LPA
Namdev Warangule
Godrej & Boyce Mfg.
Co. Ltd, Mumbai
CTC : 4.32 LPA
Rushikesh Kumawat
Mahindra CIE Ltd.
Pune
CTC : 4.2 LPA
Prathamesh Khairnar
Mahindra CIE Ltd.
Pune
CTC : 4.2 LPA
Sachin Dheple
A Raymond Fasteners
India Pvt. Ltd.
CTC : 4 LPA
Komal Khandare
Oriental Rubber
Industries Ltd., Pune
CTC : 3.5 LPA
Pranav Patil
Oriental Rubber
Industries Ltd., Pune
CTC : 3.5 LPA
Ram Sakhare
Jabil India Mfg. Pvt
Ltd, Pune
CTC : 3.5 LPA
Akash Mundhe
Varroc Polymer Pvt. Ltd.
Chh. Sambhajinagar
CTC : 3.5 LPA
Shivaji Jaybhaye
Cosmoplast India Pvt
Ltd, Chh. Sambhajinagar
CTC : 3 LPA
Muzakkir Ambekar
Cosmoplast India Pvt
Ltd, Chh. Sambhajinagar
CTC : 3 LPA
Zamir Shaikh
Cosmoplast India Pvt Ltd,
Chh. Sambhajinagar
CTC : 3 LPA
Atharv Jamwadikar
All Time Plastics,
Silvassa
CTC : 2.6 LPA
Vinayak Kajrekar
All Time Plastics,
Silvassa
CTC : 2.6 LPA
Congratulations ....!

ALUMNI SUCCESS STORIES

G.S.Mandal's
Maharashtra Institute of Technology, Aurangabad
(An Autonomous Institute)

MIT Quest for Excellence

ACCREDITED WITH GRADE A NAAC

Alumni Success Story

Pursuing M.Sc. In Materials Science and Engineering, University of Birmingham, UK
Alumni of Plastic and Polymer Engineering
Batch 2020

Introducing Chinmay Zinge, graduated in Plastic and Polymer Engineering in 2020. Chinmay has been selected in University of Birmingham to pursue the course – M.Sc. in Materials Science and Engineering.

•Scholarships Received

1. Commonwealth Scholarship(3000 GBP)
2. Global Masters Scholarship (10,000 GBP) 1 of only 30 across globe.

   Total- 13,000 GBP (equivalent to 13.5 lakhs INR)

•Type of Scholarship- International Scholarship Award and Global Excellence Scholarship Award (Fees discount).

•BTech Project- Synthesis and Characterization of Clay based Starch-Grafted-Acrylic Acid Hydrogel for Agriculture Application.

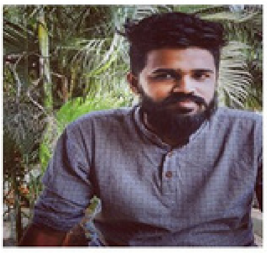
• Completed Inplant training at DIAT, Pune and published a Review paper titled " Nanocellulose based Biodegradable Polymers" European Polymer Journal 133 (2020) 109758. https://doi.org/10.1016/j.eurpolymj.2020.109758.

G.S.Mandal's
Maharashtra Institute of Technology, Aurangabad
(An Autonomous Institute)

MIT Quest for Excellence

ACCREDITED WITH GRADE A NAAC

Alumni Success Story



Freelance Script writer
Alumni of Plastic and Polymer Engineering
Batch 2014

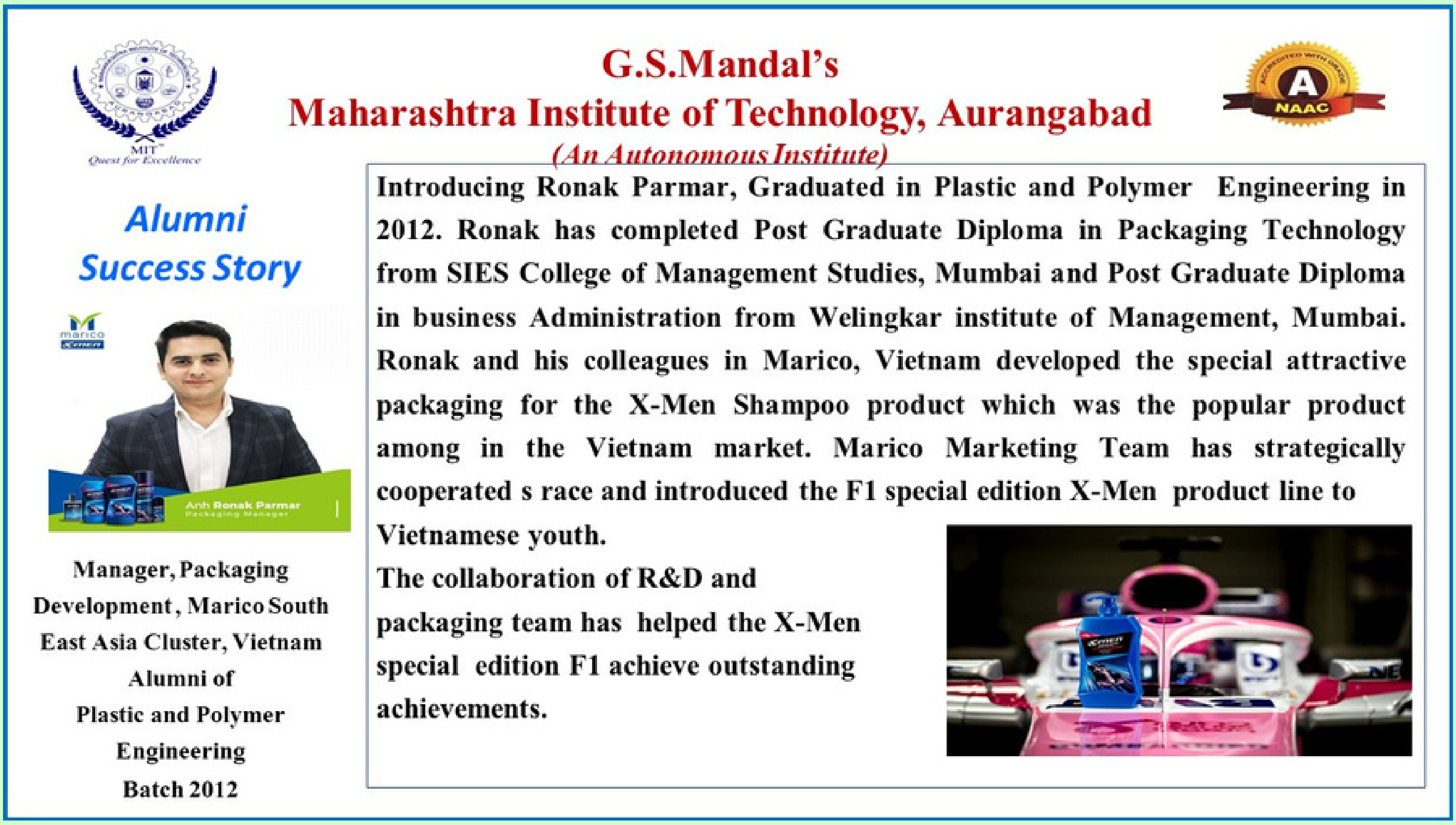
Vishal Talavanekar, an alumni of Plastic and Polymer Engineering Department. Currently, he is a freelance scriptwriter, writes for TV shows, films and animation. He has written for many renowned production houses like The Viral Fever, Greengold Animation (Creators of Chhota Bheem), Disney India and others.

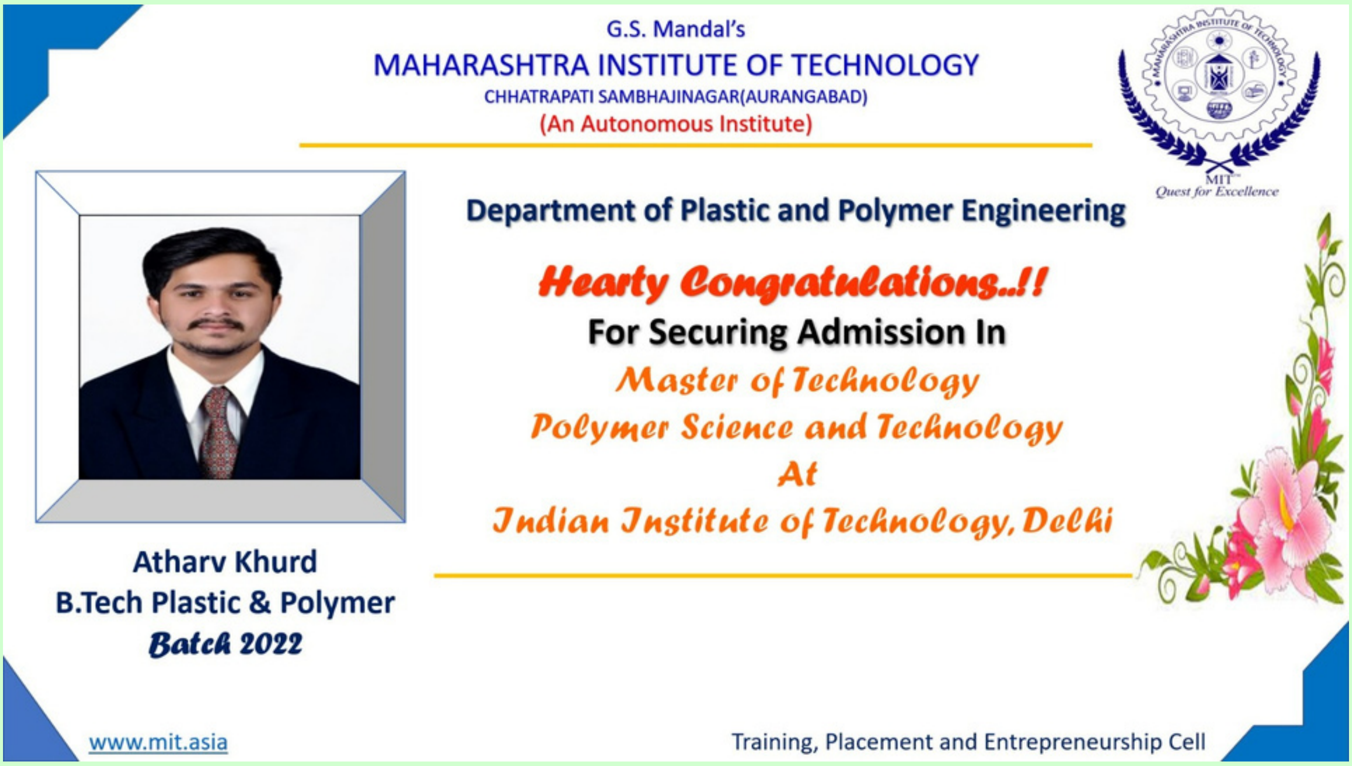
He has also written 5 seasons of Chhota Bheem, 2 seasons of Permanent Roommates : He said She said (An audio series on audible), Bhaiyyaji Balwaan (Season 1 Disney India).

Besides this he has provided creative writing services to various brands, corporate and NGOs such as Sula Vines, Room to Read India, GS Caltex India, Buddyz toy manufacturers for their corporate content.

His recent audio series *Permanent Roommates He said She said* Season 2 is out now on #Audible https://www.audible.in/pd/Permanent-Roommates-He-Said-She-Said-Season-2-Podcast/B09HJQNSJL

ALUMNI SUCCESS STORIES





GATE CORNER

Polymer Science and Engineering (XE-F)

Section 1: Chemistry of high polymers

Monomers, functionality, degree of polymerizations, classification of polymers, glass transition, melting transition, criteria for rubberiness, polymerization methods: addition and condensation; their kinetics, metallocene polymers and other newer methods of polymerization, copolymerization, monomer reactivity ratios and its significance, kinetics, different copolymers, random, alternating, azeotropic copolymerization, block and graft copolymers, techniques for polymerization-bulk, solution, suspension, emulsion. Concept of intermolecular order (morphology) - amorphous, crystalline, orientation states. Factor affecting crystallinity. Crystalline transition. Effect of morphology on polymer properties.

Section 2: Polymer Characterization

Solubility and swelling, Concept of molecular weight distribution and its significance, concept of average molecular weight, determination of number average, weight average, viscosity average and Z-average molecular weights, polymer crystallinity, analysis of polymers using IR, XRD, thermal (DSC, DMTA, TGA), microscopic (optical and electronic) techniques, Molecular wt. distribution: Broad and Narrow, GPC, mooney viscosity.

Section 3: Synthesis, manufacturing and properties

Commodity and general purpose thermoplastics: PE, PP, PS, PVC, Polyesters, Acrylic, PU polymers. Engineering Plastics: Nylon, PC, PBT, PSU, PPO, ABS, Fluoropolymers Thermosetting polymers: Polyurethane, PF, MF, UF, Epoxy, Unsaturated polyester, Alkyds. Natural and synthetic rubbers: Recovery of NR hydrocarbon from latex; SBR, Nitrile, CR, CSM, EPDM, IIR, BR, Silicone, TPE, Speciality plastics: PEK, PEEK, PPS, PSU, PES etc. Biopolymers such as PLA, PHA/PHB.

GATE CORNER

Section 4: Polymer blends and composites

Difference between blends and composites, their significance, choice of polymers for blending, blend miscibility-miscible and immiscible blends, thermodynamics, phase morphology, polymer alloys, polymer eutectics, plastic-plastic, rubber-plastic and rubber-rubber blends, FRP, particulate, long and short fibre reinforced composites. Polymer reinforcement, reinforcing fibres - natural and synthetic, base polymer for reinforcement (unsaturated polyester), ingredients / recipes for reinforced polymer composite.

Section 5: Polymer Technology

Polymer compounding-need and significance, different compounding ingredients for rubber and plastics (Antioxidants, Light stabilizers, UV stabilizers, Lubricants, Processing aids, Impact modifiers, Flame retardant, antistatic agents. PVC stabilizers and Plasticizers) and their function, use of carbon black, polymer mixing equipment, cross-linking and vulcanization, vulcanization kinetics.

Section 6: Polymer rheology

Flow of Newtonian and non-Newtonian fluids, different flow equations, dependence of shear modulus on temperature, molecular/segmental deformations at different zones and transitions. Measurements of rheological parameters by capillary rotating, parallel plate, cone-plate rheometer. Visco-elasticity-creep and stress relaxations, mechanical models, control of rheological characteristics through compounding, rubber curing in parallel plate viscometer, ODR and MDR.

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Section 7: Polymer processing

Compression molding, transfer molding, injection molding, blow molding, reaction injection molding, filament winding, SMC, BMC, DMC, extrusion, pultrusion, calendaring, rotational molding, thermoforming, powder coating, rubber processing in two-roll mill, internal mixer, Twin screw extruder.

Section 8: Polymer testing

Mechanical-static and dynamic tensile, flexural, compressive, abrasion, endurance, fatigue, hardness, tear, resilience, impact, toughness. Conductivity-thermal and electrical, dielectric constant, dissipation factor, power factor, electric resistance, surface resistivity, volume resistivity, swelling, ageing resistance, environmental stress cracking resistance, limiting oxygen index. Heat deflection temperature -Vicat softening temperature, Brittleness temperature, Glass transition temperature, Co-efficient of thermal expansion, Shrinkage, Flammability, dielectric constant, dissipation factor, power factor, Optical Properties - Refractive Index, Luminous Transmittance and Haze, Melt flow index.

Section 9: Polymer Recycling and Waste management

Polymer waste, and its impact on environment, Sources, Identification and Separation techniques, recycling classification, recycling of thermoplastics, thermosets and rubbers, applications of recycled materials. Life cycle assessment of polymer products (case studies like PET bottles, packaging bags).

GATE QUESTIONS

Q.1 Interfacial polymerization can be used to prepare
(A) Nylon 6
(B) Nylon 66
(C) Polyacrylonitrile
(D) Poly(butyl acrylate)

Q.2 In a rubber sample with a Mooney viscosity of 60 ML(1+4) 100 °C, the number 4 signifies
(A) Applied shear rate in s-1
(B) Number of samples tested
(C) Time in minutes after starting the motor when the measurement is taken
(D) Preheating time in minutes

Q.3 The initiator system which can be used for free radical polymerization at 5 °C is
(A) $FeSO_4$ + t-butyl hydroperoxide
(B) Azobisisobutyronitrile
(C) Potassium persulfate
(D) Benzoyl peroxide

Q.4 Weather resistance of high impact polystyrene can be improved by blending polystyrene with
(A) Styrene butadiene rubber
(B) Natural rubber
(C) Ethylene propylene rubber
(D) Nitrile rubber

Q.5 Which of the following is a discontinuous polymer processing operation?
(A) Calendering
(B) Extrusion
(C) Film blowing
(D) Thermoforming

Q.6 The blend of polyethylene and polypropylene is
(A) Immiscible due to enthalpic constraints
(B) Immiscible due to entropic constraints
(C) Miscible as they are polyolefins
(D) Miscible due to comparable solubility parameters

Q.7 Toughness in a polymer can be inferred from
(A) Izod impact strength
(B) Depth of indentation
(C) Area under the stress-strain curve
(D) Charpy impact strength

Q.8 Which of the following polymers are polyesters?
(A) Poly(acrylic acid)
(B) Poly(lactic acid)
(C) Polyhydroxybutyrate
(D) Poly(ε-caprolactone)

Q.9 The functionality of adipic acid for condensation reaction with glycerol is _________ (in integer).

Q.10 From the dynamic mechanical analysis of a polymer sample with a phase angle of 30°, the relationship between storage modulus (E') and loss modulus (E") can be expressed as

(A) $E' = \sqrt{3}\, E''$

(B) $2E' = \sqrt{3}\, E''$

(C) $E'' = \sqrt{3}\, E'$

(D) $2E'' = \sqrt{3}\, E'$

Q.11 Match the properties in Column A with their respective unit in Column B

Column A	Column B
P. Surface resistivity	1. Ohm-cm
Q. Volume resistivity	2. S cm-1
R. Coefficient of thermal expansion	3. Ohm
S. Electrical conductivity	4. K-1

(A) P-1; Q-3; R-4; S-2

(B) P-2; Q-3; R-1; S-4

(C) P-3; Q-1; R-4; S-2

(D) P-3; Q-1; R-2; S-4

Q.12 Match the following polymer product with its most appropriate processing technique Polymer product Processing technique

P. Bottle	1. Extrusion
Q. Blister packaging	2. Pultrusion
R. Reinforced electric poles	3. Injection blow molding
S. Sewage pipes	4. Thermoforming

(A) P-3; Q-4; R-1; S-2

(B) P-3; Q-4; R-2; S-1

(C) P-4; Q-3; R-2; S-1

(D) P-3; Q-2; R-4; S-1

Q.13 Match the following additives to their respective functions Additive Function

P. p-phenylenediamine	1. Flame retardant
Q. Trixylyl phosphate	2. Impact modifier
R. Polybutadiene rubber	3. Nucleating agent
S. Talc	4. Antiozonant

(A) P-4; Q-2; R-1; S-3
(B) P-3; Q-1; R-2; S-4
(C) P-4; Q-1; R-3; S-2
(D) P-4; Q-1; R-2; S-3

Q.14 Match the polymers with their characteristic infrared (IR) stretching frequency Polymer IR stretch (cm-1)

P. Polyurethane	1. ~2234
Q. Polyethylene	2. ~1151
R. Polysulfone	3. ~1720
S. Acrylonitrile-butadiene-styrene copolymer	4. ~2914

(A) P-4; Q-3; R-2; S-1
(B) P-3; Q-4; R-2; S-1
(C) P-3; Q-4; R-1; S-2
(D) P-3; Q-2; R-4; S-1

Q.15 Match the following polymers to the most appropriate product Polymer Product

P. Expanded polystyrene	1. Motor bearings
Q. Polyether ether ketone	2. TV cabinet
R. Polycarbonate	3. Sound proof walls
S. Poly(butylene terephthalate)	4. Safety glass

(A) P-2; Q-1; R-4; S-3 (C) P-3; Q-1; R-2; S-4
(B) P-2; Q-4; R-1; S-3 (D) P-3; Q-1; R-4; S-2

Q.16 Match the polymers to the polymerization method used for their synthesis Polymer Polymerization method

P. Linear low density polyethylene	1. Ring opening
Q. Nylon 6	2. Ziegler-Natta
R. Styrene-butadiene rubber	3. Condensation
S. Aromatic polyamide	4. Emulsion

(A) P-2; Q-1; R-4; S-3
(B) P-2; Q-1; R-3; S-4
(C) P-2; Q-3; R-4; S-1
(D) P-2; Q-4; R-1; S-3

Q.17 If 5 g of a monodisperse polystyrene sample of molecular weight 10,000 g mol-1 is mixed with 15 g of another monodisperse polystyrene sample of molecular weight 20,000 g mol-1, then the polydispersity of the resulting mixture is ________ (rounded off to two decimal places).

Q.18 For a polymer sample with a viscosity of 6 × 1011 poise, if the apparent plateau modulus of 3 × 106 dyne cm-2 drops to zero above a certain temperature, the relaxation time of the polymer is _________ days (rounded off to one decimal place).

Q.19 The thermal conductivity values of glass fiber and epoxy resin are 1.05 W m-1 K-1 and 0.25 W m-1 K-1, respectively. The thermal conductivity of a glass fiber reinforced epoxy composite with a fiber content of 60% by volume along the fiber direction is ________ W m-1 K-1 (rounded off to two decimal places).

Q.20 The tensile modulus of a thermosetting polyester resin and glass fiber are 3 GPa and 80 GPa, respectively. If a tensile stress of 110 MPa is applied along the fiber direction on a continuous uniaxially aligned glass fiber reinforced thermosetting polyester composite with a fiber content of 60% by volume, the resulting strain will be ___________×10-3 (rounded off to one decimal place).

Q.21 The amount of low molecular weight plasticizer with a Tg of -60 °C that must be added to nylon 6 to reduce its Tg from 50 °C to 30 °C is __________ % (rounded off to nearest integer).

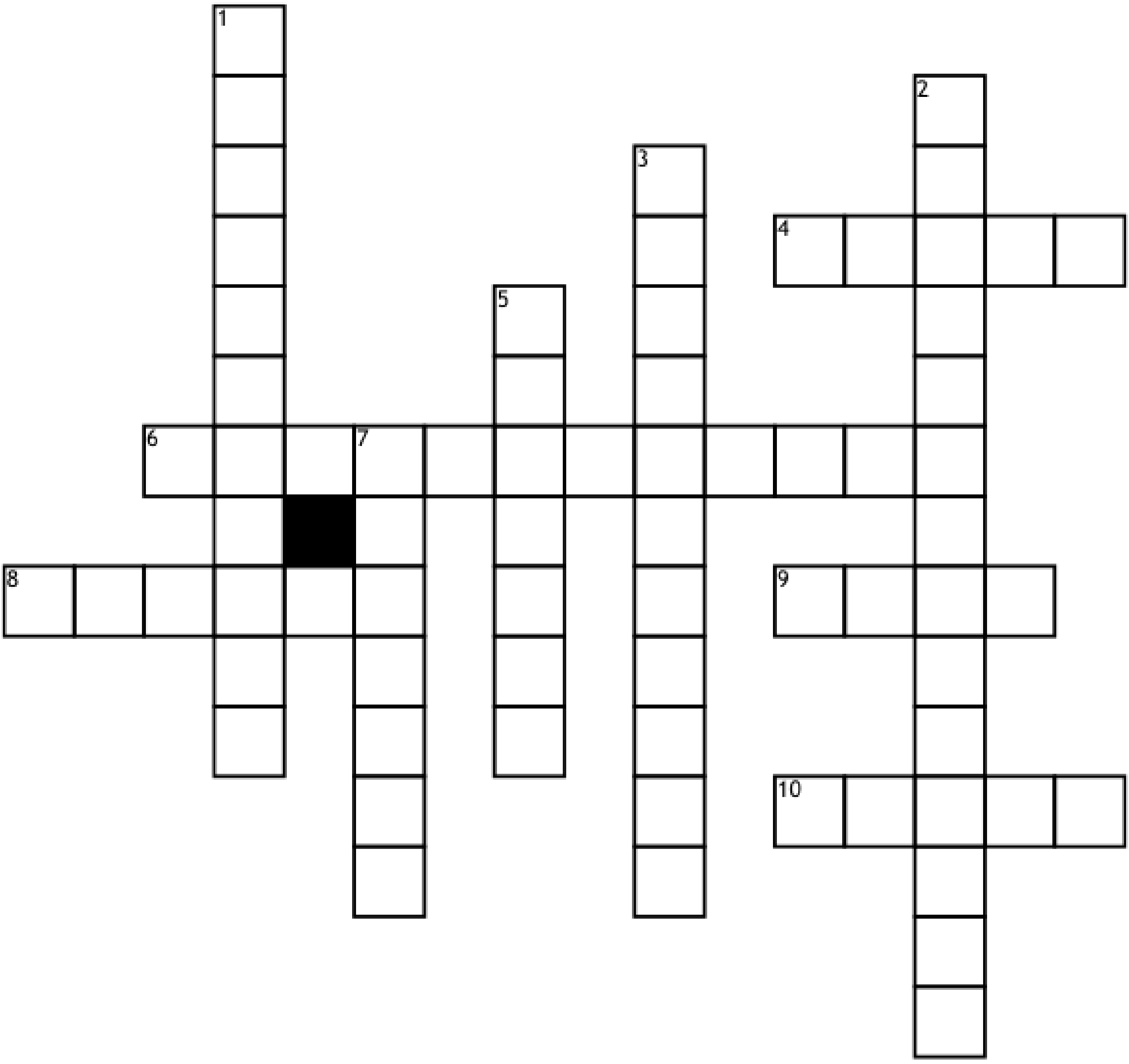
Q.22 The enthalpy of fusion for a polymer is found to decrease from 135.6 J g-1 to 120 J g-1 after five years of use. If the enthalpy of fusion of the same polymer with 100% crystallinity is 290 J g-1, then the loss in crystallinity after five years is _______ % (rounded off to one decimal place).

POLYMERS WORD SEARCH

X	E	Z	I	E	O	H	H	K	W	V	M	R	H	F	S	U	D	M	D	J	G	O	V
X	X	X	T	Z	D	P	F	D	W	K	X	H	K	X	I	C	M	A	F	W	M	K	Q
T	G	E	N	E	R	Y	T	S	Y	L	O	P	T	C	A	P	M	I	H	G	I	H	R
U	C	L	H	V	J	S	H	X	E	P	Z	L	N	N	K	B	J	C	Y	B	T	S	B
K	N	H	M	I	E	Q	N	E	Y	L	B	G	T	V	F	D	Q	D	O	E	R	B	G
W	C	I	X	K	G	D	D	Y	D	M	D	Q	L	A	Y	V	X	M	O	P	F	U	T
D	O	R	J	P	F	H	I	E	K	L	P	W	Y	S	B	E	T	G	Z	C	C	E	S
A	G	S	N	L	S	G	D	R	O	V	A	H	O	Y	T	Y	V	E	T	Y	P	O	Z
F	J	H	Z	U	F	Z	G	E	O	C	Z	M	W	K	N	T	I	A	P	G	L	K	Z
C	F	B	W	D	D	Z	S	W	N	L	W	X	R	O	O	H	T	Y	J	I	I	U	A
C	T	E	E	A	I	B	N	K	Q	S	H	U	J	O	N	I	G	H	K	D	L	J	E
N	I	Y	E	S	H	P	T	I	B	Z	I	C	Z	B	F	B	F	Q	I	L	G	M	N
W	V	L	G	A	C	Q	U	V	S	W	V	T	L	W	V	A	Z	L	S	I	W	X	E
S	S	U	Y	S	X	D	W	Z	W	E	D	G	Y	Y	G	E	E	U	X	P	F	R	L
Y	B	S	L	R	U	C	Z	Y	C	X	R	A	R	P	N	K	W	R	Z	K	C	M	Y
A	I	V	O	I	C	L	J	R	I	I	A	R	K	Y	O	I	A	R	U	H	J	G	P
C	D	B	K	P	O	A	A	W	P	B	L	J	E	F	D	L	V	L	J	T	P	E	O
N	I	S	E	R	Y	X	O	P	E	E	A	Q	V	T	R	X	Y	Y	P	S	T	H	R
U	D	D	O	O	I	F	E	O	C	L	B	B	O	F	S	N	C	T	L	N	Y	U	P
O	R	W	Y	O	D	L	R	D	Q	L	J	W	J	S	G	E	I	L	H	O	P	Y	Y
T	Y	T	L	X	Z	O	A	H	J	B	S	P	C	D	Y	M	Y	X	V	E	P	Z	L
B	B	U	K	K	J	Z	L	V	T	R	O	V	M	W	O	W	J	L	F	V	N	Y	O
L	D	X	Q	J	Y	A	R	K	L	N	Q	V	H	O	R	W	I	Y	O	X	V	E	P
B	H	T	H	O	U	B	V	O	P	W	U	O	M	G	A	N	Z	U	A	P	E	C	H

Urea-formaldehyde	Polyester Resin	PF
MF	Epoxy resin	PET
Polyvinyl chloride	Polypropylene	High density Polythene
High impact polystyrene	Acrylic	

POLYMERS CROSSWORD



Across

4. What state of matter are most polymers at room tempreture

6. In industry what can be used to harden plastics

8. What is the most common protein in milk

9. What is the name of a compound that donates hydrogens

10. What do cows drink

Down

1. What is a polymer made from a propene monomer called

2. What is the process that forms polymers called

3. What are DNA monomers called

5. If something is capable of dissolving in a liquid, it is...

7. What is the small molecule from which a polymer is synthesized


Yes
SAY ~~NO~~ TO
PLASTIC