

BASICS OF FLOW PROPERTIES IN PLASTIC PROCESSING

PREPARED & CONDUCTED BY
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- Basic Concepts of Flow Properties
- Measurement of Flow properties
- Applications in Processing

SUMMARY

Plastic products are made by processing techniques such as extrusion or molding. For a satisfactory-quality polymer compound should flow in a desired manner in mold or from an extruder. Plastics exhibit very high viscosity as compared to normal solvents or monomers. The viscosity depends upon the processing conditions like temperature, pressure, and processing rate. A given polymer may show very different behaviour at different speeds of extruder or it may show different behaviour in equipment of different sizes. The plastic of similar MFI procured from two different suppliers can give poor quality product. Incorporation of recycled material can be problematic in some cases.

Production of a master batch with different grades can give problems. All these may be connected to the flow properties of plastics. For product development, understanding of efficiency of stabilizers, thermal degradation, gel time, mixing time, etc. is important. These aspects are covered in applications. The masterbatch may show poor dispersion in one machine but may work satisfactorily in other machines. All these effects are related to flow properties.

SUMMARY

This course covers the basics of Flow Properties (viscosity behaviour), the measurement techniques, and applications of Flow Properties in understanding polymer processing or manufacturing in simple manner without complicated mathematical equations.

WHO SHOULD ATTEND?

The course is designed for almost everyone connected with the plastic industry:

- Plastic Processors
- Masterbatch manufacturers
- Plastic Compound Manufacturers
- R&D personnel and Product development team
- Sales and Marketing personnel
- Machinery manufacturers
- Students or anyone who wishes to upgrade oneself with basic knowledge of flow properties.

WHAT WILL YOU LEARN?

- Basic understanding the viscosity and its dependence on temperature and pressure, with examples.
- Complex flow properties of plastics and how they affect processing and the remedies for the improvements.
- The relevance of flow properties in plastic processing, master batch manufacturing or batch to batch variation of product quality
- Basics of measurement of flow properties
- Applications

LECTURE 1: BASIC CONCEPTS OF FLOW PROPERTIES

This lecture covers the basic flow property, the viscosity and its relevance in processing. The dependence of viscosity on temperature, pressure, solid or gas contents in plastic melt is explained. The importance of these in plastic processing is explained. The elastic behavior of plastic melt is related to processing conditions.

LECTURE 2: MEASUREMENT OF FLOW PROPERTIES

This lecture covers the basic measurement principles in capillary viscometer, cone & plate viscometer, parallel plate viscometer to measure the flow properties and elastic parameters.

LECTURE 3: APPLICATIONS IN PROCESSING

This lecture covers the application of basic flow properties to plastic processing is discussed. It also describes the torque rheometer. The development of plastic compounds to flow properties is described also.



PROF. DR. DD KALE

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Born on November 16, 1945, Prof. (Dr.) D D Kale is a Chemical Engineer and has obtained his Ph. D. from University of Salford, UK.

With a teaching experience of over 40 years, Prof. (Dr.) D D Kale retired from University of Mumbai's Department of Chemical Technology, UDCT, Mumbai in 2005 as a Professor of Polymer Technology and as a Head of the Department of Polymer Engineering.

At present, he is a technical advisor to Giriraj Group, Mumbai and in the past has also been a consultant to several plastics industries.

He is a member of high power expert committee to Government of Maharashtra on various environmental issues and is on the expert panel for centers of excellence by DCPC. (Dr.) D D Kale is also a member of committee to define single use plastics set up by Ministry of Chemicals and fertilizers, New Delhi.

He has been a Visiting Professor in South Korea.

After superannuation in 2005, he has worked with Reliance Industries Ltd. for a tenure of three years.

His research interests include polymer processing, rheology, product design and recycling. He has guided 28 Ph. D. and 65 Masters Students. He has published more than 100 papers in peer reviewed journals and has one patent to his credit. He has presented papers in several International conferences such as IUPAC and has travelled widely.

He is associated with many professional bodies such as PLASTINDIA, All India Plastics Manufacturers Association, (AIPMA), IPI and SPE etc.

Prof. (Dr.) D D Kale has trained more than 5000 undergraduate and post graduate students in India and overseas. He has also trained more than 1000 industry personnel and has successfully authored two books. He was Honorary Editor of the journal, "Chemical Engineering Journal" published by I.I.Ch.E., India

WORK EXPERIENCE:

Jan 2018 till date - Technical Director, Euressia Polymers, Mumbai.

Feb 1, 2010 to - May 2012 - Director, Shroff S R Institute of Chemical Technology, Vataria, Taluka Valia, Bharuch, Gujarat, India

Aug 1, 2011 to Dec. 2012 - Visiting Professor, IIT Gandhinagar

Jan 1, 2006 to Dec 31, 2008 - Advisor, Reliance Industries Ltd.

Jan. 31, 1991 - Nov 30, 2005 - Professor of Polymer Technology, Head, Plastics and Paints Technology Division UICT, University of Mumbai.

AWARDS AND HONORS:

Elected as a Fellow of Maharashtra Academy of Science (1998)

Received the Teaching Services Award (Best Teacher) of Mumbai University, 2003-2004

Received the Prof. K. S. Armugam National Award for Innovative Research in the Field of Engineering and Technology by the Indian Society for Technical Education (ISTE) New Delhi (2004)

Received 'Life Time Achievement Award' from Color Society, (2015)

OTHER INFORMATION:

- Editor 'Chemical Engineering Journal' published by I.I.Ch.E. (1992 – 94)
- Designed course work for
 - Plastics for non-plastic personnel,
 - Flexible packaging
 - Coloration of plastics
 - Chemical Engineering for plant personnel
- Headed the Knowledge Management group of I.P.I.
- Member of Board of Studies for Polymer Engg. Course of many Universities.

Has organized more than 10 Refresher Courses for Industry on behalf of Professional Bodies like IPI, SPE, Indian Institute of Chemical Engineers, Indian Small Scale Paint Association.

THANK YOU

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