

Introduction To Particle Technology Solutions

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particle technology is a term used to refer to the science and technology related to the handling and processing of particles and powders the production of particulate materials with controlled properties tailored to subsequent processing and applications is of major interest to a wide range of industries including chemical and process food pharmaceuticals minerals and metals companies and the handling of particles in gas and liquid solutions is a key technological step in chemical engineering this textbook provides an excellent introduction to particle technology with worked examples and exercises based on feedback from students and practitioners worldwide it has been newly edited and contains new chapters on slurry transport colloids and fine particles size enlargement and the health effects of fine powders topics covered include characterization size analysis processing granulation fluidization particle formation granulation size reduction storage and transport hopper design pneumatic conveying standpipes slurry flow separation filtration settling cyclones safety fire and explosion hazards health hazards engineering the properties of particulate systems colloids respirable drugs slurry rheology this book is essential reading for undergraduate students of chemical engineering on particle technology courses it is also valuable supplementary reading for students in other branches of engineering applied chemistry physics pharmaceuticals mineral processing and metallurgy practitioners in industries in which powders are handled and processed may find it a useful starting point for gaining an understanding of the behavior of particles and powders review of the first edition taken from high temperatures high pressures 1999 31 243 251 this is a modern textbook that presents clear cut knowledge it can be successfully used both for teaching particle technology at universities and for individual study of engineering problems in powder processing

it is difficult to imagine modern technology without small particles 1 1000 nm in size because virtually every industry depends in some way on the use of such materials catalysts printing inks paper dyes and pigments many medicinal products adsorbents thickening agents some adhesives clays and hundreds of other diverse products are

based on or involve small particles in a very fundamental way in some cases finely divided materials occur naturally or are merely a convenient form for using a material in most cases small particles play a special role in technology because in effect they constitute a different state of matter because of the basic fact that the surface of a material is different from the interior by virtue of the unsaturated bonding interactions of the outermost layers of atoms at the surface of a solid whereas in a macroscale particle these differences are often insignificant as the surface area per unit mass becomes larger by a factor of as much as 10 physical and chemical effects such as adsorption become so pronounced as to make the finely divided form of the bulk material into essentially a different material usually one that has no macroscale counterpart

if a substance is repeatedly subdivided the result is what are known as microscopic particles these particles are distinguished from the solid mass which they originally formed by the size of the surface area per unit weight this simple difference holds true down to a certain lower size limit and when this limit is exceeded a new state of matter is reached in which the behavior of the particles is quite different to that of the original solid particles in this state are termed superfine particles and are distinct from ordinary particles the size of the superfine particles that is to say the size limit below which particle behavior is completely different from the behavior of the original solid varies a good deal depending on the physical properties of the substance in question properties such as magnetism and electrical resistance are closely related to the internal structural properties of the particles themselves such as the magnetization processes of their respective magnetic domains and the mean free path of charged bodies this internal structure therefore limits the size of the superfine particles in ceramic processing on the other hand the surface area of the particles themselves becomes an even more important factor than their internal structure in this case the size of the superfine particles is determined by the interaction between water and solvents on the surface of the particles

introduction to particle technology a new edition of the indispensable guide to

particulates and powders particle technology concerns the formation processing and properties of the particles and powders which make up many of the products that surround us such products range from the cement and aggregate in the built environment to pharmaceuticals and processed foods most of the process industries involve particles either as essential components such as catalysts or as intermediate or final products and minerals such as the rare earths that are generally mined and processed in particulate form particles can have many beneficial uses but they can also cause harm in the environment and through inhalation to the individual in all cases the powder properties particularly particle size are crucially important this well known textbook now in its 3rd edition provides an easily understood introduction to the underlying scientific principles of particle technology together with examples of how these principles can be used in practical design and operation of industrial processes each chapter contains both worked examples and exercises for the student based on feedback from students and users of the earlier editions this revised and expanded text includes introductory chapters on particles as products and on computational methods the topics have been selected to give coverage of the broad areas of particle technology and include characterization size analysis surface area processing granulation fluidization particle formation granulation crystallisation tableting size reduction storage and transport hopper design pneumatic conveying standpipes separation filtration settling cyclones safety fire and explosion hazards health hazards engineering the properties of particulate systems to achieve desired product performance discrete element modelling of particulate systems introduction to particle technology 3rd edition is essential reading for students of chemical engineering the text is also recommended reading for students of mechanical engineering applied chemistry pharmaceuticals physics mineral processing and metallurgy and is an excellent source for practising engineers and scientists looking to establish a working knowledge of the subject

particle technology and applications presents the theoretical and technological background of particle science and explores up to date applications of particle technologies in the chemical petrochemical energy mechanical and materials industries

it looks at the importance of particle science and technology in the development of efficient chemi

fundamentals of particle technology is designed to assist the understanding of how particulate materials behave during processing and is written with engineers and scientists who are new to the subject in mind it is accessible in both cost and style and is illustrated with numerous line diagrams most of the 16 chapters end with questions in multiple choice format this helps problem decomposition and the reader can see each step required to arrive at an overall process solution if the reader makes a mistake with any of the steps he or she usually does not see their answer and will immediately know where they have gone wrong the aspects of particle technology covered include particle characterisation solid liquid and solid gas separations fluidisation flow of and in dispersions powder mixing storage hazards crushing and colloidal interaction extensive internet support and referencing is provided the teaching style adopted is the result of experience gained from presenting the subject for over 30 years at both undergraduate and postgraduate level

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