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Mechanical Agitator Power Requirements For Liquid Batches

Solved example: Power requirement for mixing Agitation Tank Design Calculations - Agitation and Mixing Equipment Design The Effects of Impeller Diameter | Sepro Mixing Agitator Power Calculation@ChemicalMahi Agitator power calculation Agitator Animation High resolution Estimation of power number for different impellers Agitation and Mixing Equipment (Impeller, Vessels, Baffles, etc.) Applied Fluid Dynamics - Clas Mechanical Agitator Agitator for 10M3 Reactor Tank Under Commissioning at GREATWALL MIXERS 13 Power number Agitator Working | Agitator Use | Agitator Components Sawtooth Type Agitator | High Speed Agitator | Stirrer | Mixer | You Never saw this Large Size Impeller agitator | Mixer | Stirrer | Gear Motor #workinprogress Hydrofoil Agitator Agitator seal from Asino seal Agitator Design (Part 1) paddle agitator reactor #vessel #manufacturer #fabrication #pully #motor #stainlesssteel #agitator Agitator

Mines and Methods
Engineering and Contracting
Solved Practical Problems in Fluid Mechanics
Agitator Design for Gas-Liquid Fermenters and Bioreactors
The Surveyor & Municipal & County Engineer
Journal of Industrial and Engineering Chemistry
Modeling Analysis for Grout Hopper Waste Tank
Report on the Investigations Into the Purification of the Ohio River Water
Rules of Thumb for Chemical Engineers
Metallurgical & Chemical Engineering
Biological Wastewater Treatment Processes
Principles of Mass Transfer
Principles and Modern Applications of Mass Transfer Operations
The Surveyor and Municipal and County Engineer
Transactions

Mechanical Agitator Power Requirements For Liquid Batches ***OMB No. 7610543021623 edited by***

CECELIA HUANG

Mines and Methods

Butterworth-Heinemann
Core textbook teaching mass transfer fundamentals and applications for the design of separation processes in chemical, biochemical, and environmental engineering Principles of Mass Transfer teaches the subject of mass transfer fundamentals and their applications to the design of separation processes with enough depth of coverage to guarantee that students using the book will, at the end of the course, be able to specify preliminary designs of the most common separation process equipment. Reflecting the growth of biochemical applications in the field of chemical engineering, the fourth edition expands biochemical coverage, including transient diffusion, environmental applications, electrophoresis, and bioseparations. Also new to the fourth edition is the integration of Python programs, which complement the Mathcad programs of the previous edition. On the accompanying instructor's website, the online appendices contain a downloadable library of Python and Mathcad programs for the example problems in each chapter. A complete solution manual for all end-of-chapter problems, both in Mathcad and Python, is also provided. Some of the topics covered in Principles of Mass Transfer include: Molecular mass transfer, covering concentrations, velocities and fluxes, the Maxwell-Stefan relations, and Fick's first law for binary mixtures The diffusion coefficient, covering diffusion coefficients for binary ideal gas systems, dilute liquids, and concentrated liquids Convective mass transfer, covering mass-transfer coefficients, dimensional analysis, boundary layer theory, and mass- and heat-transfer analogies Interphase mass transfer, covering diffusion between phases, material balances, and equilibrium-stage operations Gas dispersed gas-liquid operations, covering sparged vessels, tray towers, diameter, and gas-pressure drop, and weeping and entrainment Principles of Mass Transfer is an essential textbook for undergraduate chemical, biochemical, mechanical, and environmental engineering students taking a core course on Separation Processes or Mass Transfer Operations, along with mechanical engineers and mechanical engineering students starting to get involved in combined heat- and mass-transfer applications.

Engineering and Contracting John Wiley & Sons
Handbook of Industrial Mixing will explain the difference and uses of a variety of mixers including gear mixers, top entry mixers, side entry mixers, bottom entry mixers, on-line mixers, and submerged mixers The Handbook discusses the trade-offs among various mixers, concentrating on which might be considered for a particular process. Handbook of Industrial Mixing explains industrial mixers in a clear concise manner, and also: * Contains a CD-ROM with video clips showing different type of mixers in action and a overview of their uses. * Gives practical insights by the top professional in the field. * Details applications in key industries. * Provides the professional with information he did receive in school

Solved Practical Problems in Fluid Mechanics John Wiley & Sons
Chemical and related industries often equip processes with mechanical agitators in continuous operation. Continuous systems with high incoming flow rates, such as those in water treatment applications, have experienced deviations between actual agitator power draw and that predicted with experimental data from batch studies. Occasionally, underestimating power draw can have costly consequences, such as shutting down a process for repairs. This work

investigates the effects of flow on agitator power draw due to variables including impeller type and diameter, inlet diameter, and imposed flow rate for an agitated vessel in continuous operation with a bottom-centered inlet. It has been observed that some continuous systems experience significant differences in power draw from batch systems. Three radial-flow disc impellers were tested and each experienced nearly linear increases in power draw with increasing imposed flow. The S-4 impeller, a radial-flow impeller with no disc, experienced an increase in power draw with increasing imposed flow until reaching a maximum, after which the power draw rapidly decreased to a minimum, and then gradually began to rise again. The P-4 and HE-3 impellers in the down-pumping orientation experienced increases in power draw, which were steeper for the HE-3. The P-4 in the up-pumping orientation experienced a slight increase in power draw with increasing imposed flow rate, followed by a slight decrease, whereas the up-pumping HE-3 experienced a significant power draw decrease. General graphical correlations have been developed as the ratio of power number with flow to the power number without flow as a function of the imposed flow velocity to impeller tip speed ratio, in disagreement with literature models that predict that the power number ratio is determined by the ratio of imposed volumetric flow rate to impeller pumping rate. Only the S-4 data was correlated by the flow ratio. Some systems diverge from the correlations due to less imposed flow contacting the impeller discharge by mechanisms of bypassing and flooding. Also, some deviations may be due to data uncertainty and system temporal variance, which are difficult to quantify and should be considered in future studies.

Agitator Design for Gas-Liquid Fermenters and Bioreactors Butterworth-Heinemann
Agitator Design Technology for Biofuels and Renewable Chemicals Comprehensive guide to the design, installation, selection, and maintenance of agitators in the biofuels and renewable chemicals industries Agitator Design Technology for Biofuels and Renewable Chemicals is a single-source reference on all the major issues related to agitator design for biofuel, written with the intention of saving the reader time by avoiding the need to consult multiple references or sift through many pages of text to find what is needed for agitator design in specific industries. The work presents a brief introduction of basic principles and relevant theory, then goes on to cover the real-world applications of these principles, including economic evaluations of alternatives as well as supplier evaluation principles. To aid in quick and seamless reader comprehension, each chapter has the symbols used in that chapter listed and defined at the end. Overall, the work is written more as a how-to book than an academic treatise. The highly qualified author has included plenty of brevity throughout the pages with the hopes that readers go through the entire book as a single unit, rather than just skimming an occasional page or chapter as is common with other resources in similar fields. Sample topics covered in the work include: Avoiding common problems, such as using impeller diameters and speeds that would not result in even minimal solids suspension or liquid motion Choosing the right impellers for the job, understanding how power draw and pumping are calculated, and becoming familiar with biofuel/biomass agitator sizing guidelines The principles and limitations of scale-up and the most common non-Newtonian rheology applicable to biofuel applications Designing lab tests and scale-up cellulosic hydrolysis agitation, plus the uses and limitations of Computational Fluid Dynamics (CFD) As an easy-to-read and completely comprehensive resource to the subject, Agitator Design Technology for Biofuels and Renewable Chemicals is immensely valuable for professionals tasked with selecting agitation equipment or troubleshooting existing equipment, as well as those involved in planning activities and allocating resources related to project management.

The Surveyor & Municipal & County Engineer Elsevier
This title is part of UC Press's Voices Revived program, which commemorates University of California Press’s mission to seek out and cultivate the brightest minds and give them voice, reach, and impact. Drawing on a backlist dating to 1893, Voices Revived makes high-quality, peer-reviewed scholarship accessible once again using print-on-demand technology. This title was originally published in 1975.

Journal of Industrial and Engineering Chemistry Springer Science & Business Media
The Saltstone facility has a grout hopper tank to provide agitator stirring of the Saltstone feed materials. The tank has about 300 gallon capacity to provide a larger working volume for the grout slurry to be held in case of a process upset, and it is equipped with a mechanical agitator, which is intended to keep the grout in motion and agitated so that it won't start to set up. The dry feeds and the salt solution are already mixed in the mixer prior to being transferred to the hopper tank. The hopper modeling study through this work will focus on fluid stirring and agitation, instead of traditional mixing in the literature, in order to keep the tank contents in motion during their residence time so that they will not be upset or solidified prior to transferring the grout to the Saltstone disposal facility. The primary objective of the work is to evaluate the flow performance for mechanical agitators to prevent vortex pull-through for an adequate stirring of the feed materials and to estimate an agitator speed which provides acceptable flow performance with a 45{sup o} pitched four-blade agitator. In addition, the power consumption required for the agitator operation was estimated. The modeling calculations were performed by taking two steps of the Computational Fluid Dynamics (CFD) modeling approach. As a first step, a simple single-stage agitator model with 45{sup o} pitched propeller blades was developed for the initial scoping analysis of the flow pattern behaviors for a range of different operating conditions. Based on the initial phase-1 results, the phase-2 model with a two-stage agitator was developed for the final performance evaluations. A series of sensitivity calculations for different designs of agitators and operating conditions have been performed to investigate the impact of key parameters on the grout hydraulic performance in a 300-gallon hopper tank. For the analysis, viscous shear was modeled by using the Bingham plastic approximation. Steady state analyses with a two-equation turbulence model were performed with the FLUENT{trademark} codes. All analyses were based on three-dimensional results. Recommended operational guidance was developed by using the basic concept that local shear rate profiles and flow patterns can be used as a measure of hydraulic performance and spatial stirring. Flow patterns were estimated by a Lagrangian integration technique along the flow paths from the material feed inlet. The modeling results show that when the two-stage agitator consisting of a 45{sup o} pitched propeller and radial flat-plate blades is run at 140 rpm speed with 28 in diameter, the agitator provides an adequate stirring of the feed materials for a wide range of yield stresses (1 to 21 Pa) and the vortex system is shed into the remote region of the tank boundary by the blade passage in an efficient way. The results of this modeling study were used to develop the design guidelines for the agitator stirring and dispersion of the Saltstone feed materials in a hopper tank.

Modeling Analysis for Grout Hopper Waste Tank CRC Press
Rules of Thumb for Chemical Engineers, Fifth Edition, provides solutions, common sense techniques, shortcuts, and calculations to help chemical and process engineers deal with practical on-the-job problems. It discusses physical properties for proprietary materials, pharmaceutical and biopharmaceutical sector heuristics, and process design, along with closed-loop heat transfer systems, heat exchangers, packed columns, and structured packings. Organized into 27 chapters, the book begins with an overview of formulae and data for sizing piping systems for incompressible and compressible flow. It then moves to a discussion of design recommendations for heat exchangers, practical equations for solving fractionation problems, along with design of reactive absorption processes. It also considers different types of pumps and presents narrative as well as tabular comparisons and application notes for various types of fans, blowers, and compressors. The book also walks the reader through the general rules of thumb for vessels, how cooling towers are sized based on parameters such as return temperature and supply temperature, and specifications of refrigeration systems. Other chapters focus on pneumatic conveying, blending and agitation, energy conservation, and process modeling. Chemical engineers faced with fluid flow problems will find this book extremely useful. Rules of Thumb for Chemical Engineers brings together solutions, information and work-arounds that engineers in the process industry need to get their job done. New material in the Fifth Edition includes physical properties for proprietary materials, six new chapters, including pharmaceutical, biopharmaceutical sector heuristics, process design with simulation software, and guidelines for hazardous materials and processes Now includes SI units throughout alongside
Report on the Investigations Into the Purification of the Ohio River Water John Wiley & Sons
A staple in any chemical engineering curriculum New edition has a stronger emphasis on membrane separations, chromatography and other adsorptive processes, ion exchange Discusses many developing topics in more depth in mass transfer operations, especially in the biological engineering area Covers in more detail phase equilibrium since distillation calculations are completely dependent on this principle Integrates computational software and problems using Mathcad
Features 25-30 problems per chapter
Rules of Thumb for Chemical Engineers
Society for Mining, Metallurgy, and Exploration Inc.
Contains Fluid Flow Topics Relevant to Every EngineerBased on the principle that many students learn more effectively by using solved problems, Solved Practical Problems in Fluid Mechanics presents a series of worked examples relating fluid flow concepts to a range of engineering applications. This text integrates simple mathematical approaches tha

Metallurgical & Chemical Engineering

SME
This Fertilizer Manual was prepared by the International Fertilizer Development Center (IFDC) as a joint project with the United Nations Industrial Development Organi zation (UNIDO). It is designed to replace the UN Fertilizer Manual published in 1967 and intended to be a reference source on fertilizer production technology and economics and fertilizer industry planning for developing countries. The aim of the new manual is to describe in clear, simple language all major fertilizer processes, their requirements, advan tages and disadvantages and to show illustrative examples of economic evaluations. The manual is organized in five parts. Part I deals with the history of fertilizers, world outlook, the role of fertilizers in agriculture, and raw materials and includes a glossary of fertilizer-related terms. Part II covers the production and transportation of ammonia and all important nitrogen fertilizers-liquids and solids. Part III deals with the characteristics of phosphate rock, production of sulfuric and phosphoric acid, and all important phosphate fertilizers, including nitrophosphates and ammonium phosphates. Part IV deals with potash fertilizers-ore mining and refining and chemical manufac ture; compound fertilizers; secondary and micronutrients; controlled-release fertilizers; and physical properties of fertilizers. Part V includes chapters on planning a fertilizer industry, pollution control, the economics of production of major fertilizer products anJ intermediates, and problems facing the world fertilizer industry.

Biological Wastewater Treatment Processes

Concept of Design for Agitator/Mixer
The Saltstone facility at Savannah River Site (SRS) has a grout hopper tank to provide agitator stirring of the Saltstone feed materials. The tank has about 300 gallon capacity to provide a larger working volume for the grout nuclear waste slurry to be held in case of a process upset, and it is equipped with a mechanical agitator, which is intended to keep the grout in motion and agitated so that it won't start to set up. The primary objective of the work was to evaluate the flow performance for mechanical agitators to prevent vortex pull-through for an adequate stirring of the feed materials and to estimate an agitator speed which provides acceptable flow performance with a 45{sup o} pitched four-blade agitator. In addition, the power consumption required for the agitator operation was estimated. The modeling calculations were performed by taking two steps of the Computational Fluid Dynamics (CFD) modeling approach. As a first step, a simple single-stage agitator model with 45{sup o} pitched propeller blades was developed for the initial scoping analysis of the flow pattern behaviors for a range of different operating conditions. Based on the initial phase-1 results, the phase-2 model with a two-stage agitator was developed for the final performance evaluations. A series of sensitivity calculations for different designs of agitators and operating conditions have been performed to investigate the impact of key parameters on the grout hydraulic performance in a 300-gallon hopper tank. For the analysis, viscous shear was modeled by using the Bingham plastic approximation. Steady state analyses with a two-equation turbulence model were performed. All analyses were based on three-dimensional results. Recommended operational guidance was developed by using the basic concept that local shear rate profiles and flow patterns can be used as a measure of hydraulic performance and spatial stirring. Flow patterns were estimated by a Lagrangian integration technique along the flow paths from the material feed inlet.

Principles of Mass Transfer

Imran Pinjara
In the 21st Century, processing food is no longer a simple or straightforward matter. Ongoing advances in manufacturing have placed new demands on the design and methodology of food processes. A highly interdisciplinary science, food process design draws upon the principles of chemical and mechanical engineering, microbiology, chemistry, nutrition and economics, and is of central importance to the food industry. Process design is the core of food engineering, and is concerned at its root with taking new concepts in food design and developing them through production and eventual consumption.

Handbook of Food Process Design is a major new 2-volume work aimed at food engineers and the wider food industry. Comprising 46 original chapters written by a host of leading international food scientists, engineers, academics and systems specialists, the book has been developed to be the most comprehensive guide to food process design ever published. Starting from first principles, the book provides a complete account of food process designs, including heating and cooling, pasteurization, sterilization, refrigeration, drying, crystallization, extrusion, and separation. Mechanical operations including mixing, agitation, size reduction, extraction and leaching processes are fully documented. Novel process designs such as irradiation, high-pressure processing, ultrasound, ohmic heating and pulsed UV-light are also presented. Food packaging processes are considered, and chapters on food quality, safety and commercial imperatives portray the role process design in the broader context of food production and consumption.

Principles and Modern Applications of Mass Transfer Operations John Wiley & Sons

Gold Ore Processing: Project Development and Operations, Second Edition, brings together all the technical aspects relevant to modern gold ore processing, offering a practical perspective that is vital to the successful and responsible development, operation, and closure of any gold ore processing operation. This completely updated edition features coverage of established, newly implemented, and emerging technologies; updated case studies; and additional topics, including automated mineralogy and geometallurgy, cyanide code compliance, recovery of gold from e-waste, handling of gaseous emissions, mercury and arsenic, emerging non-cyanide leaching systems, hydro re-mining, water management, solid–liquid separation, and treatment of challenging ores such as double refractory carbonaceous sulfides. Outlining best practices in gold processing from a variety of perspectives, Gold Ore Processing: Project Development and Operations is a must-have reference for anyone working in the gold industry, including metallurgists, geologists, chemists, mining engineers, and many others. Includes several new chapters presenting established, newly implemented, and emerging technologies in gold ore processing Covers all aspects of gold ore processing, from feasibility and development stages through environmentally responsible operations, to the rehabilitation stage Offers a mineralogy-based approach to gold ore process flowsheet development that has application to multiple ore types

The Surveyor and Municipal and County Engineer University of California Press

Annotation Based on 138 proceedings papers from October 2002, this broad reference will become the new standard text for colleges and will become a must for engineers, consultants, suppliers, manufacturers.

Transactions IChemE

AGITATOR DESIGN FOR GAS-LIQUID FERMENTERS AND BIOREACTORS Explore the basic principles and concepts of the design of agitation systems for fermenters and bioreactors Agitator Design for Gas-Liquid Fermenters and Bioreactors delivers a concise treatment and explanation of how to design mechanically sound agitation systems that will perform the agitation process function efficiently and economically. The book covers agitator fundamentals, impeller systems, optimum power and air flow at peak mass transfer calculations, optimizing operation for minimum energy per batch, heat transfer surfaces and calculations, shaft seal considerations, mounting methods, mechanical design, and vendor evaluation. The accomplished author has created a practical and hands-on tool that discusses the subject of agitation systems from first principles all the way to implementation in the real world. Step-by-step processes are included throughout the book to assist engineers, chemists, and other scientists in the design, construction, installation, and maintenance of these systems. Readers will also benefit from the inclusion of: A thorough introduction to the design of gas-liquid fermenters and bioreactors An exploration of agitator fundamentals, impeller systems, optimum power, and air flow at peak mass transfer calculations A discussion of how to optimize operation for minimum energy per batch Step-by-step processes to assist engineers, chemists, and scientists An examination of heat transfer surfaces and calculations, shaft seal considerations, mounting methods, and mechanical design Perfect for chemical engineers, mechanical engineers, process engineers, chemists, and materials scientists, Agitator Design for Gas-Liquid Fermenters and Bioreactors will also earn a place in the libraries of pharmaceutical scientists seeking a one-stop resource for designing mechanically sound agitation systems.

Modern Weed Control

John Wiley & Sons

From explanations of laws and regulations to hands-on design and operation-the Handbook has it covered!

Journal of the Boston Society of Civil Engineers

John Wiley & Sons

Concept of Design for Agitator/MixerImran Pinjara

The Journal of Industrial and Engineering Chemistry

CRC Press

The crash of the minerals super cycle is being felt by the global phosphate industry. Fortunate phosphate companies are watching their profits drop manyfold, and the not-so-lucky ones are turning to survival mode. The recent market squeeze and ever-increasing environmental pressures have, however, presented opportunities for developing technologies for extracting the most valuable elements from phosphate. This compilation from the 2015 Beneficiation of Phosphates Conference includes insights from dozens of internationally respected experts on key breakthroughs that will shape the industry in the years ahead. Learn from the best and the brightest in the industry. Topics include: • Recovery of rare earths from phosphate • Uranium recovery from phosphoric acid • Recovery of magnesium from high-dolomite phosphate rock • Phosphoric acid purification via byproducts production

The Metallurgy of the Common Metals, Gold, Silver, Iron (and Steel), Copper, Lead and Zinc John Wiley & Sons

The focus of the book is on how to use mass and heat balances to simulate and design biological wastewater treatment processes. All the main processes for biological wastewater treatment are covered viz. activated sludge processes for carbon and nitrogen removal, anaerobic digestion, sequencing batch reactors, and attached growth processes.

Mixing of Liquids by Mechanical Agitation CRC Press

Rules of Thumb for Chemical Engineers, Sixth Edition, is the most complete guide for chemical and process engineers who need reliable and authoritative solutions to on-the-job problems. The text is comprehensively revised and updated with new data and formulas. The book helps solve process design problems quickly, accurately and safely, with hundreds of common sense techniques, shortcuts and calculations. Its concise sections detail the steps needed to answer critical design questions and challenges. The book discusses physical properties for proprietary materials, pharmaceutical and biopharmaceutical sector heuristics,

process design, closed-loop heat transfer systems, heat exchangers, packed columns and structured packings. This book will help you: save time you no longer have to spend on theory or derivations; improve accuracy by exploiting well tested and accepted methods culled from industry experts; and save money by reducing reliance on consultants. The book brings together solutions, information and work-arounds from engineers in the process industry. Includes new chapters on biotechnology and filtration Incorporates additional tables with typical values and new calculations Features supporting data for selecting and specifying heat transfer equipment