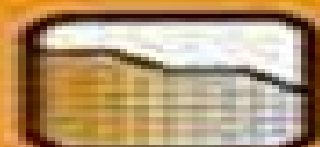


Inherently Safer Chemical Processes

A Life Cycle Approach

Robert E. Bollinger
David G. Clark
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Inherently Safer Chemical Processes A Life Cycle Approach A Ccps Concept

Sam Mannan



Inherently Safer Chemical Processes A Life Cycle Approach A Ccps Concept :

Inherently Safer Chemical Processes CCPS (Center for Chemical Process Safety),2010-08-13 Inherently Safer Chemical Processes presents a holistic approach to making the development manufacture and use of chemicals safer It discusses strategies for substituting more benign chemicals at the development stage minimizing risk in the transportation of chemicals using safer processing methods at the manufacturing stage and decommissioning a manufacturing plant Since the publication of the original concept book in 1996 there have been many developments on the concept of inherent safety This new edition provides the latest knowledge so that engineers can derive maximum benefit from inherent safety

Guidelines for Inherently Safer Chemical Processes CCPS (Center for Chemical Process Safety),2019-11-05 Since the publication of the second edition several United States jurisdictions have mandated consideration of inherently safer design for certain facilities Notable examples are the inherently safer technology IST review requirement in the New Jersey Toxic Chemical Prevention Act TCPA and the Inherently Safer Systems Analysis ISSA required by the Contra Costa County California Industrial Safety Ordinance More recently similar requirements have been proposed at the U S Federal level in the pending EPA Risk Management Plan RMP revisions Since the concept of inherently safer design applies globally with its origins in the United Kingdom the book will apply globally The new edition builds on the same philosophy as the first two editions but further clarifies the concept with recent research practitioner observations added examples and industry methods and discussions of security and regulatory issues Inherently Safer Chemical Processes presents a holistic approach to making the development manufacture and use of chemicals safer The main goal of this book is to help guide the future state of chemical process evolution by illustrating and emphasizing the merits of integrating inherently safer design process related research development and design into a comprehensive process that balances safety capital and environmental concerns throughout the life cycle of the process It discusses strategies of how to substitute more benign chemicals at the development stage minimize risk in the transportation of chemicals use safer processing methods at the manufacturing stage and decommission a manufacturing plant so that what is left behind does not endanger the public or environment

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Inherently Safer Chemical Processes Robert E. Bollinger,David G. Clark,Roger M. Dowell, III,Roger M. Ewbank,Dennis C. Hendershot,William K. Lutz,Steven I. Meszaros,Donald E. Park,Everett D. Wixom,1997-02-15 Content

Description Includes bibliographical references and index

Guidelines for Inherently Safer Chemical Processes CCPS (Center for Chemical Process Safety), 2019-10-16 Since the publication of the second edition several United States jurisdictions have mandated consideration of inherently safer design for certain facilities Notable examples are the inherently safer technology IST review requirement in the New Jersey Toxic Chemical Prevention Act TCPA and the Inherently Safer Systems Analysis ISSA required by the Contra Costa County California Industrial Safety Ordinance More recently similar requirements have been proposed at the U S Federal level in the pending EPA Risk Management Plan RMP revisions Since the concept of inherently safer design applies globally with its origins in the United Kingdom the book will apply globally The new edition builds on the same philosophy as the first two editions but further clarifies the concept with recent research practitioner observations added examples and industry methods and discussions of security and regulatory issues Inherently Safer Chemical Processes presents a holistic approach to making the development manufacture and use of chemicals safer The main goal of this book is to help guide the future state of chemical process evolution by illustrating and emphasizing the merits of integrating inherently safer design process related research development and design into a comprehensive process that balances safety capital and environmental concerns throughout the life cycle of the process It discusses strategies of how to substitute more benign chemicals at the development stage minimize risk in the transportation of chemicals use safer processing methods at the manufacturing stage and decommission a manufacturing plant so that what is left behind does not endanger the public or environment

Guidelines for Postrelease Mitigation Technology in the Chemical Process Industry CCPS (Center for Chemical Process Safety), 2010-09-17 This book puts together a body of very recent information never before presented in one volume on the design of post release mitigation systems The development of a fundamental knowledge base on post release mitigation systems through testing and data correlation is very new While further research and development is needed this practical work offers guidance on putting post release countermeasures to work now The book presents current engineering methods for minimizing the consequences of the release of toxic vapors or ignition of flammable vapors including passive and active systems intended to reduce or eliminate significant acute effects of a dispersing vapor cloud in the plant facility or into the surrounding community As in all CCPS works the book emphasizes planning and a systems approach shows limitations of any methods discussed and provides numerous references so that the reader may continue to learn

Guidelines for Initiating Events and Independent Protection Layers in Layer of Protection Analysis CCPS (Center for Chemical Process Safety), 2015-02-03 The book is a guide for Layers of Protection Analysis LOPA practitioners It explains the onion skin model and in particular how it relates to the use of LOPA and the need for non safety instrumented independent protection layers It provides specific guidance on Independent Protection Layers IPLs that are not Safety Instrumented Systems SIS Using the LOPA methodology companies typically take credit for risk reductions accomplished through non SIS alternatives i e administrative procedures equipment design etc It addresses

issues such as how to ensure the effectiveness and maintain reliability for administrative controls or inherently safer passive concepts This book will address how the fields of Human Reliability Analysis Fault Tree Analysis Inherent Safety Audits and Assessments Maintenance and Emergency Response relate to LOPA and SIS The book will separate IPL s into categories such as the following Inherent Safety eliminates a scenario or fundamentally reduces a hazard Preventive Proactive prevents initiating event from occurring such as enhanced maintenance Preventive Active stops chain of events after initiating event occurs but before an incident has occurred such as high level in a tank shutting off the pump Mitigation active or passive minimizes impact once an incident has occurred such as closing block valves once LEL is detected in the dike active or the dike preventing contamination of groundwater passive

Guidelines for Safe Automation of Chemical Processes CCPS (Center for Chemical Process Safety), 2017-01-06 This book provides designers and operators of chemical process facilities with a general philosophy and approach to safe automation including independent layers of safety An expanded edition this book includes a revision of original concepts as well as chapters that address new topics such as use of wireless automation and Safety Instrumented Systems This book also provides an extensive bibliography to related publications and topic specific information

Guidelines for Improving Plant Reliability Through Data Collection and Analysis CCPS (Center for Chemical Process Safety), 2010-08-31 Written by reliability data experts the book gives plant managers and supervisors the guidance they need to collect and use with confidence process equipment reliability data for risk based decisions Focusing on the process industries it provides the protocol and techniques to collect and organize high quality plant performance maintenance and repair data from your own operations and includes methods and examples on how the data can be converted into useful information for engineering maintenance safety and loss prevention This data can be used for facility reliability availability assessments making decisions on the need for redundant systems improving equipment designs selecting the best equipment for specific tasks estimating required work force benchmarking current efforts both frequency and time integrating predictive and preventive maintenance effort integrating shutdowns with production needs quantifying risks and minimizing human reliability issues

Guidelines for Design Solutions for Process Equipment Failures CCPS (Center for Chemical Process Safety), 2010-09-17 While there is no perfect solution or absolute zero risk engineering design can significantly reduce risk potential in the CPI In *Guidelines for Design Solutions to Process Equipment Failures* industry experts offer their broad experience in identifying numerous solutions to the more common process equipment failures including inherent safer passive active and procedural solutions in decreasing order of robustness and reliability The book challenges the engineer to identify opportunities for inherent and passive safety features early and use a risk based approach to process safety systems specification The book is organized into three basic sections 1 a technique for making risk based design decisions 2 potential failure scenarios for 10 major processing equipment categories and 3 two worked examples showing how the techniques can be applied The equipment categories covered are vessels reactors mass transfer equipment

fluid transfer equipment solids fluid separators solids handling and processing equipment and piping and piping components
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Lees' Process Safety Essentials Sam Mannan,2013-11-12 Lees Process Safety Essentials is a single volume digest presenting the critical practical content from Lees Loss Prevention for day to day use and reference It is portable authoritative affordable and accessible ideal for those on the move students and individuals without access to the full three volumes of Lees This book provides a convenient summary of the main content of Lees primarily drawn from the hazard identification assessment and control content of volumes one and two Users can access Essentials for day to day reference on topics including plant location and layout human factors and human error fire explosion and toxic release engineering for sustainable development and much more This handy volume is a valuable reference both for students or early career professionals who may not need the full scope of Lees and for more experienced professionals needing quick convenient access to information Boils down the essence of Lees the process safety encyclopedia trusted worldwide for over 30 years Provides safety professionals with the core information they need to understand the most common safety and loss prevention challenges Covers the latest standards and presents information including recent incidents such as Texas City and Buncefield

Guidelines for Integrating Process Safety into Engineering Projects CCPS (Center for Chemical Process Safety),2018-11-05 There is much industry guidance on implementing engineering projects and a similar amount of guidance on Process Safety Management PSM However there is a gap in transferring the key deliverables from the engineering group to the operations group where PSM is implemented This book provides the engineering and process safety deliverables for each project phase along with the impacts to the project budget timeline and the safety and operability of the delivered equipment
Thermal Safety of Chemical Processes Francis Stoessel,2008-06-25 Based on the author s many years of experience in practicing safety assessment in industry and teaching students or professionals in this area the topic of this book is seldom found on university curricula and many professionals do not have the knowledge required to interpret thermal data in terms of risks For this reason Francis Stoessel adopts a unique systematic how to do approach Each chapter begins with a case history illustrating the topic and presenting the lessons learned from the incident In so doing he analyzes a goldmine of numerous examples stemming from industrial practice additionally providing a series of problems or case studies at the end of each chapter Divided into three distinct sections part one looks at the general aspects of thermal process safety while Part 2 deals with mastering exothermal reactions The final section discusses the avoidance of secondary reactions including heat accumulation and thermal confinement
Local Emergency Planning Committee Guidebook R. J. Walter,2010-08-27 Members of the community who serve on LEPC s are on the frontlines when it comes to responding effectively to incidents that may occur in local facilities handling hazardous materials This book provides practical solid information to assist them in formulating effective plans to respond to emergencies and reduce potential risks to the public

Guidelines for Safe and Reliable Instrumented Protective Systems Center for Chemical Process Safety (CCPS),2010-08-19

This book explains the decision making processes for the management of instrumented protective systems IPS throughout a project s life cycle It uses the new IEC 61511 standard as a basis for the work processes used to achieve safe and reliable process operation By walking the reader through a project s life cycle engineering maintenance and operations the information allows users to easily focus on their responsibilities and duties Using this approach the book is useful as a primer guidelines reference and resource manual Examples provide the added real world experience applications Guidelines for

Safe and Reliable Instrumented Protective Systems CCPS (Center for Chemical Process Safety),2011-11-16 This book explains the decision making processes for the management of instrumented protective systems IPS throughout a project s life cycle It uses the new IEC 61511 standard as a basis for the work processes used to achieve safe and reliable process operation By walking the reader through a project s life cycle engineering maintenance and operations the information allows users to easily focus on their responsibilities and duties Using this approach the book is useful as a primer guidelines reference and resource manual Examples provide the added real world experience applications *Inherently Safer*

Technology in the Context of Chemical Site Security United States. Congress. Senate. Committee on Environment and Public Works,2009 The Use and Storage of Methyl Isocyanate (MIC) at Bayer CropScience National Research Council,Division

on Earth and Life Studies,Board on Chemical Sciences and Technology,Committee on Inherently Safer Chemical Processes: The Use of Methyl Isocyanate (MIC) at Bayer CropScience,2012-07-31 The use of hazardous chemicals such as methyl isocyanate can be a significant concern to the residents of communities adjacent to chemical facilities but is often an integral part of the chemical manufacturing process In order to ensure that chemical manufacturing takes place in a manner that is safe for workers members of the local community and the environment the philosophy of inherently safer processing can be used to identify opportunities to eliminate or reduce the hazards associated with chemical processing However the concepts of inherently safer process analysis have not yet been adopted in all chemical manufacturing plants The Use and Storage of Methyl Isocyanate MIC at Bayer CropScience presents a possible framework to help plant managers choose between alternative processing options considering factors such as environmental impact and product yield as well as safety to develop a chemical manufacturing system In 2008 an explosion at the Bayer CropScience chemical production plant in Institute West Virginia resulted in the deaths of two employees a fire within the production unit and extensive damage to nearby structures The accident drew renewed attention to the fact that the Bayer facility manufactured and stores methyl isocyanate or MIC a volatile highly toxic chemical used in the production of carbamate pesticides and the agent responsible for thousands of death in Bhopal India in 1984 In the Institute accident debris from the blast hit the shield surrounding a MIC storage tank and although the container was not damaged an investigation by the U S Chemical Safety and Hazard Investigation Board found that the debris could have struck a relief valve vent pipe and cause the release of MIC to the

atmosphere The Board's investigation also highlighted a number of weaknesses in the Bayer facility's emergency response systems In light of these concerns the Board requested the National Research Council convene a committee of independent experts to write a report that examines the use and storage of MIC at the Bayer facility The Use and Storage of Methyl Isocyanate MIC at Bayer CropScience also evaluates the analyses on alternative production methods for MIC and carbamate pesticides performed by Bayer and the previous owners of the facility

Fire Risk Management Luca Fiorentini, Fabio Dattilo, 2023-08-07 FIRE RISK MANAGEMENT Practical methodologies to develop holistic and comprehensive fire safety strategies for buildings and industrial assets In *Fire Risk Management Principles and Strategies for Buildings and Industrial Assets* a team of distinguished authors delivers an incisive combination of risk management principles and fire safety assessment methods that offers practical strategies and workflows to prevent and mitigate today's complex fire scenarios The book summarizes modern risk based approaches to fire safety discussing fire safety objectives in terms of functional statements performance requirements and detailed protection measures for buildings and industrial assets towards the development of a fire safety case to timely manage risk with a systematic and structured approach throughout the life cycle of the asset The authors introduce the fundamentals of fire safety and design principles before moving on to discuss topics like fire risk assessment methods risk profiles risk mitigation safety management and performance and protective layers and controls *Fire Risk Management* presents practical methods often borrowed from those successfully used in other domains that can be defined shared and communicated with multiple stakeholders from different backgrounds and with different needs and perspectives Readers will also find A code neutral examination of fire safety principles that is independent of local regulations Discussions of key principle standards including NFPA 550 and ISO 45001 and guidelines on fire risk assessment Practical explorations that connect theory with practice in the real world In depth case studies that walk readers through fire risk management strategies for railway stations warehouse storage facilities heritage buildings renewable energy installations and process industry plants Perfect for fire safety practitioners engineers and other stakeholders involved in the design and operation of buildings and industrial assets *Fire Risk Management Principles and Strategies for Buildings and Industrial Assets* will also earn a place in the libraries of facility owners and operators safety systems managers occupational health and safety professionals and code officials

Understanding Explosions Daniel A. Cowl, 2010-08-13 There are many different types of explosions each with its own complex mechanism Understanding explosions is important in preventing them This reference provides valuable information on explosions for everyone involved in the operation design maintenance and management of chemical processes helping enhance understanding of the nature of explosions and the practical methods required to prevent them from occurring The text includes Fundamental basis for explosions Explosive and flammable behavior and characteristics of materials Different types of explosions Fire and explosion hazard recognition Practical methods for preventing explosions or minimizing the potential consequences Additional references Understanding Explosions

provides a practical understanding of explosion fundamentals including the different types of explosions the explosive and flammable behavior of materials and the hazards related to fires and explosions It also discusses practical methods to prevent and minimize the probability and consequence of an explosion during routine use of flammable combustible and or reactive materials

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