Safety in Chemical Process Industries
CHE- S502

Elective course

Arun Kumar Gupta

Safety in Chemical Process Industries

CHE- S502 Breakup: 3-0-0-4

Introduction: Definition of safety, Hazards in common chemical industries, Need and significance of safety in chemical industries, Important case histories.

Hazards associated with chemical substances: Safety related properties of hazardous substances, Classification of dangerous substances, Hazards of flammable and explosive materials, Hazards of common unit operations, Hazards of common chemical reactions, Safety in bulk storage of hazardous chemicals, Safety in shelf storage of hazardous chemicals, Corrosion in chemical industries.

Hazards associated with chemical plants: Safety in use of pipelines and their fixtures in industries, Safety in use of cross country pipelines, Safety in process control systems and use of instruments, Safety in pressure system design and operation, Safety in process plant maintenance, Safety considerations in plant site selection and layout planning.

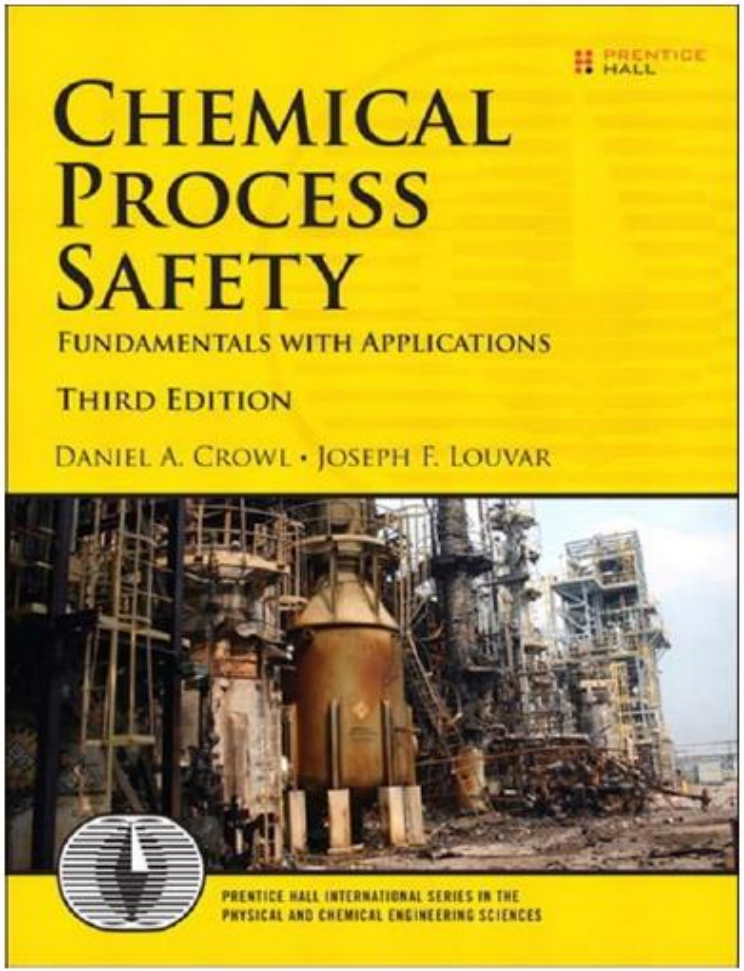
Hazard identification and assessment: Hazard identification techniques, Hazard and operability studies (HAZOP), Fire and explosion index and toxicity index, Fault tree and event tree analysis, Emission of toxic and flammable gases and vapours, Dispersion of toxic and flammable gases and vapours, Heat radiation from vapour cloud explosions, jet fires, fire balls and pool fires, Probability of accidents and risk calculation.

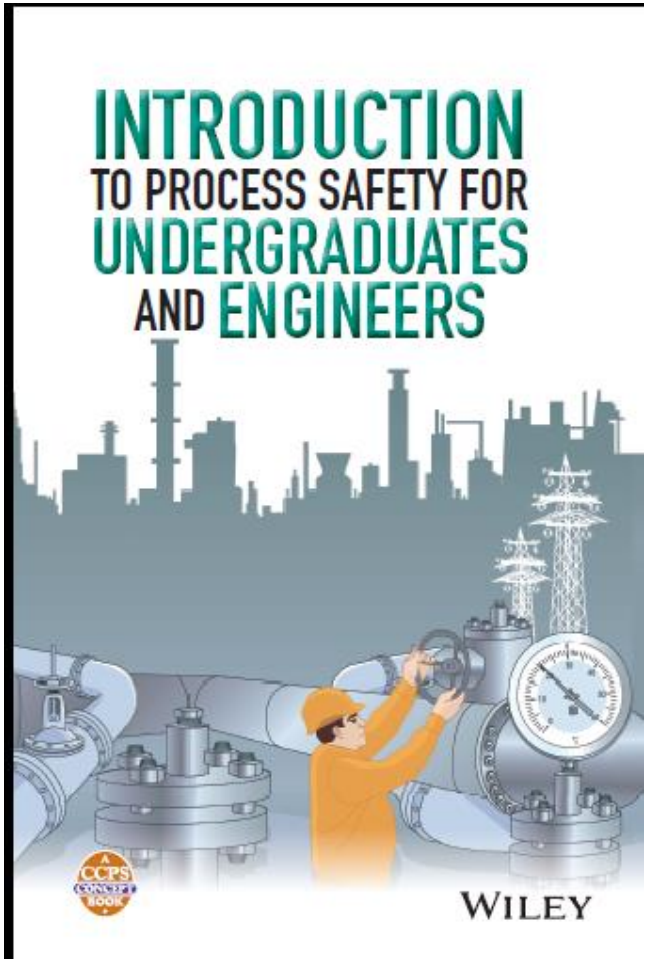
Safety management: On site emergency planning, Off site emergency planning, Personnel protection and other safety devices, Safety in chemical laboratories, Reliability engineering.

Text and Reference Books

- D A Crowl, J F Louvar, Chemical Process Safety Fundamentals With Applications, Third edition, Prentice Hall, Boston (2011).
- E Sanders, Chemical Process Safety Learning From Case Histories, Third edition, Elsevier, Oxford (2005).
- R R Tatiya, Elements of Industrial Hazards, CRC Press, London (2011).
- B O Alli, Fundamental Principles of Occupational Health and Safety, Second edition, International Labour Office, Geneva (2008).
- V Marshall, S Ruhemann, Fundamentals of Process Safety, Institution of Chemical Engineers, Warwickshire (2001).
- S Mannan (Editor), Lees' Process Safety Essentials: Hazard Identification, Assessment and Control, First edition, Butterworth-Heinemann, Oxford (2014).
- Lees, F. P., "Loss Prevention in Process Industries 3 volume set" Butterwort - Heinemann, Oxford (1996).

Reference books:





Course credit distribution

- Attendance: 5
- 2 Quizs: 15
- Mid Sem: 30
- End Sem : 50
- Assignment: 5 marks each

Pictures of Accidents in plants


833
DAYS WITHOUT A
LOST TIME ACCIDENT
"Safety First"

Process Safety – What Is It?

In the chemical, petrochemical and most other industries, occupational safety program,

Focus on

- Personal safety

  It can apply to workers in a manufacturing plant, a research laboratory or pilot plant, and even to office locations

- Prevent harm to

  workers from workplace accidents such as falls, cuts, sprains and strains, being struck by objects, repetitive motion injuries, and so on.

Process Safety – Definition

Process Safety is defined as

- "a discipline that focuses on the prevention of fires, explosions, and accidental chemical releases at chemical process facilities".

- Another definition is that process safety :

  prevention of, preparedness for, mitigation of, response to, or restoration from catastrophic releases of chemicals or energy from a process associated with a facility.

cover

- Brief history of process safety
- Concepts of *management systems*
- *Risk based process safety* proposed by the

Center for Chemical Process Safety (CCPS) in 2007

- The Center for Chemical Process Safety (CCPS) was created by the **AIChE in 1985** after the chemical disasters in Mexico City, Mexico, and Bhopal, India.

Center for Chemical Process Safety (CCPS)

Product of CCPS activities:

has been a series of guidelines to assist those implementing various elements of a process safety and risk management system.

CCPS created Safety and Chemical Engineering Education (SACHE) committee

which develops training modules for process safety.