IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 4, January 2026
Impact Factor: 7.67

Evaluation of Hazardous Scenarios and Risk Reduction Strategies in Chemical Industries Using HIRA and FMEA Techniques

Patel Nileshkumar Amrutbhai[1], P. S. Tathod[2] and Dr. Madhuri Asati[3]
PG Scholar, Department of Safety Engineering[1]
Professor, Department of Safety Engineering[2,3]
Shiv Kumar Singh Institute of Technology and Science, Indore, India

Abstract: *Exposure to chemicals represents a significant occupational health and safety (OHS) concern within chemical industry workplaces. Effective management of chemical hazards demands a coordinated approach involving occupational health and safety professionals, including general OHS practitioners, occupational hygienists, and occupational health specialists. This research focuses on the analysis of chemical hazards and the development of appropriate control measures in industrial environments. It examines how chemical toxicity is evaluated and how such evaluations are applied in regulatory and decision-making processes. The study begins with an overview of toxicological data availability and hazard identification, followed by discussions on risk assessment practices and occupational exposure limits. It further addresses key toxicological issues where scientific understanding remains incomplete, including historical perspectives on chemical reactivity and toxicity, acute and chronic exposure effects, chemical hazard classification systems, and methods for identifying, assessing, and controlling chemical risk. Preventing exposure to toxic substances is a critical priority, particularly at hazardous waste and chemical handling sites, where chemicals may exist in gaseous, liquid, or solid forms. These substances can enter the human body through inhalation, dermal absorption, ingestion, or injection via puncture wounds. Therefore, collaboration among a multidisciplinary team of occupational health and safety experts is essential to effectively prevent fatalities, injuries, occupational diseases, and long-term health impacts associated with chemical exposure.In this research, efforts are made to identify hazardous chemical scenarios and propose strategies to mitigate their adverse effects through systematic Hazard Identification and Risk Assessment (HIRA), Failure Mode and Effects Analysis etc.*

Keywords*:* Work place safety, Chemical laboratories, Hazards, Occupational safety, health analysis (OSH), Hazard Identification, Risk Assessment (HIRA), Failure Mode and Effective Analysis (FMEA), experimental approaches, Risk calculation, RPN Number calculation

DOI: 10.48175/IJARSCT-31071