Physical Injury Modes

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1st Jan, 2025

Keywords Spiritual Safety, Process Safety, Chemical Engineering, Risk Assessment

Learning Outcomes

- Identify common modes of physical injury in processing, including chemical exposure, heat flux, and overpressure.
- Calculate or estimate injury thresholds, such as the time to onset of 2nd-degree burns from heat flux.
- Distinguish between acute and chronic hazards and their long-term effects on the body (e.g., carcinogens vs. neurotoxins).

Reading

- Foundations of Spiritual and Physical Safety: with Chemical Processes; Chapter 3, Sections 2 (Heat/Overpressure) through the end of Chapter 3

Heat flux and burns; Overpressure and blast injuries; case studies

1 Heat Flux Hazards

2 Overpressure Hazards

3 Acute vs. Chronic

4 Elimination of Toxins

5 Process Injuries

6 Common Injury Frequencies

Action Items

1. Estimate the heat flux from a burning burst natural gas pipeline (shown here: https://www.youtube.com/watch?v=EverTT2D0NM). Estimate the heat flux at a distance of 50 feet from such a scenario. Assume a flow of natural gas of 0.25 kg per second.
2. Pick a needed chemical that is used in the plastics or rubber industry. Find and read a toxicology report on its effects on the body and summarized what you learned.
3. Pick a chemical that is a toxin and review the literature to determine teh pathway or process by which the body removes that specific chemical.
4. Review the "Green Beans Canning Procedure"Example Scenario: Canning Green Beans and detail three specific potential physical injury modes (e.g., thermal, overpressure, or blunt force) that could occur during this home process.
5. Read, watch a video, or otherwise learn about an incident as described by the US Chemical Safety Board (CSB) as detailed at csb.gov. Document some of the details of the event and what should happen in the future to prevent a similar accident.