Initiation Mechanisms

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Learning Outcomes

- Understand the mechanisms of the different initiation mechanisms: ESD, friction, impact, ant thermal.
- Understand the mechanisms of electrostatic charge generation and accumulation in processing equipment and personnel.
- Apply inerting techniques (Vacuum, Pressure, Sweep) to reduce oxygen concentrations below the Limiting Oxygen Concentration (LOC).
- Implement bonding and grounding procedures to prevent electrostatic discharge (ESD) ignition events.

Reading

- Foundations of Spiritual and Physical Safety: with Chemical Processes; Chapter 6, Sec. 2.1

1 ESD and Static Control

Further info here:

Download pdf of lecture freeform here: physical/supportfiles/ESD.pdf

2 Friction and Impact

3 Thermal

Action Items

1. Explain using charging principles why there is a recommendation not to get in and out of your vehicle while filling it with gas at the gas pump.
2. Given you have a resistance of 50 Megaohms, estimate the relaxation time constant after charging yourself to a sufficient voltage to result in a spark (20 kV). Assume a capacitance of 50 pF.
3. Categorize the following activities by their most likely initiation method (friction, impact, ESD, or thermal). Each activity may have multiple initiation scenarios. Cutting, Grinding, Conveying, Presing, Filling, Pumping, Mixing.