

NOVA Chemicals

EPS Fire Safety

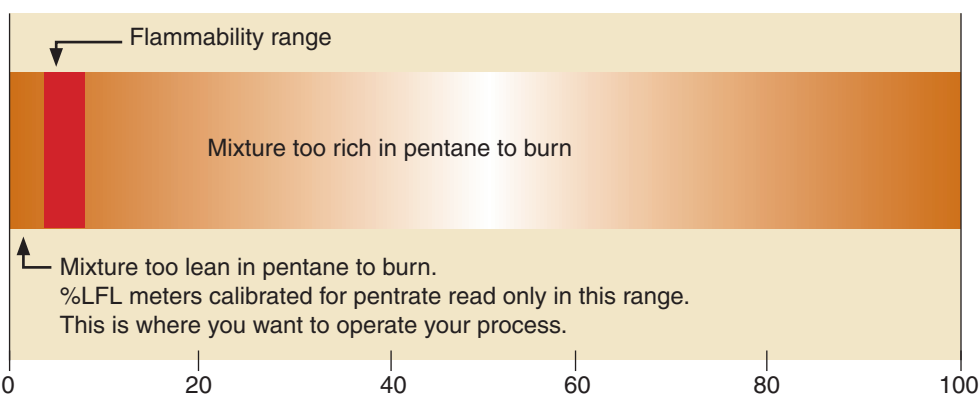
Expandable Polystyrene

- Small, white, spherical plastic beads
- Typically contain 3 - 8% by weight pentane blowing agent
- Pentane is in a family of flammable chemicals called alkanes:
 - CH₄ = methane (natural gas heating fuel)
 - C₃H₈ = propane (fuel for barbecue grills)
 - C₄H₁₀ = butane (cigarette lighter fuel)
 - C₅H₁₂ = pentane (EPS blowing agent)
 - C₈H₁₈ = octane (automotive fuel)

With appropriate safety measures in place, handling EPS is no different than handling any of these common fuels.

- Pentane vapors can be found in virtually all areas of an EPS converting facility including:
 - Bead storage
 - Pre-expansion
 - Pre-puff aging
 - Molding
 - Finished goods storage

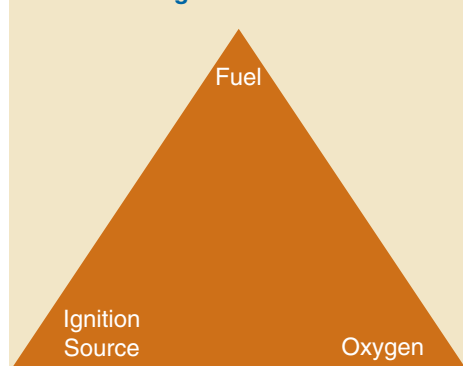
Pentane Blowing Agent



The Flammability range for pentane represents a small fraction of all possible pentane/air mix ratios. Operating in the region below 1.4% by volume (below the LFL) is desirable since the amount of fuel (pentane) present is minimal.

- Flash point of normal pentane = -49°C (-56°F) (Low flash points mean that flammability can become a concern even at room temperature.)
- Lower Flammability Limit (LFL) = 1.4% by volume
- Upper Flammability Limit (UFL) = 8.3% by volume
- Mixtures containing less than 1.4% by volume (too lean) or greater than 8.3 % by volume (too rich) of pentane in air cannot burn.
- Vapor density = 2.5
 - Vapor density < 1 means that the gas is lighter than air and will rise.
 - Vapor density > 1 means that the gas is heavier than air and will sink.

The Fire Triangle



Just like a triangle needs three sides, a fire requires three components. If you remove any one of these components, then a fire cannot occur.

Engineering Practices:

- Because pentane is heavier than air, it may accumulate in low spots, such as trenches, sumps, pits and stairwells.
- Proper ventilation increases the amount of air in the pentane/air mixture (a.k.a. "dilution").
- Diluting pentane vapors using ventilation fans will reduce the risk of generating an atmosphere within the explosive range.

Bonding:

- A physical connection between two objects using a conductor (e.g., wire).
- Ensure that both objects are at the same electrical potential

Grounding:

- A physical connection between an object and the earth using a conductor (e.g., wire).
- Provides a safe path for static electricity to transfer to the earth

EPS Safety Tips

- Strictly enforce no smoking and carrying of matches/lighters in EPS storage and converting areas.
- Keep all raw materials in a well-ventilated area away from open flames.
- Allow at least 15 minutes after opening an EPS container for pentane vapors to dissipate.
- Do not use any portable containers (e.g., buckets, scoops) with metal components to transfer beads out of cartons.
- Properly bond and ground all process equipment and piping.
- Regularly test and maintain all bonding and grounding systems.
- Provide adequate ventilation to minimize pentane vapor accumulation.
- Minimize accumulation of beads and pre-puff on floors and equipment.
- Do not lean over or reach into open EPS containers.
- Wear non-static clothing and conductive footwear.

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 - o C_3H_8 = propane (fuel for barbecue grills)
 - o C_4H_{10} = butane (cigarette lighter fuel)
 - o C_5H_{12} = pentane (EPS blowing agent)
 - o C_8H_{18} = octane (automotive fuel)

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