

Is sugar an explosion hazard?

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YES, if it is a fine powder or dust! Any material which can burn is capable of causing a catastrophic dust explosion if it is suspended as a fine dust or powder in air or other oxidizing atmosphere. On February 7, 2008 there was a severe explosion in a sugar refinery near Savannah, Georgia, USA. The explosion injured more than 30 people, and the death toll had reached 13 as of the end of March 2008. The explosion is still being investigated, and the detailed causes are not yet known. However, the initial investigation indicates that this was a dust explosion.

Many people are not aware of the explosion hazard of many dusts and fine powders. Some examples of materials which may be a dust explosion hazard if present as a fine powder include almost any organic material - grain flour, sugar, plastic, corn starch, pharmaceuticals. Powdered metals such as aluminum and magnesium also present a dust explosion hazard.



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Dust Explosion



Do you know what conditions are necessary for a dust explosion?

The conditions needed for a dust explosion can be represented as a pentagon (see figure at left above):

- **FUEL** – The presence of a combustible dust. Particle size is important – smaller particles are more likely to be both ignitable and dispersible.
- **OXIDANT** – usually oxygen in the air, which is generally enough to support an explosion.
- **SUSPENSION** – The dust needs to be dispersed into the air. The dust may normally be dispersed in air in the process equipment. In a building, this could be done by a large leak or spill, a small initial dust explosion, or any other disturbance which could shake dust layers off of equipment or lift dust off of the floor.
- **IGNITION SOURCE** – Energy is required to ignite the mixture. This may be something with as little energy as static electricity or a stronger energy source such as an open flame or an electrical fault.
- **CONFINEMENT** – For example, the walls, ceilings, floors and roof of a building create confinement. Plant equipment including process equipment, storage silos, dust collectors, and ducting also creates confinement.

Sometimes an initial explosion occurs and lifts larger amounts of dust that may have accumulated in the plant and disperses this dust into the air. This creates the conditions for a second, much larger explosion, which can be catastrophic.

A small amount of dust – a layer as small as 1/32 inch (less than 1 mm) thick on exposed surfaces – can create an explosive dust cloud once suspended. A dust layer can be considered to create a hazardous condition if it covers an area, on all surfaces, greater than 5 % of the floor area of a room. How can you tell if there is too much dust? Two guidelines which people have used are that there is too much dust accumulation (1) when you cannot tell the color of the equipment or floor beneath the layer of dust, or (2) when you write your name in the dust and very slight ridges form at the edge of the letters. Good housekeeping is a necessary safe work practice when dust hazards are concern. Other safe work practices for dust include reducing static discharge potential through the use of grounding and bonding, proper electrical area classification and equipment selection. If your plant handles potentially explosive dusts, make sure that you understand the hazards, and all of the safe work practices and safety equipment needed for safe operations.

Know the hazards of the materials in your plant!