



Home fire safety fact sheet

Self Heating And Spontaneous Combustion

Materials that may catch fire by spontaneous ignition are:

- Rags and waste with oil and paint residues
- Towels and linen, during laundering and drying
- Paint overspray or material from a paint spray booth
- Coal
- Haystacks
- Green waste piles and compost
- A number of chemical substances, such as cellulose nitrate

Spontaneous ignition occurs when a combustible material is heated to its ignition temperature by a chemical reaction involving the oxygen in the air. The oxidation of the combustible material creates heat. If this heat cannot be dissipated, it will build up in the combustible material until ignition occurs. Generally, the build up of heat to ignition point occurs when the material is in a pile so that the heat being generated cannot adequately escape.

For ignition to occur, the rate of air movement must be sufficient to provide enough oxygen for the oxidation reaction but not so fast as to stop the material heating to its ignition temperature. Since the balance of oxygen flow and heat loss needs to be carefully balanced, spontaneous ignition is not common but is still a risk that needs to be managed. Some businesses have had unsafe work practices for many years before they have a fire caused by spontaneous ignition.

The possibility of spontaneous ignition is greater if the surrounding air is warm and dry – as in the Adelaide summer. Preheating the material can initiate the oxidation reaction that leads to spontaneous ignition, or can hasten ignition by adding even more heat to the combustible material.

The spontaneous ignition of oil-soaked rags is not as common as it used to be because of the popularity of acrylic paints that do not require the use of 'drying oils' such as linseed oil. However, the problem still occurs with oil-based paints and some timber stains and polishes. Linseed oil is the most common example of a 'drying oil' but rapeseed, cottonseed, peanut, corn oil and safflower oil may also self-heat.

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Fish oils are notorious for their self-heating properties. Mineral oils like white spirit, mineral turpentine or lubricating oil are not prone to self-heating and will not cause spontaneous ignition.

It is simple to prevent spontaneous ignition since oxygen is needed for it to occur. Materials subject to spontaneous ignition should be stored in sealed metal containers such as a safety can or rubbish bin. The container will contain oxygen at first, but the oxidation process will soon use this up and the process will stop.

Rags impregnated with linseed or other drying materials should either be immersed in water or, immediately after use, spread out in a safe place to dry. If it is necessary to transport oil or paint-soaked rags, they should be sealed in metal containers.

Fires in commercial laundry facilities (and sometimes also in hospitals and laundromats) have been attributed to the spontaneous ignition of cotton or linen that has been dried and then either stacked while still hot or dumped into bins without cooling. If the materials are stacked or binned at high enough temperatures (above 90 degrees Celsius), the heat accumulated in the centre of the pile may be enough to trigger spontaneous ignition of the cotton materials. Materials must always be put through a cooling cycle in the dryer, or spread in single layers to cool completely before folding or stacking.

If towels and linen that contain oil (such as cooking oils or the oils from physiotherapy or massage clinics) are sent for laundering, a residue of oil may remain after the laundering process. The heating and drying after laundering may cause this residue to self-heat and spontaneously ignite. Reduce the risk by laundering with plenty of detergent and using a hot water temperature for the wash. Once again the linen must be put through a cooling cycle in the dryer or spread in single layers to cool completely before folding or stacking.