PROCESS SAFETY FORM

Safety Alert: 16

Date: July 2026

Isopropyl Alcohol (IPA) can spontaneously form an explosive by product after long term storage

This safety alert is shared in order to promote learning and improve safety. You should seek appropriate guidance regarding the relevance, accuracy, and completeness of this alert to your circumstances prior to implementation.

Theme

Process - Management systems
Process - Emergency Arrangements

Issue

The purpose of this Alert is to raise awareness regarding the potential formation of a hazardous explosive material in long-term stored isopropyl alcohol (IPA) solvent.

Isopropyl alcohol (IPA), also known as isopropanol, 2-propanol, or rubbing alcohol, is widely used across industry as a cleaning solvent for equipment, samples, and general laboratory or workshop activities, and in some first aid kits.

Externally reported incidents (at least 10 in the literature) have identified that aged IPA bottles have exploded during routine handling, leading to injury. Investigations indicate that this is due to the formation of a white crystalline material, identified as Triacetone Triperoxide (TATP) - a primary explosive substance that is highly sensitive to friction and impact (used as an improvised explosive material). Formation is understood to have occurred over prolonged storage periods, typically greater than 5–10 years.

Key points regarding hazard of IPA forming an explosive by-product:

- Temperature, pressure, oxygen concentration are expected to affect the rate of formation of TATP.
- Reaction produces by-products that may catalyse the formation of TATP.
- Potential accelerants include UV light, metal contaminants (e.g., Fe, Cu), oxidisers (e.g., peroxides), and acids.

It should be assumed that this issue may also occur in diluted 70% IPA.

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Learning

Check purchasing and stock records of IPA to establish time since manufacture of all IPA containers prior to carrying out any physical stock check or inspection

If any crystalline material, or unusual residue is seen in an IPA container which may have been stored unused for an extended period or been contaminated by listed accelerants:

- Do not move, tilt, or shake the container.
- Do not attempt to open the container, or attempt to unscrew the cap.
- Do not test, sample, or otherwise investigate the contents.

What you should do with any suspicious IPA container (safe, lawful options):

- **Do not touch or move it**. TATP is extremely sensitive to friction, heat, and shock.
- **Evacuate the area immediately** and keep others away.
- **Call emergency services, in the first instance the Police, (999 in the UK)** and clearly state there may be an explosive hazard.
- If you're at work, **follow your site emergency procedure** and notify site security straight away.

Recommended Precautions for Safe Handling and Use:

- Ensure good housekeeping by monitoring and managing chemical storage.
- Record the date of manufacture and delivery of all IPA products.
- Purchase only the required amount for use within less than five years.
- Label the container with the date of receipt, the date of first opening and any subsequent testing.
- Store away from UV, heat and light sources and avoid contamination by listed accelerants.
- Safely dispose of any unused IPA before 5 years since manufacture, or after expected exposure to any of the potential reaction accelerants listed above.
- Test for peroxides before processing, e.g., distilling or evaporating.
- If peroxides are present at above the specified ppm wt., then dispose[1].
- Before transportation or disposal test for peroxides and treat to remove peroxide, if present above the specified ppm wt[1].

[1]Information on test methods are available in Bretherick's Handbook of Reactive Chemical Hazards (6th edition), Vol.2, p.307-312.

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Further Resources

Characteristics of triacetone triperoxide (TATP) formed in 2-propanol

Forensic characterization of spontaneous acetone peroxide formation from consumer-aged 2-propanol

Isopropanol: general information - GOV.UK

Links to a review of the chemistry:

https://doi.org/10.1016/j.tet.2026.135237

https://doi.org/10.1016/j.firesaf.2025.104370

The Process Safety Forum has been set up to provide an industry association platform whereby initiatives, best practice, lessons from incidents and process safety strategy can be distilled and shared across sectors, to influence our stakeholders (including the Regulators), and to drive the process safety management agenda. The Process Safety Forum consists of representatives from across industry, refer to the website for details.

The website is https://www.p-s-f2.org.uk/