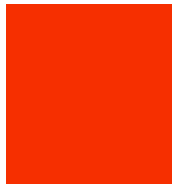


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Safety on Peroxide Chemicals
Presented by: John Dreyer



Introduction

1. Peroxide Chemicals (Pty) Ltd was established in 1967 as a joint venture between AECI and the British company La Porte to manufacture organic peroxides for AECI's polyethylene plant at its Midland Factory in Sasolburg. Production has expanded greatly over the years and in addition to the polyethylene industry, PCL supplies organic peroxides to the glass reinforced plastics, paints, adhesive and mining roof bolt industries. In addition, PCL products are used in such diverse applications as bleaching of flour, car polish, latex formulations and acne creams. Since then both parties have been replaced by Sasol Limited and Evonik GmbH (Degussa).

2. As from 1 January 2008 we have been fully acquired by Sasol but still manufacturing under licence from Evonik GmbH.

3. PCL received SABS ISO 9002:1994 accreditation in 1995, ISO 9001:2000 on 15 February 2003 and SABS ISO 14001 accreditation on 19 December 2002. We also under write Responsible Care since 24 April 1996.

4. PCL applies the most stringent safety procedures in the production, handling, storage and delivery of the wide range of peroxides manufactured.

5. The last lost work day accident at PCL was more than 12 years ago on 22 July 1995 and this record has been recognized with various safety awards in the past few years.

6. PCL will continue to work with all its customers to ensure safe handling, usage and storage of its products at all times.



What are organic peroxides?

- OPs are organic compounds which have a molecular structure containing an O-O bond.
- The compounds are designed so that the O-O bond will break at a specific temperature to give free radicals which initiate polymerization reactions.
- Organic Peroxides are therefore unstable compounds (by design) and must be handled and stored in the correct manner.

Most OPs are *flammable*

All OPs support combustion

How do I store Organic Peroxides ?

- OPs must be stored separately from other materials in a cool well ventilated place.
- Never keep O's in the sun.
- Stack the OP cans in the store so that each can may be inspected for leaks, bulging, overheating etc.
- Ensure that cans are used in rotation (FIFO) - remember that OPs have a shelf life of about 6 months. See MSDS for recommended storage temperatures. (e.g. MEKP = below 30°C)

Keep out of sun.

Keep cool and well ventilated.

Recommended Storage Quantities:

Storage of small quantities no more than 150 kg allowed to be stored at any one time in a closed room within an existing building must be constructed of non-combustible materials and the inside lighting and electrical equipment must be flame-proof.

Storage of larger quantities (more than 150 kg) should be stored in a separate, specially designed store (ask PCL for more detail if required).



How do I use Organic Peroxides ?

- Remove sufficient OP from the container for the job in hand.
- Seal the original container and return to store.
- Do not return excess OPs to the original container since this could lead to contamination and decomposition.
- Absorb any spillage with inert material such as vermiculite - do not use sawdust, cloth or paper since these will catch fire if wetted with OPs.
- Never mix OPs with accelerators since this will cause a violent explosion and fire.

Don't mop up with paper or cloth

Don't mix with accelerators

Are Organic Peroxides Toxic?

- Some OPs are toxic for example, MEKP has a Short Term Exposure Limit Ceiling value (STEL C) of 0,2ppm (OHSACT HSR-16 Table 2p8).
- Furthermore, MEKP is dissolved in a Phthalate, which has a Time Weighted Average (TWA) of 5 mg/m³.
- Use OPs only in a well-ventilated areas and avoid breathing in OP fumes.
- Details of exposure levels of OPs are given in the relevant MSDS.

It is recommended, that employees working daily with MEKP to be tested at least once per annum for STEL C

Personal protection and hygiene

- Do not eat drink or smoke whilst handling OPs.
- Wash thoroughly before eating, drinking or smoking in a designated area away from the OP storage and usage area.
- Use safety goggles or a face shield when handling OPs.
- Chemical resistant gloves should also be worn.
- Remember some OPs are irritating to skin and eyes - see relevant MSDS.

Wash after using OPs

Wear personal protective equipment

First Aid - external

- Immediately remove all contaminated clothing.
- Wash skin with soap and plenty of water.

In case of contact with the eyes rinse immediately with lots of water and seek medical advice.

Remove contaminated clothing immediately
Wash affected areas



First Aid - Internal

- Some OPs are corrosive if swallowed. May burn mouth, gullet and stomach.
- Decomposition may occur in the stomach releasing oxygen gas and causing distension.
- Drink plenty of water and consult a doctor.
- Do not cause the patient to vomit since this could cause further damage to the mucous membranes

Drink lots of water

Don't induce vomiting



What is the SADT of OPs ?

- The SADT is the Self Accelerating Decomposition Temperature of the Organic Peroxide.
- The SADT is defined as that temperature at which the heat generated by decomposition is greater than the heat removal capacity of the environment - hence the temperature increases thereby accelerating the decomposition.
- The SADT of each OP is given in the relevant MSDS (e.g. MEKP = 60°C)

Keep OPs cool



Effects of contaminants on OP's

- Various contaminants can cause vigorous decomposition of OP's - these contaminants include strong acids or bases, metals and metal salts, sulphur compounds, amines, accelerators and reducing agents.
- Avoid contamination and ensure that OP's are only used in equipment made from glass, polyethylene, Teflon or stainless steel (316).

Avoid any kind of contamination
Use correct materials of construction



What about static electricity ?

- Organic Peroxides are flammable liquids and so all forms of ignition should be avoided.
- In particular there should be no smoking in an OP area, all electrical equipment should be flameproof, tools should be non sparking and equipment should be earthed for static electricity.
- Some OP's (e.g. DTBP) have a very low conductivity and so are particularly susceptible to static build up.

Beware of sparks in the OP area
Ensure that all equipment are properly earthed



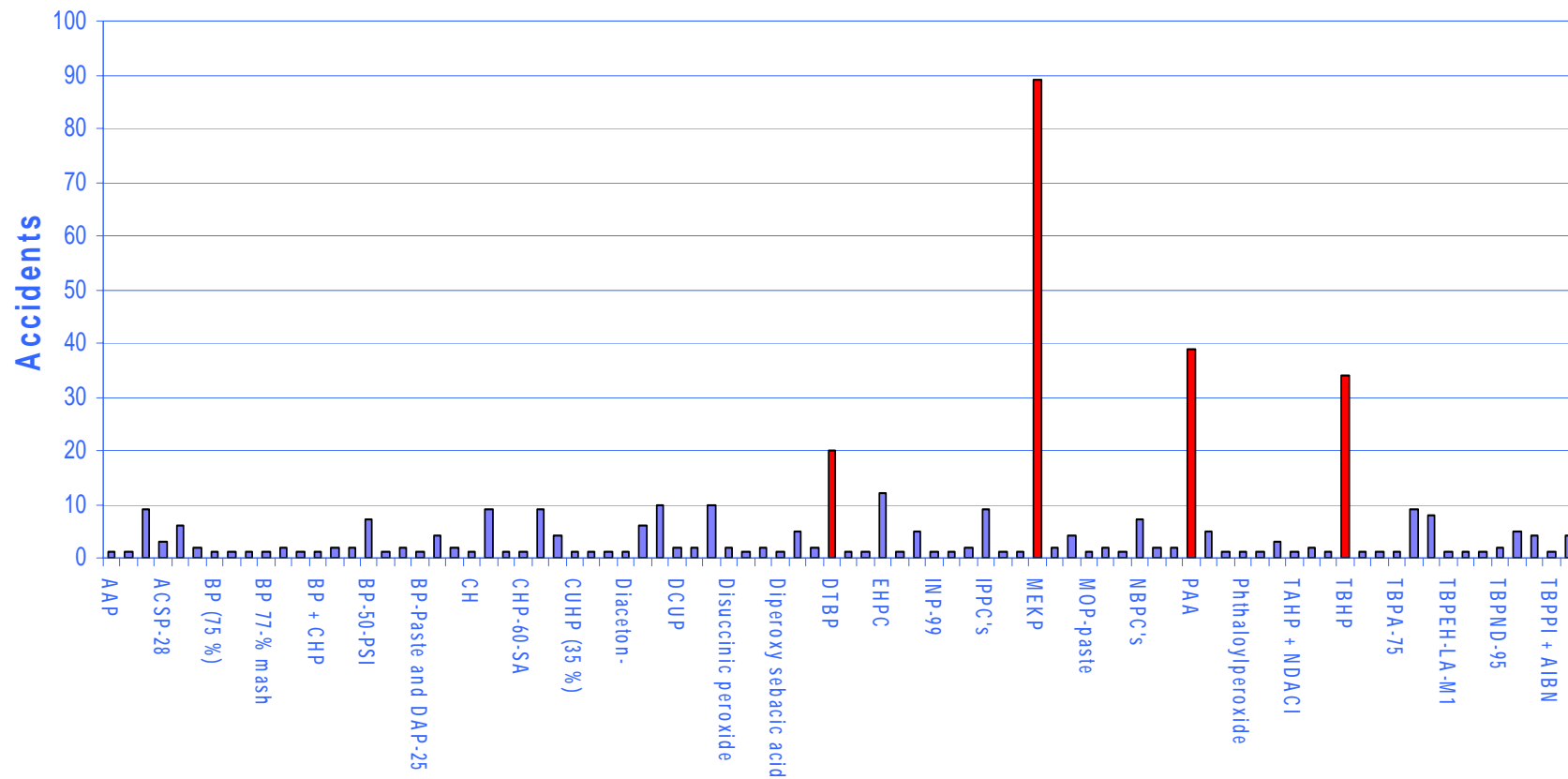
Disposal of OP containers

- Organic Peroxides tend to permeate into the polyethylene walls of the containers - because of this it is impossible to sufficiently clean the container for use with materials other than Organic Peroxides.
- Containers should be fully drained then washed with water and detergent.
- Washed containers should then be holed before sending to a scrap plastic merchant.
- Alternatively containers can be returned to PCL or via our distributors.

Never use OP cans for other liquids
Don't allow cans to be used for water

MEKP Accidents?

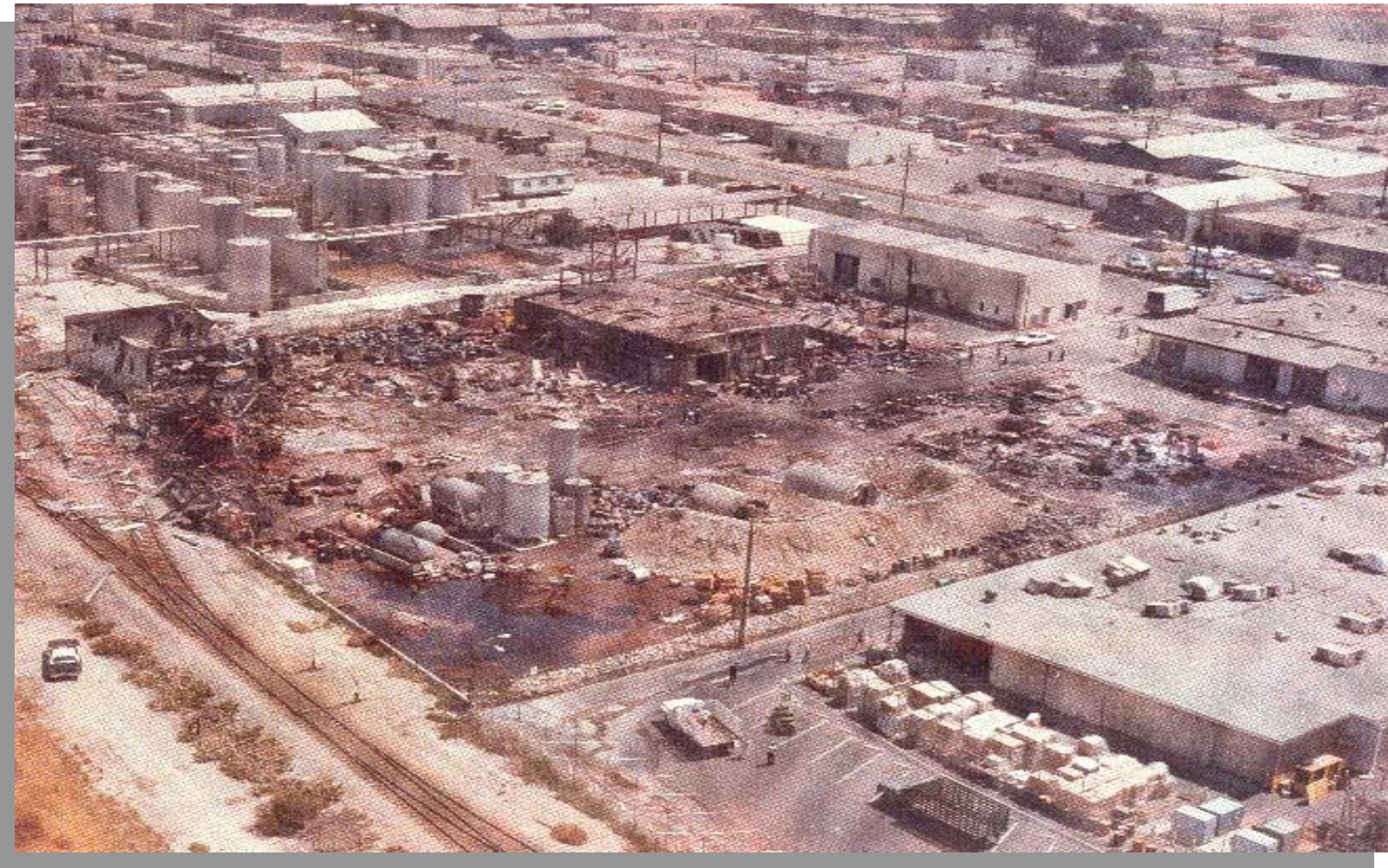
Accidents with Organic Peroxides recorded over a period of time across the world since 1957



Typical MEKP Explosion



Norac MEKP explosion



Let us then concentrate on MEKP

1. The frightening number of fatal accidents during ***synthesis*** results from a single accident with 50 fatalities, where production was run in a crowded flat building.
2. There is one accident in Germany with four men killed, where we are fairly sure, that the plegmatizer was forgotten. Other details not available.
3. During ***transport*** accidents are caused usually by leaks, either by tipping over or by cracks.
4. Depending on the MEKP type, big fires or detonations can result.
5. MEKP has most fatalities at the ***customer***. Reasons are: lack of knowledge how to deal with MEKP. And: to reduce costs, high concentrations of MEKP were used formerly, including detonable MEKPs

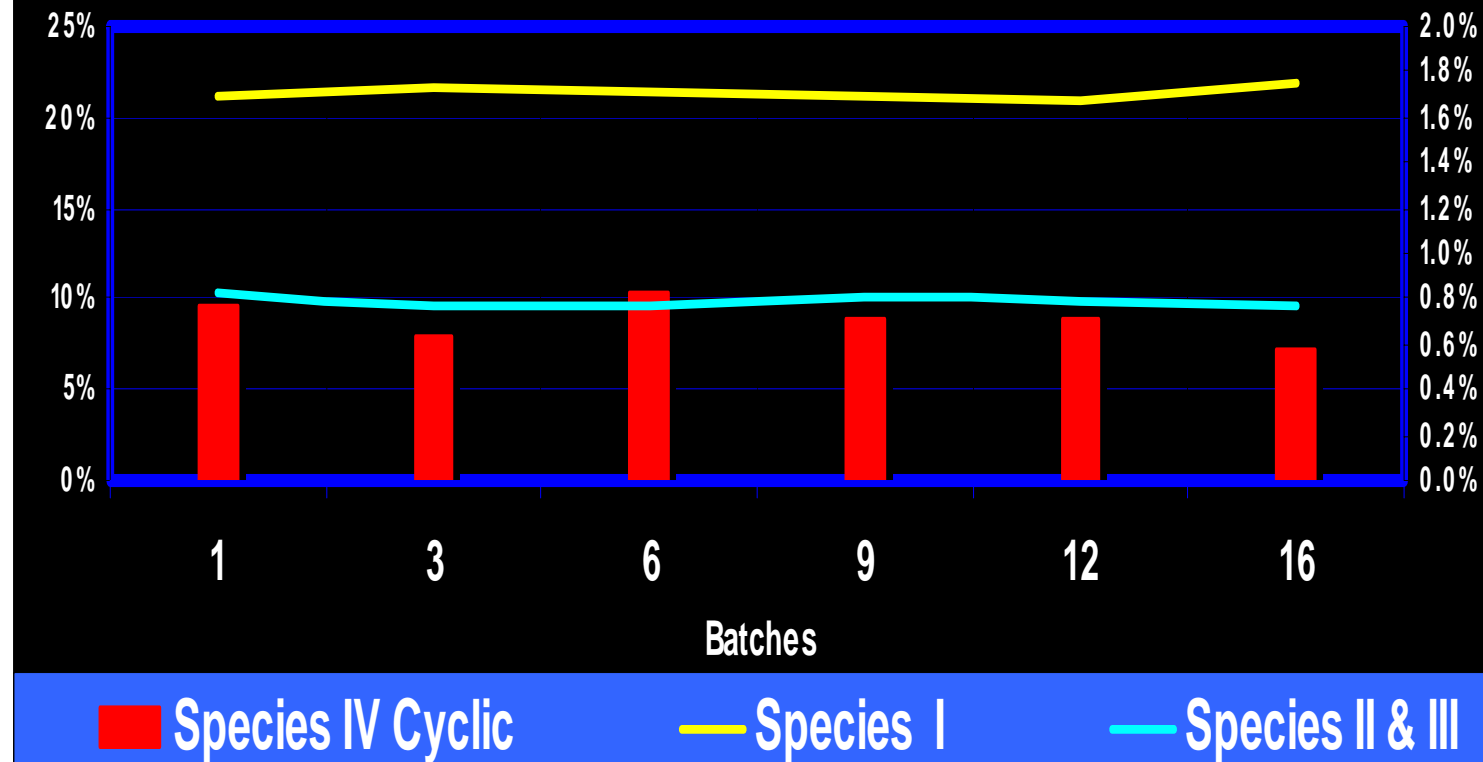


Advantages of using a local catalyst manufacturer

- Catalyst especially designed for South African climate conditions.
- Manufacturer needs to have a quality and environment systems to ensure that consistent good quality product is delivered with complete traceability without harming the environment.
- Expired PCL product can be returned to us (or via our distributors) for safe destruction without harming the environment.
- Please note that product that has been coloured with dye cannot be returned to PCL as this will effect our bio disposal system adversely –
it should rather be disposed by a waste disposal company.***
- Empty PCL catalyst containers can be returned to us (or via our distributors) to be cleaned and destroyed safely (cradle to the grave responsibility).



Typical MEKP Species Distribution



Further information on Organic Peroxides

- For further, more specific, information on OP's refer to the relevant Material Safety Data Sheets (MSDS).
- For specific questions contact John Dreyer at :-

Peroxide Chemicals

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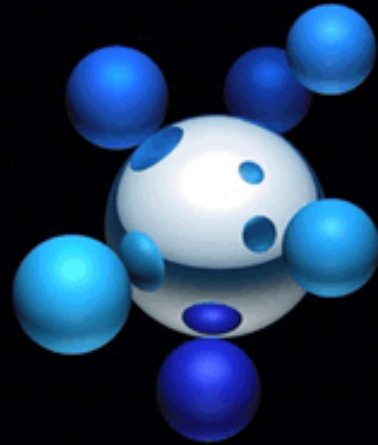
Website for MSDS's: www.sasol.com

At PCL nothing is more important than the satisfaction of customer needs





*Support local industry
to increase
jobs and reduce crime.*



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