

# Explosion of a Reactor

EPSC Learning Sheet Oct 2021



## What Happened:

In Tarragona (2020) an Alkoxylation reactor exploded, due to the decomposition of the alkoxylation products and / or the reactant Ethylene Oxide (EO). Two operators died at the site. Debris killed a citizen at 2.5 km.



Process Safety Fundamental:  
**Avoid Run-away reactions**  
Reference Document



## Aspects:

- Alkoxylation products and EO can decompose violently when the temperature gets too high. With alkaline catalysis this can start below 200 °C. This can result in an explosion.
- Understand the chemicals and decomposition energy & kinetics, also under abnormal conditions.
- Determine the safe distance between reactor and buildings and explosion pressure resistance of the buildings
- The accumulation of free EO in the reactor must be limited, to disable an uncontrollable runaway reaction. Amount of free EO is indicated by the pressure in the reactor.
- Ensure sufficient Reactor cooling and temperature control
- SIL rated interlocks should avoid critical scenario's such as EO accumulation, cooling loss and backflow into the EO line.
- Involve a safety expert on Alkoxylation and EO

Understand your chemicals and reactions