# Exploded Reactor

**EPSC Learning Sheet Oct 2021**

EPSC

What Happened:
In Tarragona (Jan 2020) an Alkoxylation reactor exploded. Ethylene Oxide (EO), the key reactant, decomposed violently. Debris killed a citizen 2.5 km away from the reactor.

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

Aspects:

- EO can decompose violently. Mixed with air the explosion or detonation is even more severe.
- Understand the stored energy in the reactor and the maximum consequence of an explosion.
- Avoid accumulation of free EO in the reactor, to avoid a runaway reaction. The explosion force indicates that liquid EO must have been present in this incident.
- For reactor temperature control and sufficient cooling include: alarms, SIL level interlocks and back-up cooling.
- Contaminants like alkali compounds, Iron oxide and ammonia can help initiate the reaction with EO
- EO reactors can use injection of solids as emergency stop
- A bunker around the reactor can help to limit debris impact

**Control exothermic reactions well**