

Transition Metals vs. Concentrated Peracetic Acid, A Case Study on Safety

What Happened?

- A **galvanized steel** dip tube was installed through the bung of a 55-gallon drum of Perasan (15% peroxyacetic acid) (PAA). The drum was then laid horizontally in drum cradle ready for use after the weekend break.
- Sometime over the weekend, the drum ruptured and released its contents to the floor.
- Fortunately no one was injured, as the site was closed for the weekend.

Why Did This Happen?

Peracetic acid is very aggressive to soft metals such as iron, copper, zinc and brass. All these metals corrode quickly and release transition metal ions into solution. Transition metals catalyze the decomposition of the hydrogen peroxide (H_2O_2) that the product also contains. Oxygen gas is produced. The reaction is exothermic and becomes autocatalytic i.e. the heat of the reaction speeds up the rate of decomposition even more.

The longitudinal nature of the rupture and its proximity to the dip tube indicated that zinc ions from the galvanized metal accumulated at the side of the drum. Once the zinc coating was breached, the underlying iron was corroded. High localized concentrations of zinc and iron ions then catalyzed the decomposition process and the combination of heat and pressure (from the buildup of oxygen gas) caused the drum to burst.

How Can This Have Been Avoided?

Thoroughly read labels and know your materials of construction! In this case, the operator failed to heed the instruction on the danger label on top of the drum. This label states: **DO NOT ALLOW ANY METAL CONTACT WITH PRODUCT** (other than stainless steel). A plastic dip tube constructed of HDPDE, PP, PVC, CPVC, Teflon or Kynar should have been used (nylon is the only common plastic not compatible with concentrated PAA). If metal construction is needed, **STAINLESS STEEL is the only common metal that should be allowed to contact undiluted PAA products.**