
Question 41: Do you have any experience with plugging of chloriding agent injection points in regenerators? How has this been overcome?

John Clower (Chevron)

The chloride injection line has a nitrogen purge connected with the intent to sweep the chloride into the chlorination gas line. In most designs, the nitrogen and organic chloride line join together before the chloride on/off valve. When the chloride valve closes, both chloride and nitrogen sweep are stopped.

The chloride in the line between chloride valve and chlorination gas line will heat up and sometimes form a heavy viscous semi solid at the junction between organic chloride injection line and chlorination gas line.

To mitigate this problem, first ensure that the injection line between chloride valve and injection point is free draining in the direction of the chlorination gas line. Also, relocate the nitrogen purge downstream of the chloride valve so that there is always a continuous nitrogen sweep and the injection line remains free of liquid.

Later generation pressurized regeneration systems do include a permanent nitrogen sweep downstream of the chloride on/off valve.

Greg Harbison (Marathon Petroleum)

Marathon has had a recent case of plugging of a perchloroethylene chloriding (PERC) agent in the injection line to the chlorination zone. Ammonium salts were identified as the plugging material. One key data point was identifying that the PERC in use for this unit contained 97 % of PERC or tetrachloro ethylene and about 3 % contaminants including water, isobutyl alcohol, trinitro-chloromethane, amines, and others. We are still unclear if it was an isolated case which could have been caused by a number of factors including the design of the PERC injection system, PERC grade type that could have contained contaminants, or intermittent operation of the regenerator between idling and black/white burn operations. The PERC in use at some of the other Marathon refineries is compatible for use in Isom units. Those refineries have not experienced chloride plugging in the injection system. They also utilize a nitrogen carrier when in white burn operations, an injection quill, and the chloride agent typically enters the top of the pipe, so it is free draining.

We also operate an Ultraformer swing reactor unit at our Robinson, Ill. Refinery. This unit operates a regeneration system at 250 psig and has had intermittent problems with chloride injection quill pluggage. We have significant flexibility with this unit and shut down the regen system to unplug the quill when necessary. This unit does not have a nitrogen purge, nor is the chloride piping blown out when not in use.

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