

What are the causes and more importantly how can they be corrected?

Corrosion in storage facilities

Wherever fuel is stored or distributed there is a risk of corrosion. Traces of water are often a contributing factor and moisture readily gets picked up by fuel during processing and storage. Certain characteristics in bioethanol make this environment even more susceptible to corrosion, which has led to failures of structures and leaks in pipe work in previous incidents.

Fuel ethanol

Fuel ethanol is hygroscopic so it has the ability to attract water molecules from the surrounding environment. Data shows a radical increase in water content of ethanol after 30 days exposure to a humid environment. In specific relation to fuel ethanol, increased water content and decreased pH have shown to be contributing factors to increasing corrosivity. Water in storage and distribution systems that handle fuel grade ethanol and finished petrol blends containing ethanol can corrode ferrous metals



Sig sulphide test for SRB in bottom sample (left unused test; right test showing strong positive)



Tank bottom plate showing pitting corrosion by SRB

found in tanks, pipelines and pumps as well as certain engine parts. Its corrosive properties therefore mean that a protective environment is desirable, from the initial stages of manufacture through to final distribution.

Affected areas in storage facilities caused by corrosion in fuel ethanol include:

- Tanks – roof and bottom plate welds, ring walls.
- Piping, fittings and components exposed to ethanol.

Protection

Controlling the corrosive environment can be achieved by the addition of a suitable corrosion inhibitor to the fuel ethanol.

Microbially influenced corrosion

Microbial growth occurs in both conventional hydrocarbon-based fuel and biofuels, wherever water is present. However, changes in fuels and fuel handling since the introduction of

biodiesel blends have led to a substantial increase in the incidence and severity of problems caused by microbial growth. Like fuel ethanol, biodiesel is hygroscopic and its affinity to water is believed to be a contributing factor for the increase in bacterial growth.

How water gets into fuel

- Biodiesel that has not been dried adequately in the manufacturing process will contain excess water and provides an ideal environment for microorganisms.
- Biodiesel that is stored in free-breathing tankage in high humidity environments will absorb moisture.
- Biodiesel will have a number of intermediate transfers between the production plant and the final customer tank including railcar, road car and ship transfers, all of which increase the possibility of moisture and bacteria contamination.

Anaerobic colonies, including sulphur reducing bacteria

(SRB), can be active in water and sludge in the bottoms of tanks and can cause pitting corrosion. Examples of severe microbial corrosion of steel, largely caused by SRB, can be found on tank bottom plates of fuel and crude oil storage tanks. Corrosion pits are formed which often have terraced edges and a silvery-grey colour when first exposed. Non-ferrous metals are stained black by SRB.

Protection

As part of a good housekeeping strategy to minimise the risk of microbial growth free water should be removed. In addition to this, a regular dosing regime of biocide at a low treat rate will reduce the need for shock treatments. User friendly, onsite test kits are available to monitor fuel and ensure that any microbial activity is kept at a safe level. ●

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