De-oxygenation Requirements in Brines

We have looked into de-oxygenation of brines but rarely used it. There are effective scavengers like sodium sulphite (8 ppm/1 ppm O2), which is a solid and needs to be dissolved in fresh water. It reacts fast in fresh water but slow in brine. Better is ammonium bi-sulphite (solution) (12 ppm/1 ppm O2).
It is unpleasant to handle (contains sulphur dioxide) and is extremely corrosive (pH 4-4.5), i.e. injection lines to be SS. The formation of sulphates can cause problems. Another scavenger is hydrazine, which is very effective, but extremely hazardous to handle and is never used in salt water systems. It is mostly used for boiler water systems. Dosage rates are small and depend on O2 content and can be recommended by the Vendor. Dosing is done on the fly with a dosing pump straight from the barrel. Care should be taken that no air enters the barrel, i.e. gas blanket is needed. Of course the well should remain free from O2 as well.

What we have used as an alternative is produced water from a source with little or no O2, i.e. straight from the test separator. Produced water generally contains iron, which will consume some O2, but for the water to be non-corrosive the O2 content should be less than 10 ppb. This can be simply tested with a break tube in a drain point. (The color of the fluid after breaking the tube while submerged in the water will indicate the O2 content.)

I presume an SS screen is used, which will not be sensitive to O2 corrosion. The stress cracking would be more of a concern, but this can be addressed with a suitable corrosion inhibitor, depending on the DH temperature and how long the screen is left in this condition before start of production. For a short period like a few days, I would not be concerned.

We left Calcium Bromide completion brine in a well for several months without any negative effects. Gary Poole at OSCA is the expert. He can tell them what, how much, how to mix, etc. You can reach Gary on 281-775-1634. This is his direct line and will automatically page him if you leave a message.

Typically oxygen is not a problem if the brine is exposed to carbon steel. The carbon steel will corrode a little and consume the oxygen. Chrome tubulars do not consume oxygen while corroding. Instead, oxygen catalyzes the corrosion process.

If the brine will be left in chrome tubulars for more than a week or so, it should be de-oxygenated. I have added chemical injection pumps to my triplex charging line and I've also just poured scavenger into the pit just prior to the last circulation. (Run the agitiator just long enough to mix in the
scavenger). Oxygen scavenger is available from the brine suppliers.

I've worked over a well where the brine sitting inside 13 Cr tubing was not de-oxygenated. It pitted through in less than 2 months.

The de-ox of brines is critical in chrome 13 wells. This is especially true in injectors where oxygen in the brines can reduce corrosion resistance of chrome to less than that of L-80. Small amounts of scavenger are usually adequate for spot jobs and more cost effective oxygen removal (seals, covers, etc.) are very effective in our operations. One comment - watch storage of Chrome pipe in areas where brine from the well or salt spray is oxygenated by the air. You can destroy chrome pipe during simple storage. We have guidelines if you need them.

We do not normally de-oxygenate completion brines of normal weighted sea water composition (9.5 ppg). This is due to the mild steel liner/casing will consume the oxygen quite quickly. We typically do add a biocide but again little organic matter to develop large colonies.

However, if I had a chrome liner, chrome screens or a high weighted brine, I would use oxygen scavengers. We do this in our high weight brines. Get the mud company to advise as they have all the chemicals and can treat as needed.