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Tiefe Geothermie

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Deep geothermal energy



New chemistry development to address stibnite scale inhibition in geothermal plants

Neue chemische Entwicklung zur Verhinderung von Stibnitablagerungen in geothermischen Anlagen

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Among all the inorganic scale species that affect geothermal applications, Stibnite is one of the most difficult to be treated due to its extremely low solubility constant. Stibnite usually occurs in binary systems, and it is more frequent in countries like Italy, Turkey, USA. Precipitation in the heat exchanger of this geothermal plants typically lowers the heat exchanging efficiency thus reducing the power output.

Different ways for preventing or eliminate stibnite precipitation have been applied, such as off-line mechanical cleaning or off-line chemical cleaning with acid/caustic or the continuous (online) application of scale inhibitor and dispersant but all of them can be expensive if the plant downtime is counted and may be associated to operators' safety issues due to the formation of H₂S.

Chemical treatment represents a more cost-effective and safer solution to minimize the side-effects associated to stibnite but only few technologies are currently available on the market and most of them didn't provide a complete inhibition and often failed under severe conditions.

In this paper, a new stibnite inhibitor is presented. A detailed description of the development work is provided, with a focus on main challenges and testing conditions considered to be as close as possible to real field conditions. An analysis of the mechanism of action of this innovative technology is also discussed.

Results show that this new technology provides better results compared to standard solutions and can work under more severe conditions achieving good inhibition. It shows a reduction in the MIC (Minimum Inhibitor Concentration) ranging from 2x to 3x, making this product a cost-effective technology and it is able to control Stibnite in brine having about 10ppm of Antimony (about 2x higher than the maximum Antimony level that can be found in Turkish geothermal brines).

Ongoing field trials are confirming lab results, showing a significant improvement in mitigation Stibnite scale in the field compared to previously adopted solutions.