OPTIMIZATION OF SCALING DEPOSITS AND DEVELOPMENT OF INDICATORS FOR MONITORING SCALING IN COOLING SYSTEMS

Introduction

Scaling is an ever-present issue in cooling systems. Process industries resort to optimizing water qualities, reducing pH and using mechanical means to address scaling on heat transfer surfaces. Scaling on metal surfaces could be considered beneficial for preventing corrosion, but detrimental to heat transfer efficiency. Industries would largely benefit from effective operational indicators that inform stages, possibilities and effects of scaling. Existing indicators such as the Langelier saturation index have shortcomings, such as the inability to capture nonlinear relationships among a multitude of water qualities.

Methodology

1. Identify features of scaling that can be attributed to corrosion and heat transfer e.g. porosity, thermal conductivity, thickness
2. Peruse literature for existing models/empirical correlations that predict aforementioned features in the scope of scaling.
3. Integrate models/correlations in step 2 into an objective function.
4. Use objective function in step 3 to optimize water qualities and other influencing variables to obtain optimal scaling deposit.
5. Use models/correlations in step 2 to also develop indicators for monitoring effects of scaling (e.g. an early warning system).

Industrial data sets available within the AQUASPICE project can be used as required.

Image adapted from: https://vrcmetalsystems.com/protect-against-various-types-corrosion/

Objectives of the thesis

- Development of advanced scaling indicators for large scale chemical plants.
- Optimization of scaling deposits to minimize corrosion and maximize heat transfer.

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BACKGROUND

Chemistry and bioprocess technology, Environmental Science and technology, Environmental technology

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English

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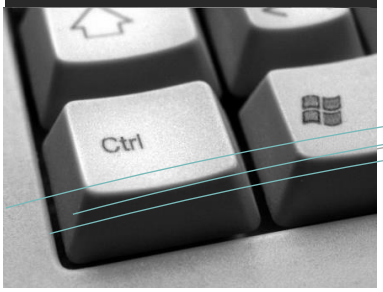

AquaSPICE PoInT Particle and Interfacial Technology CAPTURE BIOMATH