

Experimental Investigation of Heat Transfer and Scale Growth Characteristics of Crystallisation Scale in Agitation Tank

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Abstract : Crystallisation scale occurs when dissolved minerals precipitate from an aqueous solution. To investigate the crystallisation scale growth of normal solubility salt, a lab-scale agitation tank with and without baffles were used as a benchmark using potassium nitrate as the test fluid. Potassium nitrate (KNO₃) solution in this test leads to crystallisation scale on heat transfer surfaces. This experimental investigation has focused on the effect of surface crystallisation of potassium nitrate on the low-temperature heat exchange surfaces on the wall of the agitation tank. The impeller agitation rate affects the scaling rate at the low-temperature agitation wall and it shows a decreasing scaling rate with an increasing agitation rate. It was observed that there was a significant variation of heat transfer coefficients and scaling resistance coefficients with different agitation rate as well as with varying impeller size, tank with and without baffles and solution concentration.

Keywords : crystallisation, heat transfer coefficient, scale, resistance

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