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Ion Exchange Treatment of Saline Solutions using Lanxess S108H Strong Acid Cation Resin

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6

7 **Abstract**

8 Common to many types of water and wastewater is the presence of sodium ions which can
9 be removed by desalination technologies, such as reverse osmosis and ion exchange. The
10 focus of this investigation was ion exchange as it potentially offered several advantages
11 compared to competing methods. The equilibrium and column behaviour of a strong acid
12 cation (SAC) resin was examined for the removal of sodium ions from aqueous sodium
13 chloride solutions of varying normality as well as a coal seam gas water sample. The
14 influence of the bottle-point method to generate the sorption isotherms was evaluated and
15 data interpreted with the Langmuir Vageler, Competitive Langmuir, Freundlich, and Dubinin-
16 Astakhov models. With the constant concentration bottle point method, the predicted
17 maximum exchange levels of sodium ions on the resin ranged from 61.7 to 67.5 g Na/kg
18 resin. The general trend was that the lower the initial concentration of sodium ions in the
19 solution, the lower the maximum capacity of the resin for sodium ions. In contrast, the
20 constant mass bottle point method was found to be problematic in that the isotherm
21 profiles may not be complete, if experimental parameters were not chosen carefully.
22 Column studies supported the observations of the equilibrium studies, with maximum
23 sodium loading of *ca.* 62.9 g Na/kg resin measured, which was in excellent agreement with
24 the predictions of the data from the constant concentration bottle point method. Equilibria

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