THE INDUSTRIAL DEVELOPMENT OF SEARLES LAKE BRINES

WITH EQUILIBRIUM DATA

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occurs in the salt body in important amounts, especially below the 50-foot level. Glaserite is in equilibrium with a solution of its component salts, Na_2SO_4 and K_2SO_4, at ordinary temperatures, but is not below about 0° C. With KCl and Na_2SO_4 the transition point is between 4° and 5° C. below which glaserite is not stable.

3. $9Na_2SO_4.2Na_2CO_3.KCl$, hanksite, well known but not of frequent occurrence. It contains about the same percentage of KCl as the Searles Lake brine does with which it is in equilibrium. It forms an important part of the salt body where its characteristic crystals are often large, well formed, and easily recognizable. Hanksite is apparently stable in the lake at 22.5° C., but is decomposed by water at 25° C. or above, and on warming the solution precipitates burkeite, $2Na_2SO_4.Na_2CO_3$. The temperature range within which hanksite may exist is seemingly very narrow. The hanksite equilibrium is exceedingly difficult to reproduce in the laboratory, requiring great care and patience and weeks of time. This has been accomplished, however, as will be seen from System VI, Diagram 17, but the extreme slowness and difficulty of formation makes hanksite unimportant in plant practice, where its place is always taken by burkeite.

4. $2Na_2SO_4.Na_2CO_3$, burkeite, a new double salt discovered by Mr. W. E. Burke in 1919.* Although its native occurrence has not hitherto been reported, and although it does not seem to be a constituent of the Searles Lake salt body, we fully expect to hear of it from Owens Lake, or some of the other alkaline lakes, now that attention has been called to its existence. For this reason, and also as a matter of convenience in referring to a material formed in the plant at the rate of some thousands of tons every week, we have given it a name, burkeite.

In the reaction

$$2Na_2SO_4.10H_2O + Na_2CO_3.10H_2O \leftrightarrows 2Na_2SO_4.Na_2CO_3 + 30H_2O$$

the transition point is about 25° C., the burkeite being stable above that temperature. Another reaction of vital importance in plant operation is the one connecting burkeite and glaserite:

$$2Na_2SO_4.Na_2CO_3 + 3KCl + H_2O \leftrightarrows K_3Na(SO_4)_2 + 3NaCl + Na_2CO_3.1H_2O$$

The transition temperature is about 49° C., glaserite being stable only below that when in contact with the solution.

Burkeite forms beautiful crystals of very high luster and is stable in equilibrium with Searles Lake brine under plant conditions at all temperatures from 20° to 110° C.

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