ESI, Tutorial Review: G. Coquerel

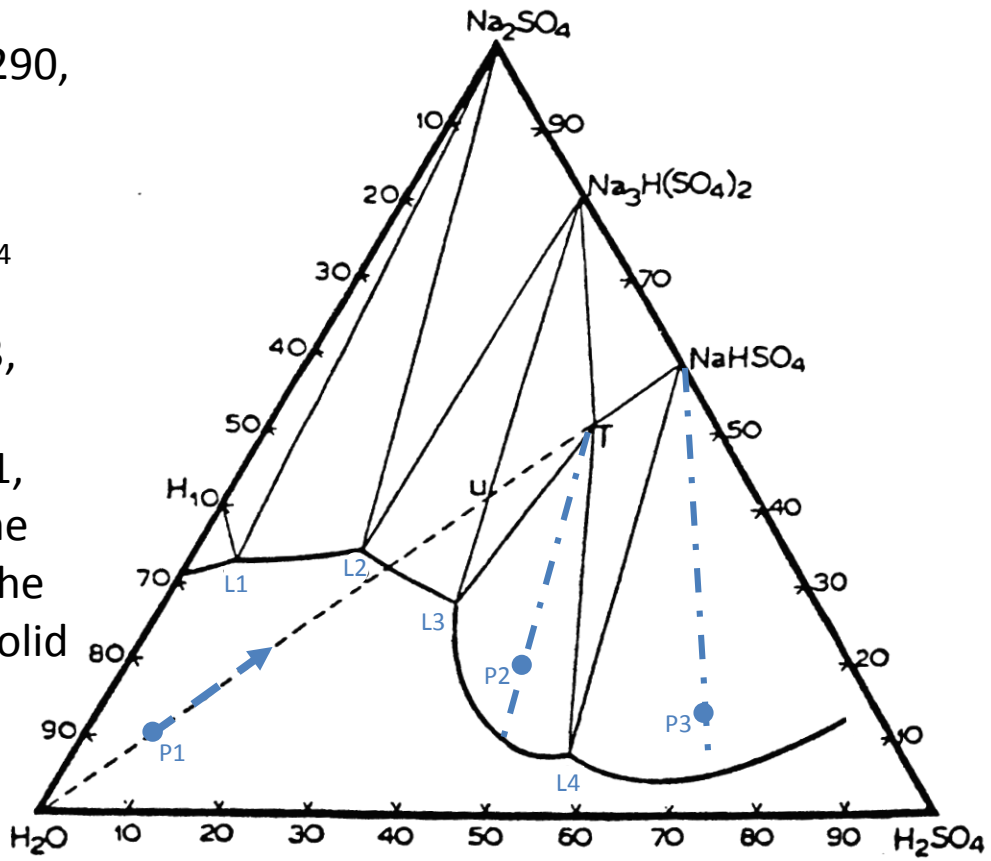
After Faust & Esselman, Z. anorg. Ch., 157, 290, 1926 (Isotherm at 29.5°C)

L1, L2, L3 and L4 are invariant liquids.

Na_2SO_4 ; $Na_3H(SO_4)_2$; $NaHSO_4$-H_2O ; $NaHSO_4$ are all non congruent solubility phases in water. Their solubility curves are: L1L2, L2L3, L3L4 and L4-no end respectively.

Starting from the mixture represented by P1, an isothermal evaporation would lead to the crystallization of $Na_3H(SO_4)_2$ = letovicite. If the evaporation is continued a mixture of two solid phases will be obtained in liquid L3: $Na_3H(SO_4)_2$ and $NaHSO_4$-H_2O

When no liquid remains (point T) only $NaHSO_4$-H_2O will be present. If this latter phase is dehydrated then $NaHSO_4$ could be obtained.



Conversely it is possible to obtain directly: $NaHSO_4$-H_2O and $NaHSO_4$ by just starting from mixtures P2 and P3 respectively.

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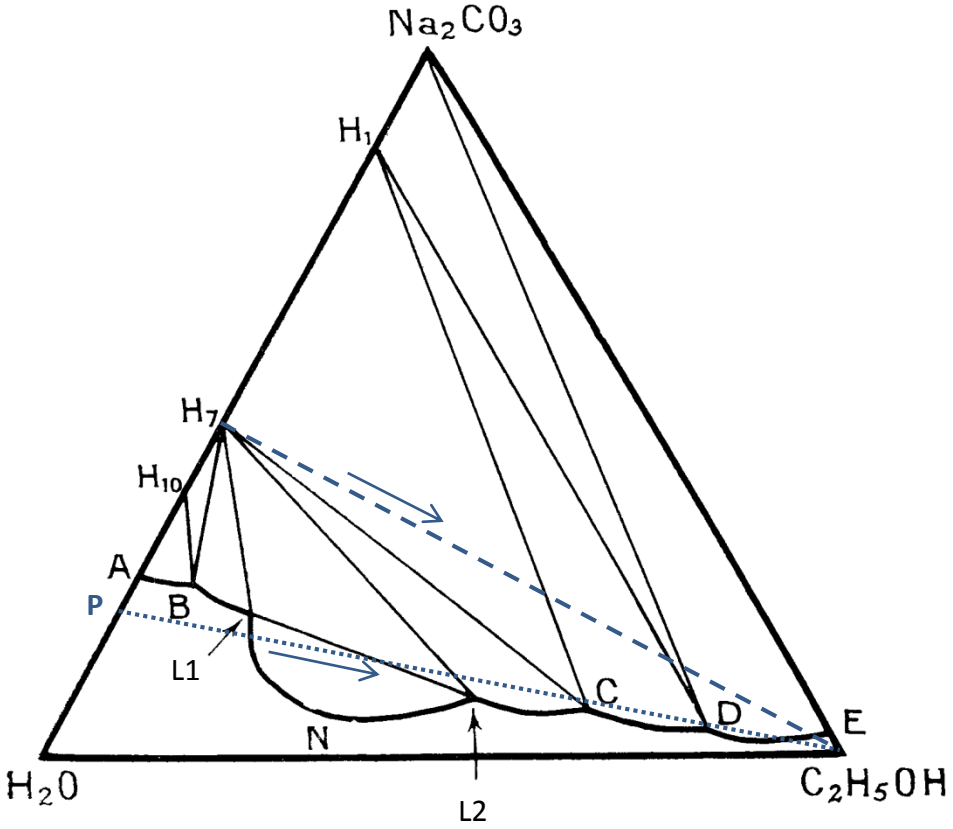
After: Ketner, Z. Physik Chem., 39, 641, 1902 (Isotherm at 31.5°C)
B, L1, L2, C and D are invariant liquids.
Na_2CO_3 ; exists as an anhydrous phase, a monohydrate H1, a Heptahydrate H7 and a decahydrate H10.
H7, H1 and the anhydrous sodium carbonate have a non congruent solubilility in water. H10, H7 and H1 have a non congruent solubility in pure ethanol.



Starting from the undersaturated aqueous solution represented by P, on successive addition of ethanol the system will exhibit: (i) a liquid liquid demixion (ii) H7 and liquids L1 plus L2 (iii) H7 and a saturated solution, (iv) small domain where H7 and H1 co-exist with the doubly saturated liquid C (v) H1 and its saturated solution (vi) very small domain: liquid D and H1 plus sodium carbonate (viii) few crystals of anhydrous sodium carbonate and its saturated solution (vii) homogeneous understaturated solution
Starting from H7, on successive additions of pure ethanol one can observe: (i) coexistence of H7, H1 and doubly saturated liquid C (ii) H1 and a saturated solution (iii) a narrow domain including H1 Na_2CO_3 and the doubly saturated liquid D (iv) Na_2CO_3 with its saturated solution (v) homogeneous undersaturated solution.