F' is the same (namely, $F' \rightleftarrows$ vapour F') ΔW and ΔV are also the same for both systems. The curves $a''D$ and $a'K'$ must, therefore meet in the P, T-diagram in the point l.

A corresponding property holds when a corresponding point l is situated on the four-phase curve, or on the melting point curve of the complex $F + F'$.

Hence, if the sublimation line, the four-phase line or the melting point line of the complex $F + F'$ is in a part a congruent and in a part a transition curve, the curve of the complex in the P,T-diagram will meet in its transition point the corresponding curve of that compound which is being converted.

If there are two transition points, many cases may present themselves, according to their situation, the compound converted etc., which we will not discuss here any further.

(To be continued).

Chemistry. — *"The system sodium sulphate, manganous sulphate and water at* 35°[1]). By Prof. F. A. H. Schreinemakers and D. J. van Prooije.

In this system occur as solid phases, which can be in equilibrium at 35° with saturated solutions: anhydrous Na_2SO_4, the hydrate $MnSO_4 . H_2O$ and the two anhydrous double salts:

$$D_{9.10} = (Mn\,SO_4)_9 . (Na_2\,SO_4)_{10} \text{ and } D_{1.3} = Mn\,SO_4 . (Na_2\,SO_4)_3.$$

The double salts previously described:

$$Mn\,SO_4 . Na_2\,SO_4 , 2H_2O \text{ and } Mn\,SO_4 . Na_2\,SO_4 . 4\,H_2O$$

have not been found by us, whereas on the other hand those now noticed have not been described up to the present. Moreover, the accurate preparation and solubility of the salts previously described are but insufficiently known, so that it is difficult to decide whether these are perhaps metastable or whether the presence of two metastable salts was, perhaps, due to accident.

The equilibria occurring at 35° are indicated schematically in the figure; the two double salts are represented by the points $D_{9.10}$ and $D_{1.3}$, the salt $MnSO_4 . H_2O$ is represented by the point Mn_1. The isotherm consists of four branches, namely

1) Marignac and Geiger, A. Min. [5] **9**. 15. Mag. Pharm. **11** 27.

ab the saturation line of Na_2SO_4.
bc „ „ „ „ D_{13}
cd „ „ „ „ D_{910}
de „ „ „ „ $MnSO_4 . H_2O$

The exact position of these branches can be drawn with the aid of the determinations recorded in table I.

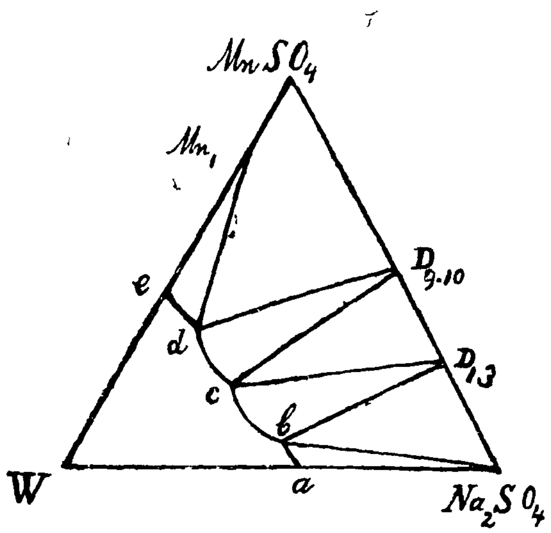
TABLE I.

Composition in °/₀ by weight of the solutions saturated at 35° and of the residues.

Solution		Residue		Solid phase
% $MnSO_4$	% Na_2SO_4	% $MnSO_4$	% Na_2SO_3	
39.45	0	—	—	$MnSO_4 . H_2O$
33.92	5.23	43.84	4.50	„
33.06	7.97	50.85	23.22	$MnSO_4 . H_2O + D_{9\,10}$
32.76	7.71	49.35	14.71	„
32.92	7.42	43.49	7.76	„
31.05	9.20	39.21	28.73	$D_{9\,10}$
27.67	10.76	33.44	21.81	„
22.14	14.28	37.44	35.46	„
14.58	20.01	31.06	35.50	„
13.96	21.91	24.51	40.65	$D_{9\,10} + D_{1\,3}$
12.19	22.49	18.63	47.18	$D_{1\,3}$
10.45	23.41	18.40	49.53	„
7.43	26.58	18.53	55.45	„
5.69	29.31	17.02	55.00	„
5.11	30.52	9.11	61.58	$D_{1\,3} + Na_2SO_4$
2.96	31.33	1.46	67.40	Na_2SO_4
0	33	—	—	„

From the table it is shown that the composition of the solution saturated with $MnSO_4 . H_2O + D_{9.10}$ has been determined three times.

In order to be able to deduce the composition of the solid substances with which the solutions are saturated, the composition of such a solution has been determined and in addition that of the correlated residue.



As shown in the table, four solutions of branch *cd* and their correlated residues have been determined besides the two terminal points; if these are introduced into the figure and the conjugation lines are drawn, these intersect the side $MnSO_4$— Na_2SO_4 in a point indicating 48.89 % of $MnSO_4$ and consequently 51.11 % of Na_2SO_4. The double salt $MnSO_4 . Na_2SO_4$ contains, however, 51.53 % of $MnSO_4$, therefore, 48.47 % of Na_2SO_4, so that the solid substance with which the solutions of branch *cd* are saturated cannot be the double salt $MnSO_4 . Na_2SO_4$ or one of its hydrates. If from the composition (% by weight) of the point of intersection we calculate the molecular composition we find: $(MnSO_4)_9\ (Na_2SO_4)_{10} = D_{9.10}$.

As shown in the table, four solutions of branch *bc* and their correlated residues have been determined besides the two terminal points *b* and *c*, these four conjugation lines intersect the side $MnSO_4$—Na_2SO_4 in a point indicating the composition of the double salt: $MnSO_4\ (Na_2SO_4)_3 = D_{1.3}$. This double salt contains 26.16 % of $MnSO_4$ and consequently 73.84 % of Na_2SO_4.

The behaviour of both double salts in regard to water is shown at once in the figure if we connect therein the apex W with the points $D_{1.3}$ and $D_{9.10}$. As the line $W.D_{1.3}$ intersects the curve *bc* and the line $W.D_{9.10}$ the curve *cd*, it is evident that at 35° both double salts are soluble in water without decomposition.