The latter equation assumes that the liquid composition, W_2 lies on the H_2O side of the triangle Ca_2SiO_4–$Ca(OH_2)$–MgO. If it lies on the CaO side of the triangle then the vapor phase would occur on the right hand side of the equation.

The boundaries between the fields for L + V and the three-phase elements in Fig. 4 correspond to sections through the vapor-saturated liquidus surface, projected onto these composition joins along the tie-lines connecting the liquid compositions to H_2O. The points J, M and I on the boundary of the L + V field in Fig. 4 correspond to points on the vapor-saturated liquidus field boundaries. The point J separates the primary crystallization of CH from that of Ch (in the presence of H_2O vapor), M separates the primary fields of Ch and C_2S, and I separates the primary fields of Ch and P. The four-phase elements appropriate for each of these field boundaries are intersected in areas extending from these points in Fig. 4.

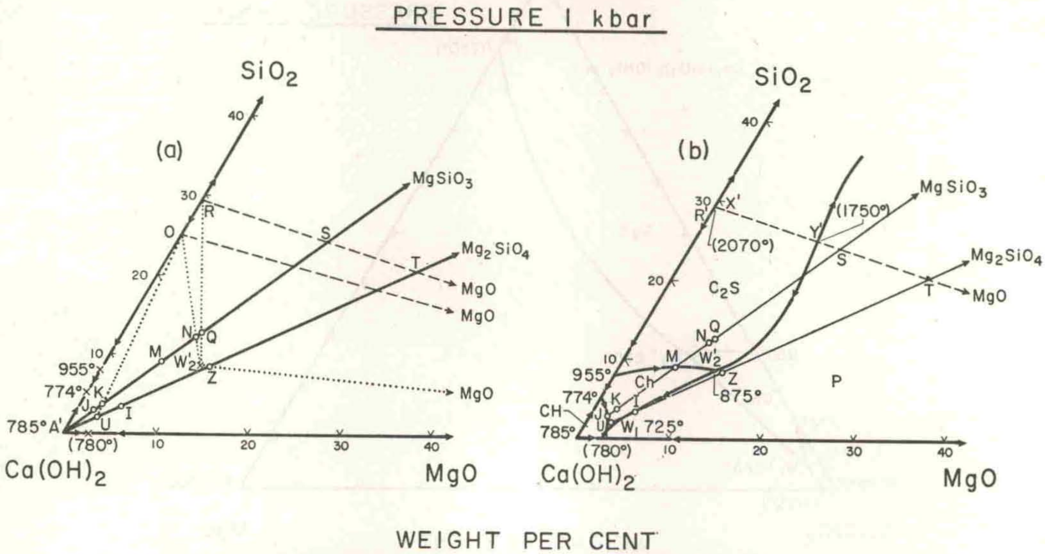

Fig. 5. Phase relationships on the vapor-saturated liquidus surface when projected onto the triangle $Ca(OH)_2$–MgO–SiO_2, as constructed from the experimental results in Fig. 4. Note the line RST MgO in Figs. 1 and 3.

(a) The composition joins, the construction points plotted in Fig. 4, and the dotted construction lines. See text for details.

(b) Positions of vapor-saturated field boundaries determined from Fig. 4(a). The temperatures in parentheses are estimated. See text for more details.

Vapor-saturated liquidus surface

The arrangement of primary phase fields and field boundaries illustrated in Fig. 5(b) corresponds to a projection of the vapor-saturated liquidus surface onto the composition triangle $Ca(OH)_2$–MgO–SiO_2 along the liquid-H_2O tie-lines; the projection was from the surface towards H_2O, except for the small area ADF of Fig. 3. The projection was constructed from what is known of the bounding ternary systems (Fig. 2) and from the experimentally located phase fields of Fig. 4; the measured points from Fig. 4, and the construction lines, are illustrated in Fig. 5(a).

In Fig. 5(a), the dashed line RST is the upper limit of the Ca_2SiO_4–$Ca(OH)_2$–MgO–H_2O tetrahedron (compare Fig. 1). The point of intersection of the lines Ch–H_2O and CH–R in Fig. 1 is represented by point O in Fig. 5(a). The crosses on the sides $Ca(OH)_2$–SiO_2 and $Ca(OH)_2$–MgO represent the ternary vapor-saturated eutectics and peritectics (Fig. 2). The points J, K, M, N and Q, and U, I and Z located in Fig. 4. J, M and I have already been described as points on the field boundaries and they are so plotted in Fig. 5(b). The other points permit location of the liquid compositions for the projected peritectic (W_2') and eutectic (W_1').

W_2' in Fig. 5 is the point of intersection of the L(W_2)-V line of the five-phase tie figure C_2S + Ch + P + L + V with the composition triangle $Ca(OH)_2$–MgO–SiO_2. In Fig. 5(a), the dotted lines ON extended and RQ extended, are the intersections of sides of the four-phase element Ch + C_2S + L + V (Fig. 4a), which must meet at the point W_2'. Similarly, the dotted lines RQ extended and MgO–Z extended are the intersections of two sides of the four-phase element C_2S + P + L + V (Figs. 4a and 4b), and these must also meet at W_2'. The point of intersection of the dotted lines ON, RQ and MgO–Z is therefore the projected peritectic liquid W'_2.

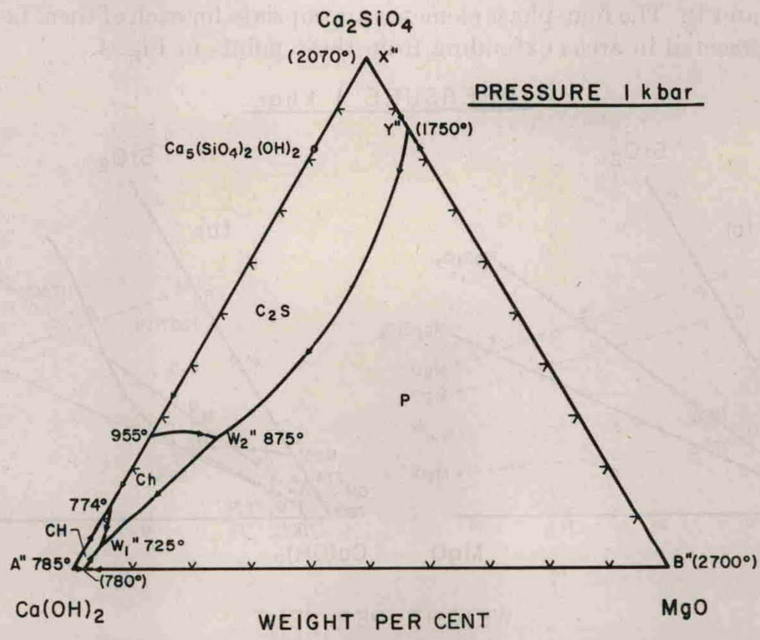

Fig. 6. Phase relationships on the vapor-saturated liquidus surface when projected onto the triangle $Ca(OH)_2$–Ca_2SiO_4–MgO, as calculated from Fig. 5(b). Temperatures in parentheses are estimated. For abbreviations see text.

W_1' in Fig. 5 is the point of intersection of the L(W_1)-V line of the five-phase tie-figure CH + Ch + P + L + V with the plane $Ca(OH)_2$–MgO–SiO_2. The dotted line OKU extended is the line of intersection of the plane Ch + L + V, which forms part of the five-phase tie-figure. and W_1' therefore lies on this line. The limits placed on the locations of the projected field boundaries by the various construction points (Fig. 5b) locate the projected eutectic liquid, W_1', at a point very close to U.

The projected vapor-saturated liquidus surface illustrated in Fig. 5(b) was constructed from the information on summarized in Fig. 4 and 5(a). The field boundaries separate the fields for the primary crystallization (in the presence of H_2O vapor) of CH, Ch, P and C_2S. The dashed line X′Y′-MgO shows the projection of the line XB in Fig. 3, and this coincides with the line RST (compare Figs. 1, 3 and 5(b).

The compositions of the projected liquids W_2' and W_1' were measured on Fig. 5(b) and recalculated in terms of the apices of the tetrahedron Ca_2SiO_4–$Ca(OH)_2$–MgO–H_2O. By omitting H_2O and recalculating to 100 per cent the positions of the liquids W_2 and W_1 when projected from H_2O onto the triangle Ca_2SiO_4–$Ca(OH)_2$–MgO were obtained. These have been plotted