if found to increase from 0.37 to 0.84; $(\bar{V}_2-\bar{V}_2{}^0)$ decreases from 12.9 cc/mole to 9.1 cc/mole. The decrease in $(\bar{V}_2-\bar{V}_2{}^0)$ has nearly the same pressure dependence as the decrease in the magnitude of ΔV^0, within three percent over the entire range; hence, by Eq. (5), the ratio k_1/κ is nearly independent of pressure. At atmospheric pressure k_1 is calculated to be 0.90×10^6 rad/sec or $k_1/2\pi$ is 143 kc. At infinite dilutions, therefore $f_m=\kappa/2\pi$ is 143 kc which may be compared with the results shown in Fig. 7.

The predicted pressure dependence of sound absorption using Eq. (8) is shown in Fig. 11. The slope of the predicted curve agrees with experiment fairly well from 5000–15 000 psi, but there is a discrepancy between observed and theoretical behavior below 5000 psi. This discrepancy undoubtedly stems from the assumption that $\Delta V'$ is independent of pressure. Unfortunately it is not possible to evaluate this quantity at higher pressures or even at atmospheric pressure with accuracy sufficient to permit quantitative interpretation of results. Until the pressure dependence of $\Delta V'$ is known it will not be possible to discuss this discrepancy more fully. Another source of discrepancy may arise from inaccuracies in the value of θ calculated at atmospheric pressure. Variations as large as 30% in the value of θ might be expected from the reported data.

CONCLUSION

The marked pressure dependence of acoustic absorption in $MgSO_4$ solution offers additional proof that chemical equilibrium in this solution is affected by pressure.

Since κ and the ratio k_1/κ were found to be nearly independent of pressure, it must be concluded that k_1, the specific reaction rate for dissociation, is influenced very little by pressure.

The nature of the pressure-sensitive reaction is still uncertain. It has been shown that the dissociation reaction can be responsible. Other reactions, however, cannot yet be excluded. For example, the variation with pressure of the concentration of the associated ions, $c_s(1-\theta)$, is the major factor in the predicted absorption shown in Fig. 11; the parameters $|\Delta V^0|$ and ρc vary in opposite directions such that their net influence is small. Thus, the quantity $c_s(1-\theta)$ would appear in an analogous manner if a purely monomolecular reaction involving only the associated molecules rather than the dissociation process were responsible.

Owen and Brinkley[14] indicated that ΔV^0, a negative number, becomes more positive with increasing temperature for some electrolytes. If this were true for $MgSO_4$ there may be some temperature at which $\Delta V^0=0$. A crucial test of the theory would be to measure absorption at this temperature to observe whether excess absorption persists.