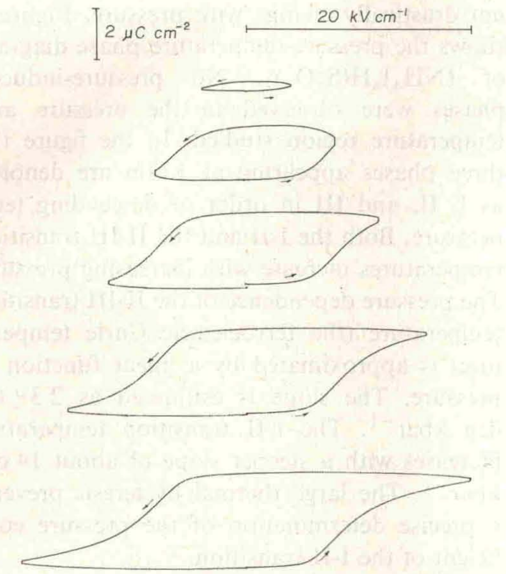

Fig. 3. D-E hysteresis loops of $(NH_4)_3H(SeO_4)_2$ for various applied field amplitudes at −105°C. Frequency: 0.014 Hz.

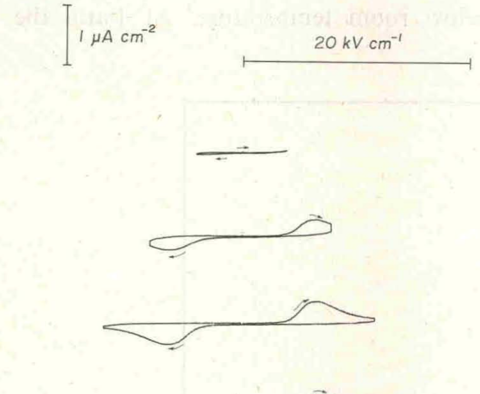

Fig. 4. Switching current vs electric field of $(NH_4)_3H(SeO_4)_2$ for various field amplitudes at −105°C. Frequency: 0.014 Hz.

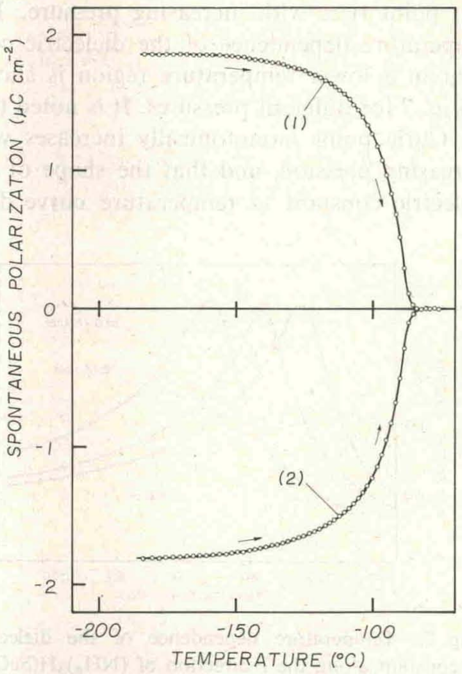

Fig. 5. Temperature dependence of the spontaneous polarization of $(NH_4)_3H(SeO_4)_2$ obtained from the pyroelectric measurement. The specimen was poled at −100°C with (1) $+24\ \mathrm{kV\,cm^{-1}}$ and (2) $-24\ \mathrm{kV\,cm^{-1}}$. It is shown that the polarization is reversed by reversal of the poling field.

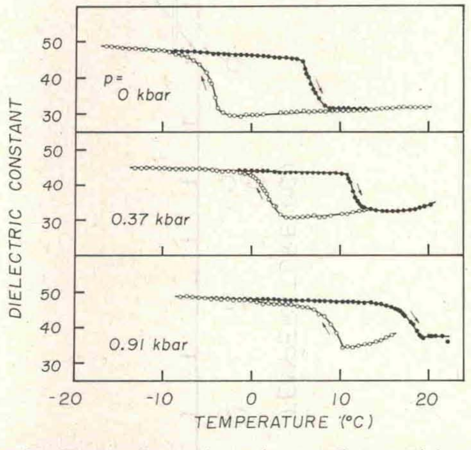

Fig. 6. Temperature dependence of the dielectric constant along the c-direction of $(NH_4)_3H(SeO_4)_2$ in the vicinity of the I–II transition at different hydrostatic pressures.

during heating process. The saturated spontaneous polarization at low temperature is about $1.8\ \mu\mathrm{C\,cm^{-2}}$.* The spontaneous polarization decreases with increasing temperature and disappears at around the Curie temperature of −92°C. Reversal of the poling field causes the reversal of the spontaneous polarization as shown by curves (1) and (2) in Fig. 5.

Figure 6 shows the temperature dependence of the dielectric constant along the c-direction at different hydrostatic pressures in a temperature region of the upper transition. The transi-

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* Slightly low value was previously reported because of unsaturation of the polarization.[4]

tion point rises with increasing pressure. The temperature dependence of the dielectric constant in a lower temperature region is shown in Fig. 7 for different pressures. It is noted that the Curie point monotonically increases with increasing pressure, and that the shape of the dielectric constant vs temperature curve does not drastically change with pressure. Figure 8 shows the pressure-temperature phase diagram of $(NH_4)_3H(SeO_4)_2$. No pressure-induced phases were observed in the pressure and temperature region studied. In the figure the three phases appearing at 1 atm are denoted as I, II, and III in order of descending temperature. Both the I-II and the II-III transition temperatures increase with increasing pressure. The pressure dependence of the II-III transition temperature (the ferroelectric Curie temperature) is approximated by a linear function of pressure. The slope is estimated as 2.3 ± 0.1 deg kbar^{-1}. The I-II transition temperature increases with a steeper slope of about 14 deg kbar^{-1}. The large thermal hysteresis prevents a precise determination of the pressure coefficient of the I-II transition.

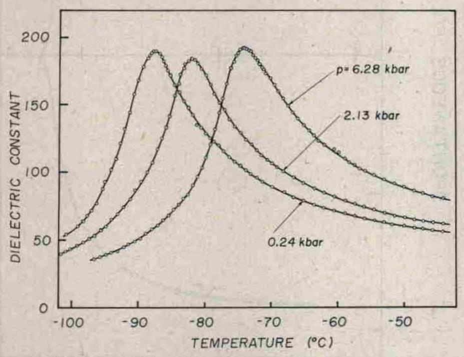

Fig. 7. Temperature dependence of the dielectric constant along the c-direction of $(NH_4)_3H(SeO_4)_2$ in the low temperature region at different hydrostatic pressures.

§4. Discussion and Conclusion

The present results show that there are three phases, I, II, and III, in $(NH_4)_3H(SeO_4)_2$ below room temperature. At 1 atm the I-II

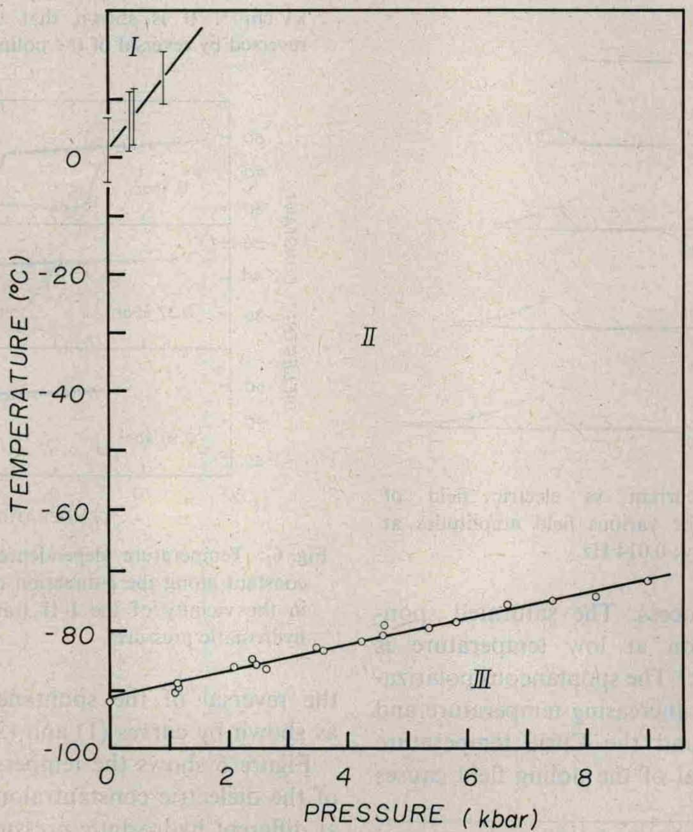

Fig. 8. Pressure-temperature phase diagram of $(NH_4)_3H(SeO_4)_2$ below room temperature.