period. Then it was rapidly cooled to room temperature, and the glow curve was measured.

The peak of the glow curve shifts continuously to higher temperatures with increasing period of decay and with higher decay temperatures. Therefore it is concluded that there exist in glass some unresolved groups of trapping centers, each group of which has its distribution around its center.

The induced absorption bands at room temperature are shown in Fig. 4.

A comparison of glow and absorption curves shows that the resolution in glow curves is better than in absorption curves, although the resolution in absorption curves increases generally at low temperature.

The above results show clearly that fused quartz—the glassy state of quartz—has a disordered lattice but preserves to some extent the local order of the crystal.

A full account will appear in the *Journal of the Physical Society of Japan*.

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An Ultra-High-Frequency Rotational Line of HDO†

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AN asymmetric top molecule whose dipole moment is oblique to its axes of principal moments may be expected to have a rotational absorption spectrum extending to very low frequencies. Some of these low-frequency lines may be transitions between levels of low J and may have appreciable intensities. King, Hainer, and Cross[1] have predicted that the $3_2 \rightarrow 3_3$ transition of HDO would occur in the uhf region with remarkable intensity, 2×10^{-7} cm^{-1}. Because of the possibility of observing deuteron quadrupole structure and of the novelty of working at such low frequencies, we have searched for this line.

Since the predicted frequency lay below the cutoff of our $1\frac{1}{2}$-in.$\times$3-in.$\times$20-ft wave-guide absorption cell, it was necessary to devise a method whereby the cell could operate in its TEM mode. The rf power, supplied by a 6AF4 triode in a Mallory TV-101 television converter, and the 5000-cps square-wave generator were both connected to the Stark septum through a matching and decoupling network near one end of the cell. At the other end was connected a crystal detector with a special adapter which effected capacitative coupling to the Stark septum through the mica window. The crystal detector was connected to a tuned amplifier and phase-sensitive detector in the conventional manner. With this equipment the line was found.

The measured frequency is given in the first line of Table I. Also contained in Table I are revised values of the frequencies of the three Q-branch and one P-branch S-band lines which we have reported previously.[2]

The constants of the centrifugal distortion formula for Q-branch transitions due to Kivelson and Wilson[3] were adjusted to obtain the best fit with the three S-band lines and six higher-frequency lines.[4–7] The calculated frequencies using the parameters $(a-c)/2=8.4895$ cm^{-1} and $\kappa=-0.6830$ are given in the last column of Table I. It is to be noted that the agreement is excellent.

TABLE I. Observed low-frequency lines of HDO.

Transition $(J_\tau \rightarrow J_{\tau'})$	Measured frequency (Mc/sec)	Calculated frequency (Mc/sec)
$3_2 \rightarrow 3_3$	824.64 ±0.05	824.61
$6_1 \rightarrow 6_2$	2394.56 ±0.05	2394.5
$4_0 \rightarrow 5_{-5}$	2887.4 ±0.1	
$12_{-1} \rightarrow 12_0$	2961 ±1	2963
$9_0 \rightarrow 9_1$	3044.71 ±0.10	3043.5

Satellite lines 30 kc/sec on either side of the main $3_2 \rightarrow 3_3$ line were partially resolved. The satellites are undoubtedly due to the deuteron quadrupole hyperfine structure. They will be studied for obtaining values of the coupling constants.

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Quadrupole Coupling of the Deuteron in DCCCl and DCN*

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THE $J=1\rightarrow2$ transition of deuterated chloroacetylene has been studied with a high-resolution bridge spectrometer.[1] DCCCl is a linear molecule containing two nuclei with quadrupole moments. The spectrum of this compound at lower resolution has been described in the literature,[2] as has the procedures for treating the two-quadrupole molecule.[3] For the $F_1=\frac{1}{2}\rightarrow\frac{1}{2}$ transition, where $F_1=J+I_{Cl}$, it can be calculated that no splitting caused by the deuteron quadrupole moment would be expected, whereas for the $F_1=\frac{3}{2}\rightarrow\frac{3}{2}$ transition the splitting should be most easily observed. Recorder traces of these lines were obtained, from which it was ascertained that $(eqQ)_D=+175\pm20$ kc/sec. The pattern is not symmetric, so ths sign of the coupling is unambiguously determined. A more detailed description of the experimental evidence and its interpretation will be published in the near future.

The investigation reported above was suggested by line broadening in DCN observed while studying asymmetries of the nitrogen quadrupole coupling in HCN and DCN. Line widths of 50 kc/sec could be obtained for HCN, while DCN produced lines of 70 kc/sec width under the same conditions of temperature, pressure, and power. From the line broadening a value $(eqQ)_D=300$ kc/sec±150 was inferred. The large uncertainty is caused primarily by the circumstance that the transition involved, being $\Delta J=0$, is most unfavorable for the quadrupole coupling investigation. Accordingly, the molecule DCCCl described above, with the same bond structure and a more favorable transition was examined.

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Measurement of Permeability Tensor in Ferrites*

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A NUMBER of investigators have measured the imaginary component of the magnetic permeability in ferromagnetic semiconductors.[1] The usual method has been to introduce a small ferrite sample into a microwave cavity and to note the resulting perturbing effect on the cavity Q upon application of a dc mag-