

unit described here, this loss is balanced by fixing a small adjustable shutter on to the cell which reflects and scatters the least amount of radiation.

Preliminary experiments have been carried out using a single-beam Grubb Parsons S.3 infra-red spectrometer. This instrument employs a chopping frequency of $16\frac{2}{3}$ c./s., and the sample and blank cells were rotated in the normal cell-holder at a speed of 500 r./m., the cell-holder being dynamically balanced by suitable counter-weights. (Since the radiation beam passed twice through each cell during one revolution, a speed of 500 r./m. or $8\frac{1}{2}$ r./s. produced a chopping frequency of $16\frac{2}{3}$ r./s.) A governor-controlled a.c. gramophone motor was suitably geared to drive the cell-turret and, by accurate adjustment of the motor speed, it was possible to produce a beam alternation frequency equal to that of the band-pass maximum of the amplifier.

Fig. 1 shows part of the absorption spectrum of a sheet of polystyrene (0.03 mm. thick) when examined by the single-beam method. Fig. 2 shows the absorption spectrum of the same material when examined by means of the rotating-cell unit. In order to demonstrate the removal of absorption due to atmospheric carbon dioxide and water, the instrument case was not dried out during the examination of these spectra.

During the examination of the polystyrene spectrum obtained by both methods, the spectrometer slits were opened continuously by means of a small synchronous motor unit. A device is at present under construction which will enable the S.3 spectrometer to produce a record directly on a linear wave-length scale. By means of this device and a slit-drive mechanism similar to that described by Cannon¹, it is hoped to be able to record absorption spectra directly from a spectrometer fitted with the rotating-cell unit.

It should be pointed out that, although this double-beam unit may not prove to be as efficient as some of those discussed by Oetjen and Roess², the rotating-cell unit is very simply constructed and requires no extra optical components.

Full details of this double-beam system will be published elsewhere at a later date.

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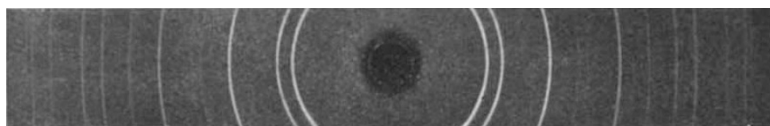
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¹ Cannon, C. G., *J. Sci. Instr.*, **23**, 50 (1952).

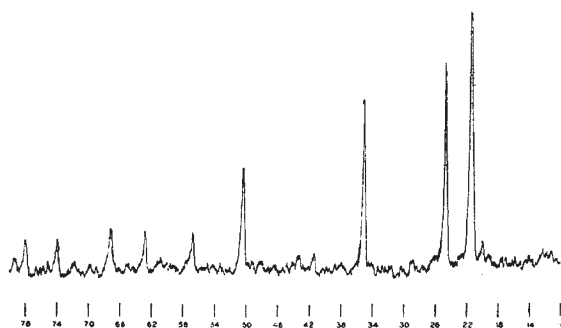
² Oetjen, R. A., and Roess, L. C., *J. Opt. Soc. Amer.*, **41**, 203 (1951).

X-Ray Diffraction Pattern of Ammonium Fluoferrate

In the course of an investigation of the adsorption of phosphate ion from solution by sesquioxides, X-ray diffraction methods were used in the identification of ammonium fluoferrate, $(\text{NH}_4)_3\text{FeF}_6$. Although it has been established¹ that the compound consists of isotropic crystals with a lattice constant a_0 of 9.10 Å., a table of d spacings has apparently not been published.



(a)



(b)

X-Ray diffraction patterns of ammonium fluoferrate. (a) Powder camera. (b) Spectrometer

A sample of ammonium fluoferrate was prepared and its composition verified by chemical analysis. X-ray diffraction patterns were obtained using both powder camera and spectrometer. A Philips Norelco X-ray diffraction apparatus was used with iron radiation ($\lambda = 1.932$ Å.) and manganese filter. These patterns are reproduced herewith, and the d spacings and line intensities obtained from them are given in the accompanying table. The complete list of

X-RAY DIFFRACTION DATA FOR AMMONIUM FLUOFERRATE

d (in Å.) (exp.)	I/I_0	hkl	d (in Å.) (calc.)	d (in Å.) (exp.)	I/I_0	hkl	d (in Å.) (calc.)
5.28	100	111	5.25	1.39	10	533	1.39
4.57	61	200	4.55	1.37	5	622	1.37
3.23	45	220	3.22	1.31	5	444	1.31
2.75	6	311	2.74	1.27	10	711	1.27
2.64	8	222	2.63	1.26	5	640	1.26
2.28	29	400	2.28	1.22	15	642	1.22
2.04	11	420	2.04	1.18	5	731, 553	1.18
1.86	16	422	1.86	1.10	5	820, 644	1.10
1.75	14	333, 511	1.75	1.07	10	822, 660	1.07
1.61	9	440	1.61	1.05	5	751, 555	1.05
1.54	9	531	1.54	1.02	5	840	1.02
1.52	6	600, 442	1.52	0.998	10	753	0.999
1.44	5	620	1.44				

d spacings are from the powder patterns (average of five values), which checked well with the spectrometer recordings. The I/I_0 values were obtained from the spectrometer pattern for the lines down to and including d spacings of 1.44 Å. For d spacings less than 1.44 Å. the intensities were estimated from the camera patterns. Using the d spacings shown and Pauling's a_0 value of 9.10 Å., hkl values were calculated for each line, and are shown in the table. Theoretical d spacings were calculated from these hkl figures and $a_0 = 9.10$ Å., and are included for comparison with experimental results.

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¹ Pauling, L., *J. Amer. Chem. Soc.*, **46**, 2738 (1924).