a drop increases linearly with time. Actually the area is proportional to the two-thirds power of the time.

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An Infra-Red Band System of SrO

THE infra-red band spectrum of strontium oxide has been investigated with the 21-ft. grating at this Institute. The dispersion in the region in question is about $1 \cdot 0$ A./mm. The preliminary results of the vibrational and rotational analyses are given below.

Heads belonging to the infra-red spectrum of SrO have previously been measured by Meggers[1] and Mahla[2]. The former made no analysis; the latter made both vibrational and rotational analyses of a $^1\Sigma$—$^1\Sigma$ transition. His vibrational analysis is, however, not convincing; on the other hand, his rotational analysis seems at first sight to be correct.

We have arranged some of the infra-red bands, forming a $^1\Sigma$—$^1\Sigma$ transition in the following way. The wave-numbers are given, with the wave-lengths in brackets.

	0	1	2	3
2	$12106 \cdot 42$ (8257·82)	$11461 \cdot 5$ (8722·5)		
1	$11491 \cdot 07$ (8700·02)		$9578 \cdot 6$ (10437·1)	
0	$10871 \cdot 53$ (9195·82)	$10226 \cdot 18$ (9776·15)	$9588 \; 6$ (10426·2)	

(intervals: between 2,0 and 1,0: 615·35; between 1,0 and 0,0: 619·54; between 2,0 and 2,1: 644·92; between 0,0 and 0,1: 645·35; between 0,1 and 0,2: 637·58)

The equation for the band heads is as follows :

$$\nu_h = 10885 \cdot 5 + 623 \cdot 8 \; (v' + \tfrac{1}{2}) - 2 \cdot 1 \; (v' + \tfrac{1}{2})^2 - 652 \cdot 7 \; (v'' + \tfrac{1}{2}) + 3 \cdot 8 \; (v'' + \tfrac{1}{2})^2.$$

The vibrational frequency $652 \cdot 7$ cm.$^{-1}$ for the lower state agrees very well with that for the lower state of the blue SrO bands, which were treated by Mecke and Guillery[3] and Mahanti[4]. From measurements of the heads of the bands, Mecke and Guillery obtained $\omega'' = 648$ cm.$^{-1}$, Mahanti $653 \cdot 47$ cm.$^{-1}$.

Mahla made a rotational analysis of the bands at 8258 and 8700 A., and he considered them to be 0,2 and 0,3 transitions, respectively. There are some perturbations in the bands. Mahla thought that the lower levels are perturbed. He assumed that the occurrence of these perturbations confirmed the correctness of his rotational analysis. It is, however, possible to alter the J-numbering. We consider that the bands represent the 2,0 and 1,0 transitions, and that some of the upper rotational levels are perturbed, not the lower ones. Our interpretation only requires that the J-numbering of the R-branch be decreased and the J-numbering of the P-branch increased by one unit.

Further, we have made rotational analyses of the bands at 9196 and 9776 A. The analyses show that the former band has the same lower state as the bands at 8258 and 8700 A., and that the bands at 9196 and 9776 A. have their upper state in common. The 9196-band represents the 0,0 transition, the 9776-band the 0,1 transition. Thus, our rotational analysis shows that our arrangement of the bands is quite correct. The analysis of the two last-mentioned bands was very difficult as the upper rotational levels were unusually strongly perturbed. The preliminary band constants are as follows :

$B'_0 = 0 \; 303$	$B''_0 = 0 \; 336_8$
$B'_1 = 0 \cdot 302_9$	$B''_1 = 0 \cdot 334_7$
$B'_2 = 0 \cdot 302_1$	
$r'_e = 2 \cdot 02$A.	$r''_e = 1 \cdot 92$A.

Especially below about 8000 A. there are a lot of band-heads in the spectrum indicating several band-systems. A more detailed paper on this investigation will appear in Arkiv för Fysik. In a later paper we will return to the blue bands, and the remaining infra-red ones.

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March 31.

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Red Bands of MgO

MAGNESIUM oxide has two well-known singlet systems, a green one and a red one. Vibrational analyses were made by Mahanti in 1932 [1]. Rotational analysis of the red bands was carried out by Mahanti in 1935 [2], of the green bands by one of us in 1943 [3]. Measurements of the heads of the bands show that the vibrational constants for the upper levels are almost equal. Thus it seems likely that the systems have the same upper level; the rotational analysis gave, however, different values of B for the upper levels. It seemed, therefore, of interest to repeat the rotational analysis of the red bands. The preliminary results are given here.

Mahanti stated that the red system is a $^1\Sigma - {}^1\Sigma$ transition. Our plates, however, show distinctly the presence of a Q-branch. The rotational analysis shows that the red and green bands have a common upper level. Thus Mahanti's analysis is incorrect.

The band constants calculated by us for the red bands are as follows (rotational analyses made of the 2,0, 1,0, 0,0, 0,1 and 0,2 bands) :

$B_2' = 0 \cdot 570_8$ cm.$^{-1}$	$B_2'' = 0 \cdot 493_9$ cm.$^{-1}$
$B_1' = 0 \cdot 575_4$	$B_1'' = 0 \cdot 498_6$
$B_0' = 0 \cdot 579_9$	$B_0'' = 0 \cdot 503_4$
$r_e' = 1 \cdot 737 \times 10^{-8}$ cm.	$r_e'' = 1 \cdot 864 \times 10^{-8}$ cm.
$D' = 1 \cdot 14 \times 10^{-6}$ cm.$^{-1}$	$D'' = 1 \cdot 18 \times 10^{-6}$ cm.$^{-1}$

The rotational analysis of the green bands (Lagerqvist[3]) was only made of the 0,0 and 1,1 bands. The heads are formed by about twenty P-lines. After the turn of the P-branch at the head the J-numbering of the P-lines ought to be altered by one unit; in the 0,0 band the first resolved P-line after the head is $P(78)$ not $P(79)$, in the 1,1 band $P(73)$ instead of $P(74)$. The rotational analysis of the green bands,