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ROTATIONAL TEMPERATURE ESTIMATED FROM (0,0) BAND OF $B^1\Sigma-X^1\Sigma$ SYSTEM OF MgO

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ABSTRACT

Rotational structure of (0,0) band of $B^1\Sigma-X^1\Sigma$ system of MgO molecule in the green region was photographed in the first order of a 10.6 m concave grating spectrograph. Excitation of MgO molecule was purely thermal. Intensity distribution amongst the well resolved rotational lines of P and R branches were recorded and rotational temperature estimated was 5644 ± 152 oK.

Introduction:

MgO molecule is known for its astrophysical significance as its bands are found in sunspots [1]. The details of the electronic states can be seen in Huber and Herzberg [2]. Vibrational intensity measurements of this system were reported by Dubey [3]. He estimated the vibrational temperature as 6370 ± 300 oK. Since there is no report on rotational temperature measurements, present work is taken up. Prior to

these studies, vibrational temperatures of C-X, D-X & F-X systems of LaO were also reported by Behere and Bhartiya [4].

Theory:

The intensity of the spectral line in emission is given by the expression [5]

$$I_{em} = (C_{em} v^4 / Q) (J+J'+1) \exp(-B_v J'(J'+1)hc/KT) \quad (1)$$

Where C_{em} is a constant which depends on the change in the dipole moment and the total number of molecules in the initial level.

Taking logarithms of the above equation

$$\log \{ I_{em} / (J' + J'' + 1) \} = A - B_v J' (J' + 1) hc / KT \text{ ----(2)}$$

Where $A = \log (C_{em} v^4 / Q_r)$

When lines with high J values are considered for intensity measurements then the expression $B_v J' (J' + 1)$ in the above equation 2 needs to be replaced by $F'(J)$, because in such cases Dv correction becomes important. The plot of LHS of equation 2 versus $J' (J' + 1)$ gives a straight line whose slope is $B_v hc / KT$. Knowing all the other quantities T can be estimated.

Experimental:

Green system of MgO was photographed in the first order of the 10.6 mtr. concave grating spectrograph with plate factor of 0.747 Å/mm. Mg ribbon burning in air was used as source, so that the excitation of MgO molecule is purely thermal. The bluish white glow was focussed on the slit with the help of a convex lens. Slit width was kept at 20 µm. Exposure of 10 to 15 minutes was required to record the (0,0) sequence of B-X system. Rapid process Ilford plates and Orwo films were used to record the spectra. Due care was taken to ensure that the exposure falls in the normal region of the H-D curve [6]. Plates were processed with fine grain developer. Since the (0,0) band of B-X system of MgO, under study, cover a wavelength region within 25 Å, techniques of homochromatic photometry was used to determine the intensity measurements. A

Carl Zeiss/Jena MD 100 densitometer was used to record the intensity distributions amongst the rotational lines. The procedure of Herbert and Tye [7] was followed in extrapolating the intensity contours of the rotational lines. The areas of the profiles of the rotational lines were measured with the help of the digital planimeter with an accuracy better than 10-2 cm². Average value of each of the line was employed to calculate the rotational temperature.

Rotational Temperature:

Rotational structure of (0,0) band of B-X system obtained is similar to that of Lagerqvist and Uhler [8]. J numbering obtained from them was transferred on to the densitometric charts. Relative intensities were measured. Overlapped lines and the lines beyond 25 Å were excluded from the measurements. The graph of LHS of equation 2 versus $J''(J''-1)$ Or $F'(J)$ were plotted. They are as shown in figures 1-2. The slopes of these graphs were obtained from the regression outputs and the rotational temperature thus calculated are shown in table 1. The average rotational temperature estimated is 5644±152 oK

Results and Discussion:

The vibrational temperature estimated by Dubey (6370±300 oK) is slightly higher than the rotational temperature reported in this paper because he excited the molecule in a dc arc, while here the excitation is purely thermal.

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Figure 1: Graph showing $\text{Log} \{ I_{em} / J'' \}$ versus $J''(J''-1)$ for P branch lines of (0,0) band of MgO.

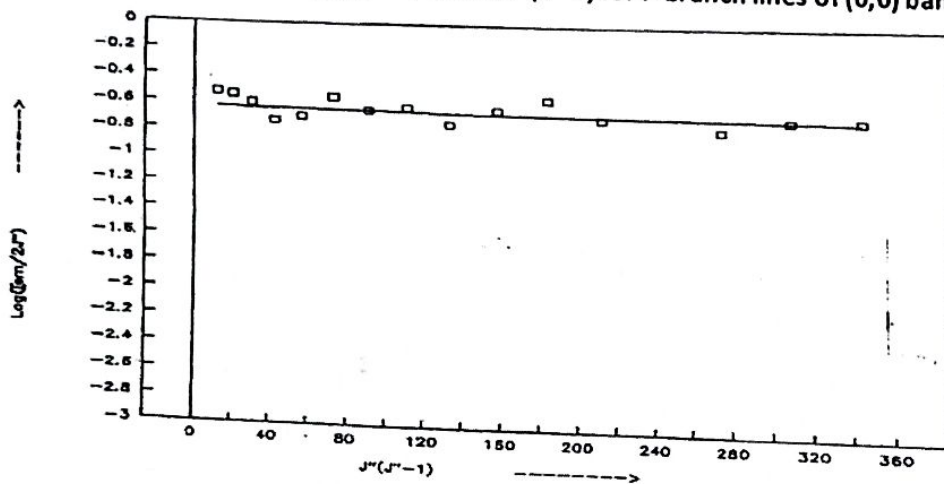


Figure 2: Graph showing $\text{Log} \{ I_{em} / [2(J''+1)] \}$ versus $F'(J)$ for R branch lines of (0,0) band of MgO.

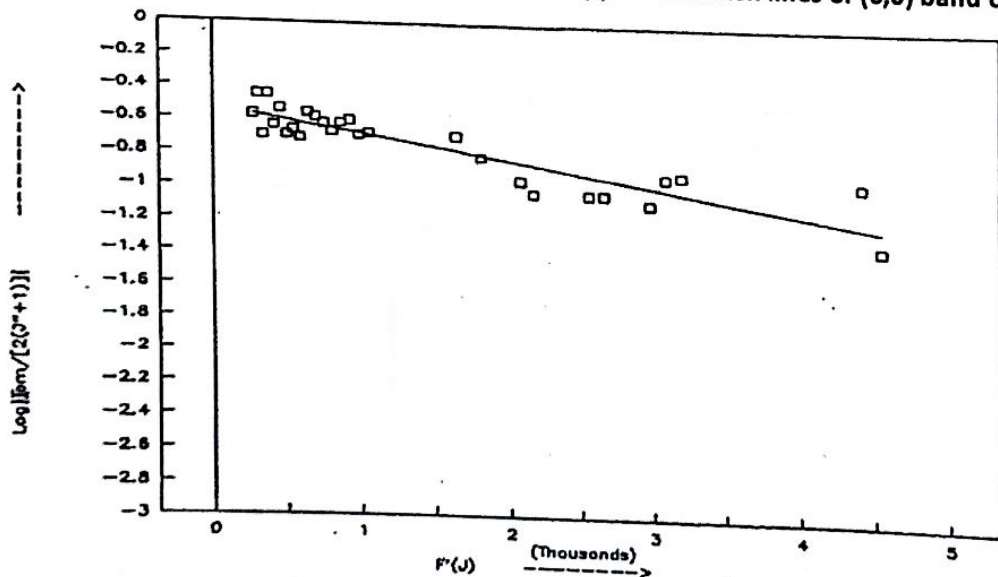


Table 1 : Rotational Temperature of MgO.

Transition	Band	Branch	No. of lines	Slope	Temperature °K
$B^1\Sigma-X^1\Sigma$	(0,0)	P	15	-0.00014	5960
		R	28	-0.00027	5328
		Average Temperature =			5644±152

References :-

- [1] Sinha K, Proc. Astro. Soc. 9, 32 (1991); Babcock H D, Astrophysical J. 102, 154, (1945); Murthy P S, Solar Physics, 63, 83, (1979)
- [2] Huber K P and Herzberg G, Constants of diatomic molecules, IV, Van Nostrand Reinhold Company, New York, (1979).
- [3] Dubey P, Ind. J. of Pure and App. Phys., 11, 445, (1973).
- [4] Behere S H and Bhartiya J B, J. of Phys. B, Atomic Molecular and Opt. Phys, 24, 4505, (1991); Behere S H and Bhartiya J B, J. Quant. Spectros. Rad. Trans., 49, 449 (1993).
- [5] Herzberg G, Spectra of diatomic molecules, Van Nostrand Reinhold Company, New York, (1950).
- [6] Harrison G R, Lord R C, Loofbourow J R, Practical Spectroscopy, McGraw Hill Publications, New York, (1948).
- [7] Herbert G R and Tyte D C, Proc. Phys. Soc., 83, 629, (1964).
- [8] Lagerqvist A and Uhler U, Ark. Fys., 1,459, (1949).