

## LASER PRODUCED SPECTRUM OF ZINC MOLECULE

R. GOPAL, *Laser and Spectroscopy Lab., Physics Department, University of Allahabad, Allahabad - 211 002 India.*

Laser produced spectrum of zinc molecule has been obtained focusing second harmonic of a Nd: YAG laser (532nm, 35mJ) on the rotating (speed 1 rpm) zinc target rod inside the ablation chamber using computer controlled Spex Triax 320M monochromator fitted with TE cooled ICCD system. The emission spectra of the laser-produced plasma radiation of Zn<sub>2</sub> molecule has been recorded in the spectral region 340 - 520 nm using a grating with 1200 grs/mm and in the region 550 - 800 nm using 600 grs/mm grating in gated mode of ICCD.

About 150 new bands have been recorded which consists of three maxima reported by Hamada (1931) and Winans (1931) lying at 368 nm, 378.7 nm and 445 nm. All these bands have been assigned to three new band systems C - X, B - X and A - X lying in the spectral ranges 365 - 400 nm, 405 - 440 nm, and 440 - 480 nm respectively.

Molecular constants determined are:

C - X	$21739.1 = {}_{00} \mathcal{V} \text{ cm}^{-1}$	$e' = 241.08,$	$e'xe' = 2.185$
B - X	$23816.2 = {}_{00} \mathcal{V} \text{ cm}^{-1}$	$e' = 146.7 \text{ cm}^{-1},$	$e'xe' = 0.85 \text{ cm}^{-1}$
A - X	$26642.5 = {}_{00} \mathcal{V} \text{ cm}^{-1}$	$e' = 163.95 \text{ cm}^{-1},$	$e'xe' = 1.825 \text{ cm}^{-1}$
X		$e'' = 211.66,$	$e''xe'' = 1.095$

The electronic state  ${}^1\Sigma_g^+$  can be assigned to the ground state of Zn<sub>2</sub> as theoretically calculated by Bender et.al. (1979).

1. H. Hamada, *Philos. Mag.*, 12, 50 (1931)
2. J.G. Winans, *Phys. Rev.*, 37, 902 (1931)
3. C.F. Bender et. al., *J. Chem. Phys.* 71, 1122 (1979)