<table>
<thead>
<tr>
<th>$C_d$ from cathodic polarisation (μF/cm²)</th>
<th>$C_a$ from anodic polarisation (μF/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) curve fitting</td>
<td>86.71</td>
</tr>
<tr>
<td>(ii) From $\eta_{\text{max}}$ and $t_{\text{max}}$ using eqs. (3) and (4))</td>
<td>89.78</td>
</tr>
<tr>
<td></td>
<td>93.56</td>
</tr>
<tr>
<td></td>
<td>91.80</td>
</tr>
</tbody>
</table>

**Table 2** Double-layer capacitance ($C_d$) for the system, MS in 1N H₂SO₄ (deoxygenated) by the exponential linear relaxation method ($t = 1$ m sec)

**ETHYNYL BENZENE: THE NEAR ULTRAVIOLET EMISSION SPECTRUM**

M. A. SHASHIDHAR, N. H. AYACHIT and K. SURYANARAYANA RAO
Department of Physics, Karnatak University, Dharwad 580 003, India.

Emission spectra of polyatomic molecules, especially of aromatic hydrocarbons are very difficult to record. There is every probability of their dissociation before the excitation of the molecules takes place. It is also believed that generally the emission spectrum of a molecule yields more information of the ground electronic state than its absorption spectrum. With this in view an attempt was made to record and analyze the emission spectrum of ethynylbenzene.

The 2790 Å electronic absorption spectrum of ethynylbenzene in vapour phase has been studied earlier, under medium resolution and detailed work on this electronic spectrum was also carried out. A detailed vibrational analysis of infrared and Raman spectra of this molecule has also been reported by King and Soo who also attempted to record the emission spectrum of this molecule using different techniques of excitation but were not successful. The present authors could record the emission spectrum of ethynylbenzene as explained below and in present note are given details of the investigation.

The excitation of the molecule was brought about by an uncondensed transformer discharge through the flowing vapour of the substance contained in a bulb attached to the conventional pyrex glass tube. The whitish blue discharge was maintained by controlling the output of the transformer at about 3000 volts. The substance used in the investigation was supplied by Light Chemical Company. The spectrum was photographed on Ilford R-40 plates using an Hilger medium quartz spectrograph with a slit width 0.03 mm. The spectra were recorded with different exposure times ranging from 5–10 hr. For comparison the near ultraviolet absorption spectrum of the ethynylbenzene in vapour phase was also recorded on the same spectrometer. The accuracy of measurements of the position of the bands is slightly better than ± 5 cm⁻¹.

The emission spectrum spreads in the region 2715 Å–3095 Å with a weak continuous background. The bands are sharp and degraded to the red. The emission spectrum observed here corresponds to the electronic transition $^1B_2 \leftrightarrow ^1A_1$ under the $C_{2v}$ symmetry of the molecule. A comparison of the emission spectrum

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obtained in the present investigation with the near ultraviolet absorption spectrum of ethynylbenzene vapour, has shown that the two are parts of the same band system thus confirming that the emitter of the emission bands is ethynylbenzene only. The 35880 cm\(^{-1}\) band has been chosen as the 0,0 band of the system which agrees well with the position 35879 cm\(^{-1}\) obtained in the absorption spectrum\(^3\).

The positions of the emission bands of 2790 Å system of ethynylbenzene along with their probable assignment are given in table 1 together with the corresponding fundamentals obtained in the electronic absorption and infrared/Raman spectra.

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21 April 1986

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