

tion is left only with the solitary source Assam, which can meet nearly 10 per cent. of the country's petrol demand. For the rest of her consumption, India to-day has to import the supplies mainly from the neighbouring countries, namely Burma, Iran, Iraq, Bahrein Islands, etc. Recently the Government of India has invited foreign oil experts for consultations to set up oil refineries along the Indian coast and manufacture synthetic petrol from the existing grades of Indian coals by the well-known Fischer-Tropsch method. It is, therefore, all the more necessary that large-scale oil prospecting in Kangra Valley should be carried out by the Government of India and a number of oil wells be drilled after successful oil prospecting has been completed by the oil experts.

The authors take this opportunity of thanking Principal Narinjan Singh, Head of the Department of Chemistry, East Punjab University, for procuring us a sample of gas from the temple for analysis.

Physical Laboratory, MOHAN LAL KHANNA,  
S.I.R., Delhi,

and Chemistry Dept., Inder Sain Gupta,  
East Punjab Uni.,

Delhi,  
May 20, 1949.

1. Evans, E. A., "Lubricating and Allied Oils," Chapman and Hall Ltd., London, third edition, 1945, p. 2.
2. Pinfold, E. S., "The Science of Petroleum," Oxford University Press, London, 1938, 1, 138.

#### EMISSION SPECTRA OF THE MANGANESE HALIDES

In a previous paper,<sup>1</sup> the author reported a system of bands of MnCl in emission in the region  $\lambda$  3900- $\lambda$  3500. On the analogy of the interpretation of the MnF bands by Rochester and Olsson,<sup>2</sup> the above system was considered as due to a  ${}^1\pi-{}^1\Sigma$  transition. But on account of the complex structure and abnormal intensity distribution among the heads, a transition  ${}^7\pi-{}^7\Sigma$  (rather than  ${}^1\pi-{}^1\Sigma$  as considered by Muller<sup>3</sup>) involving high multiplicity terms was suggested as perhaps more probable. While the analysis on this basis was in progress, Bacher<sup>4</sup> published a paper on the structure of the Mn halide bands, attributing them to the transition  ${}^7\pi-{}^7\Sigma$ . In MnCl, Bacher's analysis could be complete only

for the  $\Delta v=0$  sequence; the bands are obtained in absorption. The author has since confirmed the scheme and extended it to the remaining sequences  $\Delta v=\pm 1, \pm 2, \pm 3$ , which he could obtain with a fairly good intensity in emission. A similar analysis of the MnBr bands corresponding to the higher sequence  $\Delta v=+1$  is also obtained.

Details of the work have been communicated recently for publication in the *Indian Journal of Physics*.

Andhra University, P. TIRUVENGANNA RAO,  
Waltair,  
April 5, 1949.

1. Tiruvenganna Rao, *Curr. Sci.*, 1948, 17, 209; —, *Ind. Jour. Phy.* (in press).
2. Rochester and Olsson, *Zeit. f. Physik.*, 1939, 114, 495.
3. Muller, *Helv. Phy. Acta.*, 1943, 16, 1.
4. Bacher, *Ibid.*, 1948, 21, 379.

#### THE BAND SPECTRUM OF TiCl

In the course of extensive investigations in our laboratory on the complex band spectra of diatomic molecules notably the halides of the transition group of elements, the band spectrum of TiCl is investigated. A characteristic spectrum is obtained by running a transformer discharge through TiCl vapour. Two systems are photographed in the regions— $\lambda$ 4209-3702, comprising in all of five groups. The first system was partially analysed by More and Parker. The two systems have a common ground state. The transitions may be  ${}^4\pi-{}^4\Sigma$  and  ${}^4\Sigma-{}^4\Sigma$  for the less and more refrangible systems respectively. The following are the approximate vibrational constants:

	$\omega_e'$	$x_e'\omega_e'$	$\omega_e''$	$x_e''\omega_e''$
System I	534	1.5	455	3.8
System II	474	4.4	455	3.8

Details of the analysis will be published shortly elsewhere.

V. RAMAKRISHNA RAO.

Department of Physics,  
Andhra University,  
May 28, 1949.

#### A STUDY OF THE SCATTERING OF LIGHT IN NORMAL URINES

In a note<sup>1</sup> in the *Indian Journal of Physics*, S. Ranganathan reported results of depolarisation measurements of light scattered transversely in samples of normal