many obstacles placed in its way had to be removed, before industries envisaged to employ it in their laboratories. The result was that the method was resorted to only by some untiring research scientists on a purely scientific level, whilst the overwhelming majority of chemists practically disregarded so promising a method.

> "One can see, it is a wearisome and time-wasting process which in addition requires special instruments and training. It will therefore be applied on rare occasions only."

Thus wrote H. KAYSER in 1910 in his *Manual* of Spectroscopy. His verdict on the quantitative analysis is best expressed by the following sentence :

> "When summarising all the investigations discussed, I came to the conclusion that quantitative spectroscopic analysis has proved to be impracticable."

As late as in 1923, DE GRAMONT laments that French chemists have a latent fear of spectral analysis and that there still are instances of prominent physicists even refusing to inform themselves on any kind of spectral analysis, publicly declaring that spectral analysis since the times of KIRCHHOFF and BUNSEN had been a maldevelopment which had made no progress whatsoever from a practical point of view.

Yet, only one year later, F. LOWE drew the attention of his German professional colleagues to "A forgotten method of quantitative spectral analysis" with the result that the quantitative spectro-chemical emission analysis succeeded in finding general introduction in the metal-processing and metal-producing industry here as well as in a few other countries where in some isolated quarters it had proved its worth.

From that time on the development of the spectral analysis is characterised particularly by ever more perfected methods and procedures of investigation. Especially the use of new, highly sensitive radiation detectors (photoelectric cells, thermo couples) in conjunction with efficient amplifying equipment resulted in the design of "photoelectric spectrophotometers" which, for many purposes, provide a direct, and frequently automatically recorded, indication of the intensity of spectral lines or of the quantities of certain elements contained in the tested specimens.

Yet, even apart from the briefly indicated struggle for its practical applicability, the spectral analysis was the subject of eager activity on the part of investigators. As a result of the attempts at interpreting the emission spectrum of the atomic hydrogen the knowledge was arrived at that beyond furnishing the basis for the chemical identification of elements, the spectrum also represents the most striking means of disclosing information about the structure of the atom itself. Thus, after the pioneer work of KIRCHHOFF and BUNSEN, and with the assistance of many investigators not mentioned herein, a bridge has been built reaching from the spectral line to the atomic structure, and across which a road to modern atomic research leads even to this day.—OSWALD SCHIEK, *Veb Carl Zeiss, Jena.*

GROUND STATE OF THE C_2 MOLECULE

MOLECULAR spectroscopists who are familiar with the analysis of the well-known Swan bands ($^3\pi_g - {}^3\pi_u$) of the C_2 molecule have all along considered the $^3\pi_u$ state as the ground state of the molecule. Apart from the main reason for this assignment, *viz.*, that the Swan bands are the easiest to be observed in absorption, there are other reasons also as for example, (*i*) the observation of the Swan bands in emission from comets in which the emission is believed to be dun. me esonance fluorescence experience to contribute firrence of the Swan I.H. Prospect and Retrospeposited in an inert I.H. Surveys, Action of Toxthe observations of spheric Contaminants, Respity (*J. Chem. Phys.*, tory Protection Devices. pate that the $^1\Sigma_u^+$

The chapter on Human Industrial Safety, written by R

state is the ground state for the C_2 molecule, in the gas phase at least. They base their assignment on the rotation vibration analysis of a new band system of the C_2 molecule in the near infra-red, in emission from a carbon furnace. An analysis of the perturbations of two levels involved in this emission band leads to the result that $^1\Sigma_g^+$ state lies below the $^3\pi_u$ state by about 610 cm.$^{-1}$ In this connection it is interesting to note that the Swan bands have never been observed in interstellar space. According to the present observation if C_2 is a constituent of the interstellar medium its presence should be sought by means of band systems involving $^1\Sigma_g^+$ state and not by means of the first lines of the Swan system.