

and careful series of experiment. extending over a period of several years--conducted and repeated on thoroughly scientific lines, by means of physical and chemical methods, the outcome of the combined labours and knowledge of physicists and chemists of the age, which I think we may safely say is the most brilliant, and withal the most accurate that science has ever known.

Lord Rayleigh had previously proved that nitrogen extracted from chemical compounds was about one half per cent. lighter than "atmospheric nitrogen." Thus, the [mean] result for the weights of nitrogen gas in the globe, prepared from the following compounds.--Nitric oxide, nitrous oxide, ammonia nitrite, urea was 2.2990, while that for "atmospheric nitrogen" prepared and purified by the best hitherto known methods was 2.3102. Reduced to standard conditions, their figures give 1.2525 grms of "chemical" nitrogen and 1.2572 grms of "atmospheric" nitrogen per litre. This difference, though small, was quite sufficient to arouse in the mind of Lord Rayleigh the suspicion that "atmospheric nitrogen" was not pure nitrogen.

We may very briefly at this stage consider the details of one method for the preparation of nitrogen, used in these investigations of Lord Rayleigh and Prof. Ramsay: By the ignition of the metal magnesium in nitrogen, a compound of the two is formed, (magnesium nitride) which on subsequent treatment with water yields ammonia. from the latter by many methods the combined nitrogen may be determined.

As magnesium nitride, nitrogen was extracted from the air, then liberated with water and carefully estimated. The result obtained proved that, prepared in this way, nitrogen--which in the first stages of the method of preparation was part of the atmosphere--was practically identical in physical constants with nitrogen from chemical compounds.

It was, therefore, conjectured that nitrogen separated from the atmosphere by all the methods save the one just quoted, was not pure nitrogen. What then was its impurity? In other words, is there not another gaseous constituent in the atmosphere unknown?

We have now stated briefly the grounds for suspecting a hitherto undiscovered constituent in the air. In a review of this character it is