metals investigated. The results, however, are not conclusive. According to the theory advanced by Bohr,* ionisation of an atom can only be said to take place when the disturbing agency causes one or more of the electrons in an atom to be projected out from the permanent electronic system beyond the outermost stationary or non-radiating orbit of the atom. Such displaced electrons in returning to the permanent configuration could emit light of only one wave-length then if the atom possessed but at most one stationary or non-radiating orbit outside the permanent ones. The theory of Bohr, however, hypothecates many of these stationary orbits even for atoms of the simplest structure. It would follow then on this theory that if an atom emits light of but one wave-length it cannot be said to be ionised. The results of the experiments with mercury vapour would indicate that the theory is invalid, for the evidence goes to show that the radiation emitted by the atoms of the vapour was entirely monochromatic, and at the same time it supports the view that under these circumstance the vapour was ionised. The results with zinc are inconclusive. With cadmium, on the other hand, we find that the vapour in the flame emitted light of at least two wave-lengths, and yet the vapour did not appear to be ionised. This result supports Bohr's conception of atomic structure. The results obtained with magnesium vapour, just as those obtained with mercury vapour, are opposed to Bohr's theory, for with this vapour in the flame we obtained ionisation of the vapour and at the same time an emission of radiation of apparently but one wave-length. Finally, the results obtained with thallium vapour neither conclusively support nor definitely tend to invalidate the theory. While the radiation emitted by this vapour in the flame, as observed by us, consisted of light of but two wave-lengths, the collateral evidence available does not altogether support the view that the radiation actually emitted under the circumstances was really confined to light of these wave-lengths. It is possible and likely that radiation also took place in the spectral region beyond that which could be detected by a quartz spectrograph, which was the optical instrument used in this investigation. The fact that ionisation of thallium vapour in the flame was observed cannot therefore conclusively be used for or against Bohr's theory.

6. *Summary of Results.*

1. Mercury vapour which is fed into the flame of a Bunsen burner is ionised, and the radiation from the vapour consists of light of wave-length $\lambda = 2536{\cdot}72$ A.U.

* Bohr, 'Phil. Mag.,' vol. 26, pp. 1, 476, 857 (1913); vol. 27, p. 506 (1914); vol. 30, p. 394 (1915).