was broken up and disappeared, leaving a continuous channelled-space spectrum.

These experiments, made at the Royal Mint, were often prolonged for many hours consecutively. They involved much furnace-work of a peculiarly trying nature; and we have much pleasure in acknowledging the assistance we received from Mr. Edward Rigg, one of the assistant assayers, who conducted many of the tedious manipulations with great skill and patience. We should also mention that the care exercised by Joseph Groves, senior fireman, in the preparation of the furnace and the lime-moulds, contributed in no small measure to the success of the experiments.

It appears to us that these experiments, conducted at the high temperature of the oxyhydrogen flame, go far to support the conclusions which were drawn from the experiments at a lower temperature. First, in passing from the liquid to the most perfect gaseous state, vapours are composed of molecules of different orders of complexity; and second, this complexity is diminished by the dissociating action of heat, each molecular simplification being marked by a distinctive spectrum. There is also an intimate connexion between the facility with which the final stage is reached, the group to which the element belongs, and the place which it occupies in the solar atmosphere.

III. "On the Liquation, Fusibility, and Density of certain Alloys of Silver and Copper." By W. Chandler Roberts, Chemist of the Mint. Communicated by Dr. Percy, F.R.S. Received March 11, 1875.

(Abstract.)

The author states that the most remarkable physical property of silver-copper alloys is a molecular mobility, in virtue of which certain combinations of the constituents of a molten alloy become segregated from the mass, the homogeneous character of which is thereby destroyed. These irregularities of composition have long been known, and reference is made to them in the works of Lazarus Erckern (1650) and of Jars (1774). A very complete memoir was published in 1852 by Levol, who did much towards ascertaining the nature and defining the limits of this molecular mobility. He discovered the important fact that an alloy containing 71·89 per cent. of silver is uniform in composition. Its chemical formula ($Ag_3 Cu_2$) and peculiar structure led him to conclude that all other alloys are mixtures of this, with excess of either metal.

The electric conductivity of these alloys was studied in 1860 by Matthiessen, who doubted the accuracy of Levol's theory, and viewed them as "mechanical mixtures of allotropic modifications of the two metals in each other."

The author then described the experiments he made with a view to determine the melting-points of a series of these alloys. He adopted Deville's determination of the boiling-point of zinc (1040° C.) as the basis of the inquiry, and ascertained, by the method of mixtures, the mean specific heat of a mass of wrought iron between 0° C. and the melting-point of silver, which, as Becquerel showed, is the same as the boiling-point of zinc.

The mean of three experiments, which were closely in accordance, gave 0·15693 as the specific heat; and it should be pointed out that this number includes and neutralizes several errors which would affect the accuracy of the subsequent determinations.

The melting-points of several alloys were then determined by plunging an iron cylinder into them and transferring the iron to a calorimeter. These melting-points varied from 840° C. to 1330° C., or through a range of 490° C. The alloys which occupy the lowest portion of the curve contain from 60 to 70 per cent. of silver. The results are interesting, as they show that the curves of fusibility and electric conductivity are very similar.

The author states that, in studying the phenomena of liquation, the alloys were cast in red-hot moulds of firebrick in which the metal (about 50 oz.) could be slowly and uniformly cooled. The results showed that the homogeneity of Levol's alloy is slightly disturbed by this method of casting; and, on the other hand, that alloys which contain more than 71·89 per cent. of silver hardly show signs of rearrangement when the solidification is gradually effected. Two alloys were examined, which contained 63 and 33·3 per cent. of silver respectively. Both were found to be far from homogeneous. In the case of the former the arrangement was influenced by gravity, the base of the casting being rich in silver.

The density of pure silver and of Levol's homogeneous alloy while in the fluid state were then determined by the method described by Mr. Robert Mallet*, the metals being cast in conical vessels of wrought iron. The results obtained were as follows:—

	Density fluid.	Density solid.
Pure silver.....	9·4612	10·57
Levol's alloy	9·0554	9·9045

In the case of silver, the mean linear expansion deduced from this change of density is ·00003721 per 1° C., which is nearly double the coefficient at temperatures below 100° C.

The Society then adjourned over the Easter Recess, to Thursday, April 8.

* *Vide suprà*, p. 209.