

SnCl_2 . Again, silica (as has been shown by Mendelejeff long before Henry) certainly has a more complicated molecular formula than SiO_2 , say $n\text{SiO}_2$, otherwise it would be a gas, analogous to CO_2 , for SiCl_4 boils at 57° and CCl_4 at 76° . But would it be reasonable to say that the SiO_2 molecules are held together by the fifth valency of Si?

The only satisfactory answer to the above question is that in molecules R_2Cl_6 the two RCl_3 groups are held together by their own—let us say residual—affinity.

I think that the study of the question touched in the above lines will greatly add to the development of our theoretical ideas in chemistry, and deserves the careful attention of chemists.

B. BRAUNER.

Bohemian University, Prague, January 8.

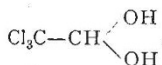
IN my letter, referred to by Dr. Brauner, I considered only the molecular formulæ of the chlorides, as indicated by the experimental results.

Dr. Brauner has now, in his interesting letter, enlarged the field of discussion by introducing the question of the constitutional formulæ of these compounds, involving the vexed question of the valency of the elements. Dr. Brauner points out the importance of the proof of the trivalency of these metals in their chlorides when in the gaseous state at high temperatures, and he then discusses the valency of the metals when their chlorides have the formula R_2Cl_6 .

Although I am inclined to believe that the views expressed by Dr. Brauner may eventually prove to be correct, yet I cannot help thinking that we are not yet in a position to speak with certainty on one or two points. Dr. Brauner states that the number of "bonds" by which the atoms of the metal in the compounds R_2Cl_6 are united is certainly not *one*, and again, that Sn_2Cl_4 cannot be expressed by the formula $\text{Cl}_2\text{Sn}^{\text{III}}-\text{Sn}^{\text{III}}\text{Cl}_2$. But is this quite certain? Indium, the metal next to tin in the seventh horizontal series, is mono-, di-, and tri-valent in the compounds InCl , InCl_2 , InCl_3 ; is it, then, quite unwarrantable to assume that tin is di-, tri-, and tetra-valent in the compounds SnCl_2 , Sn_2Cl_4 , SnCl_4 ?

As regards silica, $n\text{SiO}_2$, the properties of the compound seem to indicate that n is a large number, and here, unless we arrange the Si atoms in a ring, like the carbon atoms in benzene, we must probably look on the compound as "molecular."

It is difficult to find experimental evidence which bears directly on the question; perhaps such results as those obtained by Dr. Ramsay and myself on the dynamical and statical methods of measuring vapour-pressures may throw some light on the matter. We find that the two methods give identical results with ammonium chloride, nitrogen peroxide, and acetic acid, just as they do with all stable solids and liquids, but very different results with all the other dissociating substances examined. This appears to indicate some difference in the molecular arrangement of the two groups of compounds, but it is quite uncertain whether the difference is one between "molecular" and "atomic" compounds, or between compounds formed in a very simple manner, such as $2\text{O}_2\text{N}=\text{O}_2\text{N}-\text{NO}_2$, and those in which there is a breaking down of a stable molecule, as in the case of chloral hydrate, $\text{Cl}_3\text{C}-\text{C}\begin{smallmatrix} \text{H} \\ \diagup \\ \text{O} \end{smallmatrix} + \text{H.OH} =$



I am at present engaged in a study of the vapour pressures of halogen compounds by both methods, and it is just possible that some further light may be thrown on this question by the results of the investigation.

SYDNEY YOUNG.

University College, Bristol, January 15.

Remarkable Rime and Mist.

YOU have a letter in NATURE of January 17 (p. 270), signed "Annie Ley," which induces me to add the following:—We had here on January 6 an extraordinary rime formed at a temperature varying between 21.5° and 25.7° (1° warmer on the grass than at 4 feet), the air being almost calm. This rime increased in thickness and in length with the height above the ground. The length measured of the deposit on a birch-tree at 5 feet was $\frac{1}{8}$ of an inch; at 10 feet, 1 inch; at 15 feet,

$1\frac{1}{4}$ inch; and at 25 feet, $1\frac{1}{2}$ inch. The hoar was nearly horizontal, pointing downwards at an angle of 15° . That deposited on the grass, however, was perpendicular, rising with a thin stem and having a large funnel-shaped head. Suddenly, at 10 a.m. of the 7th (next morning), the whole of the rime (still frozen) fell to the ground, and under the birch-tree of 30 feet in height and 18 feet across (sparse of branches, and none for 10 feet), the fallen rime covered the ground to the depth of rather more than 2 inches, and this, when melted, yielded 0.550 of an inch of water (or $3\frac{3}{4}$ inches of rime to 1 of water). The rime on the grass when carefully collected and melted yielded 0.033 of an inch. There was a dense mist whilst the rime was being deposited.

From this elevation (530 feet) we frequently look over dense mists that cover the water of the Bristol Channel and see the hills of Somerset, Devon, Monmouth, and Glamorgan. On the 19th instant, with a hoar frost, over the Bristol Channel was a dense dark mist apparently extending 100 feet into the air. This mist, at 8.30 a.m., rapidly changed on its upper surface to cirri clouds, and then to transparent vapour, and in an hour the whole mist by this process had disappeared. Elsewhere the sky was cloudless. These mists of the Bristol Channel change on their upper surface sometimes to cirro-strati, sometimes to cumuli, and twice they have been known to change to thunder-clouds during the last two years. The change to cirri has only been seen once.

E. J. LOWE.

Shirenewton Hall, near Chepstow, January 22.

Cercyonis alope and nephele.

IN his review (NATURE, December 27, 1888, p. 193) of my work on butterflies now in course of publication (in which I receive a far more generous treatment than I am accustomed to), Captain Elwes thinks me illogical in holding to the probable specific distinction of *Cercyonis alope* and *nephele*, and at the same time the specific unity of the Eastern American forms of *Cyaniris pseudargiolus*, *lucia*, *violacea*, and *neglecta*; and suggests as to the former that climatic differences in the regions they respectively occupy may have brought about the distinctions noted.

On general grounds, it seems in the highest degree probable that climatic differences have had much to do with the origin of the different forms in both cases, be they species formed or forming. But surely Captain Elwes is confusing the judgment when he fails to make a distinction between the successive seasonal forms of a digoneutic butterfly, as in the case of *Cyaniris* and de Nicéville's Indian species to which he alludes, and the synchronous variation of a monogoneutic species, like those (or that) of *Cercyonis*.

SAMUEL H. SCUDDER.

Cambridge, U.S.A., January 10.

MODERN VIEWS OF ELECTRICITY.¹

PART. IV.—RADIATION.

XIII.

Possible Accounts of the Faraday and Hall Effects.

THE account I have given of the magnetic rotation of the plane of polarization has made it depend on the phenomenon of hysteresis, in a way which may be thus summarized. The value of μ for increasing magnetization is different from that for decreasing magnetization; an electric displacement such as occurs in every half-swing of a light-vibration is resolvable into two opposite circular components, one of which increases, while the other decreases, any magnetization already existing in the direction of the ray; the value of μ affects the speed of transmission of light; hence the two circular components will not proceed at the same pace, and the direction of vibration will infinitesimally rotate. The same thing is repeated at every half-swing, the elemental rotations being all in the same sense, and so the ultimate rotation of the plane of polarization in transparent bodies is accounted for.

¹ Continued from p. 13.