fore its temperature, could not be found. But since the calorimeter had slightly risen in temperature, the ice must have been above 80° C.

From the nature of the experiment, as carried out on the present scale, the weight of the ice which can be dropped into the calorimeter is only small, and therefore the rise in temperature is but slight. But since a fall in temperature of a much larger amount ought to have been obtained had the ice been at 0°, it is considered that the above experiments are conclusive. Great care was taken, in order to obtain correct temperatures in the calorimeter. The latter was inclosed in several casings, and the water was allowed to stand in it for several hours before the experiment, so that it might first attain the temperature of the room, whilst the time which elapsed between the readings of the thermometer before and after the ice was dropped in would not be more than from 10 to 15 seconds.

In the course of the next few weeks I intend to make one or two more determinations, and, if possible, on a larger scale.

V. "On the Effects of Heat on the Chloride, Bromide, and Iodide of Silver, and on some Chlorobromiodides of Silver." By G. F. Rodwell, F.R.A.S., F.C.S., Science Master in Marlborough College. Communicated by Professor Tyndall, F.R.S. Received November 26, 1880.

1. *The Chloride, Bromide, and Iodide of Silver.*

Since I had the honour of submitting to the Society papers on the above subjects, "Proc. Roy. Soc.," vol. 25, p. 279—303, accurate determinations, by a new method, of the melting points of the substances with which the experiments were made have been described by Mr. Carnelley. He finds that the melting point of iodide of silver, hitherto generally described as "a low red heat," is 527° C.; of the bromide of silver 427° C.; and of the chloride 451° C. These numbers are in all cases higher than those which I adopted, and I have, consequently, recalculated those portions of the results which are affected by the new determinations, and they are given in the following table. The volume of the chloride and bromide at − 60° C. has been taken as unity for better comparison with the iodide, which, according to Fizeau, possesses its maximum volume at that temperature. It will be remembered that the iodide of silver in *cooling* from its melting point contracts like ordinary solids until it reaches a temperature of 142° C., at which point it possesses its maximum density, it then suddenly expands to a volume greater than that which it possesses at the fusing point, and continues to expand as the temperature diminishes.

	Chloride of silver.	Bromide of silver.	Iodide of silver.
Fusing point	451° C.	427° C.	527° C.
Specific gravity at 0° C.	5·505	6·245	5·675
" " fusing point.........	4·919	5·595	5·522
Volume at −60° C.	1·000000	1·000000	1·017394 Maximum volume.
" −10° C.	.. ..	.. ..	1·017342
" 0° C.	1·005547	1·006060	
" 70° C.	.. ..	.. ..	1·017009
" 100° C.	1·015092	1·016560	
" 142° C.	.. ..	.. ..	1·015750 After sudden expansion. 1·000000 Maximum density.
" 200° C.	1·024937	1·027460	1·001649
" 300° C.	1·035082	1·038760	1·004493
" 400° C.	1·045227	1·050460	1·007337
" fusing point (solid)	1·050319	1·053470	1·010949
" " " (liquid)	1·116427	1·122840	1·044990
Physical structure, &c., of fused mass ..	Crystalline fracture; thin layers transparent and flexible; thick rods very flexible when hot.	Crystalline and brittle.	Transparent and plastic above 142° C.; crystalline, opaque, and brittle below 142° C.

2. *The Chloro-brom-iodides of Silver.*

Mr. Carnelley has been so good as to determine for me, by his new method, the melting points of the five chloro-brom-iodides of silver described in my former paper ("Proc. Roy. Soc.," vol. 25, p. 292), and the results have been recalculated in accordance therewith. By reference to the accompanying table, it will be seen that the fusing point of No. 1 is 44° C. lower than that of its most easily fusible constituent, and 144° C. lower than that of the least easily fusible constituent. The lowering is most conspicuous in No. 3, the fusing point being 101° C. lower than that of bromide of silver, which constitutes nearly one-quarter of its weight, and 201° C. lower than that of iodide of silver, which constitutes more than half its weight. Again, in No. 4 it will be seen that the melting point is 147° C. lower than of iodide of silver, which constitutes nearly three-fourths of its weight.

We may notice, moreover, the following points:—

(1.) No. 1, containing the smallest quantity of iodide of silver, is almost unaffected by it. It closely resembles bromide of silver, save that a very slight contraction takes place between 125°·5 C. and 131°·5 C.; and the orange-coloured powder furnished by pulverisation turns green on exposure to light. In No. 3, which contains a little more than half its weight of iodide of silver, we find the lowest melting point; the highest specific gravity; the greatest divergence in every respect from the properties of its constituents, although the influence of the iodide is very marked, both in the plasticity of the substance above 250° C., and in the considerable contraction which takes place between 124° C. and 133° C. In No. 5 the influence of the iodide is most marked, and in some respects the substance resembles its principal constituent.

(2.) Let us note, moreover, that the fusing points diminish from 1 to 3, and increase from 3 to 5; while the specific gravities diminish on both sides of No. 3.

(3.) In No. 1, in spite of the presence of the iodide, the coefficients of expansion above 131·5 and below 125·5 are higher than those of any of its constituents. Again, in spite of the presence of such expansible bodies as the chloride and bromide of silver, the amount of contraction undergone by some of the chloro-brom-iodides, on heating between 124° C. and 133° C., exceeds that of the iodide itself. The case becomes one of great complexity. Take the most distinctive of the chloro-brom-iodides, No. 3. Between 0° C. and 124° C., any mass of a hundred molecules consists of 58 which are undergoing slight contraction, and 42 which are undergoing rapid expansion. Rapid contraction takes place with the iodide alone at 142° C.; here it commences 18° C. lower, and while it takes place in the case of 58

	1.	2.	3.	4.	5.
	AgI, Ag_2Br_2, Ag_2Cl_2.	AgI, AgBr, AgCl.	Ag_2I_2, AgBr, AgCl.	Ag_3I_3, AgBr, AgCl.	Ag_4I_4, AgBr, AgCl.
Composition in 100 parts:—					
Iodide of silver	26·1692	41·484	58·6404	68·0171	73·9285
Bromide of silver	41·8708	33·186	23·4557	18·1379	14·7856
Chloride "	31·9600	25·330	17·9039	13·8450	11·2859
Fusing point	383° C.	331° C.	326° C.	354° C.	380° C.
Specific gravity at 0° C.	6·152	6·1197	6·503	5·9717	5·907
" " fusing point ...	5·5118	5·5673	5·6971	5·6430	5·680
" " 0° C. calculated on the assumption that no change of volume occurs.	5·836	5·8010	5·762	5·741	5·725
Volume at 0° C.	1·000000	1·000000	1·000000	1·000000	1·000000
" 124° C.	1·015331*	1·012037	1·010301	1·007440	1·006696
" 133° C.	1·015037	1·006637	·993201	·984041	·979696
Volume of solid at fusing point ..	1·054986	1·046646	1·032283	1·009612	1·006372
" liquid at solidification point.	1·112376	1·097486	1·059998	1·057645	1·040513
Certain physical properties	Crystalline fracture; brittle both when hot and cold. Resembled bromide of silver.	Compact, hard, homogeneous; semi-crystalline fracture, very tenacious when cold; bends slightly at 250° C., but breaks easily.	Compact, hard, homogeneous, very tenacious when cold; at 250° C. flexible enough to be bent through an angle of 40° without breaking.	Brittle when cold; at 250° C. flexible enough to be bent through a right angle.	Crystalline fracture, more brittle when cold than any of the preceding, except No. 1. Very flexible at 250° C., and capable of being twisted without fracture.

* In the case of No. 1, the temperatures at which contraction began and finished respectively were 125°·5 and 131°·5, not, as in the case of the others, 124° and 133° C.

molecules, the 42 molecules of bromide and chloride are still expanding. Finally, from 133° C. to the fusing point, all the molecules are expanding, 42 of them quickly and 58 slowly. And during this heating from 0° C. to 133° C., a highly crystalline brittle solid has been converted, within the mass of two crystalline solids, into a plastic amorphous body.

VI. "Phenomena of the Capillary Electroscope." By G. Gore, LL.D., F.R.S. Received November 23, 1880.

(Abstract.)

In this communication is described an investigation of various of the conditions of the above phenomena. The phenomena have been found to be purely physical except in those cases where the electricity was of too high tension and produced electrolysis, and in those in which the solution acted chemically upon the mercury.

The influence of the kind and strength of numerous solutions was examined, including those of various salts of neutral, alkaline, and acid reaction, and of various acids, and the results are described. Of the salts, some gave anomalous results ; alkaline cyanides, for instance, reversed the direction of the movements of the mercury. Inferior conducting liquids, such as aqueous ammonia, gave feeble movements. Good conducting solutions, such as neutral salts of the alkalies, potassic cyanide, and dilute sulphuric and phosphoric acids, yielded strong movements. Both the kind and the degree of dilution of the various substances had great influence upon the results.

By examining the question of the influence of the relative dimensions of the mercurial surfaces it was found that no such influence existed, simply because one surface of liquid metal with a suitable solution was alone sufficient.

Attempts were made, but without success, to obtain the same movements of two aqueous solutions instead of mercury and a watery liquid. Other effects, of apparent movement, &c. (described in a separate communication, see "Influence of Voltaic Currents on the Diffusion of Liquids," (*ante*, p. 250), were obtained.

The question as to whether the movements were wholly due to alteration of volume of the mercury was also investigated, and the conclusion arrived at was, that while a very minute alteration of volume did occur, nearly the whole of the movement was due to other causes.

The influence of adhesion was freely examined, and the hypothesis proposed that the motion is primarily due to a direct mechanical action at the immediate surfaces of contact of the mercury and solution,