Percentage of iodide of silver in the copper-silver iodide alloys.		Temperature at which contraction on heat commences.
38·2232	.....	284° C.
55·3066	.....	233
64·9884	.....	214
71·2225	.....	199
88·1304	.....	153

Thus while 66·206 per cent. of iodide of lead lowered the point of change 18° C., the presence of 61·7767 per cent. of iodide of copper raised it 142° C.

9. The possible causes of these results are discussed.

10. The lead-silver iodide alloy is compared with the copper-silver iodide alloy, as to structure, properties, &c.

11. The results of the microscopic examinations of these alloys is given, and shown by drawings.

12. The special properties of each alloy are described.

Erratum.—"Proc. Roy. Soc.," vol. 32, p. 550, 16 lines from bottom of page: for "more than twenty times," read "*nearly four times.*"

X. "On the Vibrations of a Vortex Ring, and the Action of Two Vortex Rings upon each other." By J. J. Thomson, B.A., Fellow of Trinity College, Cambridge. Communicated by Lord Rayleigh, F.R.S. Received November 16, 1881.

(Abstract.)

In the first part of the paper it is shown that if the circular axis of a vortex ring be displaced so as to be represented by the equations—

$$\rho = a + \alpha_n \cos nd,$$

$$z = \beta_n \cos nd.$$

when ρ is the distance of a point on the circular axis from the straight axis, and z the distance of a point on the circular axis from its mean plane, then—

$$\alpha_n = \mathrm{A} \cos\left(\frac{\omega e^2}{2a^2} \log \frac{2a}{e} n\sqrt{n^2-1}\,.\,t + \mathrm{B}\right),$$

$$\beta_n = \mathrm{A}\frac{\sqrt{n^2-1}}{n} \sin\left(\frac{\omega e^2}{2a^2} \log \frac{2a}{e} n\sqrt{n^2-1}\,.\,t + \mathrm{B}\right),$$

when ω is the angular velocity of molecular rotation, e the radius of the cross section of the vortex core, and a the radius of the aper-

ture. The cross section is supposed small compared with the aperture, so that e is small compared with a.

Thus the time of vibration is—

$$2\pi/\frac{we^2}{2a^2}\log\frac{2a}{e}n\sqrt{n^2-1},$$

and the motion is stable for all such displacements.

In the second part of the paper the action of two vortices, which move so as never to approach nearer than a large multiple of the diameter of either, upon each other, is considered, and the following results among others obtained:—

If ϵ be the angle between the direction of motion of the vortices, c the minimum distance between their centres, v the velocity of translation of vortex (i), w that of vortex (ii); α and β angles given by—

$$w\cos\alpha=v\cos\beta,$$

$$\alpha+\beta=\epsilon.$$

m and m' the strength of vortices (i) and (ii) respectively, a and b their radii; k the relative velocity of the vortices, viz., $\sqrt{v^2+w^2-2vw\cos\epsilon}$; then, in the standard case when the vortices are moving in the same direction and (I) first passes through the points of intersection of their directions of motion, we have the following results:—

The direction of motion of I is deflected towards the direction of motion of II through an angle whose circular measure is—

$$\frac{m'b^2a\cos\alpha\sin 2\beta}{kc^3}.$$

The direction of motion of II is deflected in the same direction through an angle—

$$\frac{ma^2b\cos\beta\sin 2\alpha}{kc^3}.$$

The radius of vortex (i) is increased by—

$$\frac{m'b^2a\cos\alpha(1+\cos 2\beta)}{kc^3}.$$

The radius of vortex (ii) is diminished by—

$$\frac{ma^2b\cos\beta(1+\cos 2\alpha)}{kc^3}.$$

The effects for all circumstances of motion, whether the vortices are moving in the same or opposite directions, may be summed up in the following rule:—

The vortex which first passes through the point of intersection of the direction of motion of the vortices is deflected towards the direction of motion of the other, it increases in radius and energy, and its velocity of translation is diminished; the other vortex is deflected in the same direction, it diminishes in radius and energy, and its velocity of translation is increased.

XI. Letter addressed to the Secretary R.S. by Dr. W. ROBERTS, F.R.S. Received December 1, 1881.

In deference to the request of Mr. W. R. Dunstan, I wish to correct an error of omission in my paper "On the Estimation of the Amylolytic and Proteolytic Activity of Pancreatic Extracts," printed in "Proc. Roy. Soc.," vol. 32, p. 145.

Mr. Dunstan points out to me that I had overlooked a paper by himself and Mr. A. F. Dimmock on the "Estimation of Diastase," published in the "Pharmaceutical Journal" for March 8th, 1879, wherein he described a process, in which (as in my method) the cessation of the iodine reaction is utilised for the purpose of gauging the activity of diastasic solutions on starch gelatine.

I had not previously seen this paper, and am now glad to have the opportunity of referring to it those who are interested in diastasimetry.