Anisic acid.

1st Stage $C_{16}H_8O_6+2HSO_4=C_{16}H_8S_2O_{12}+2HO$.

2nd Stage $C_{16}H_8O_6+4HSO_4=C_{14}H_8S_4O_{14}+4HO+2CO_2$.

There can be no doubt that salicylic acid, so closely allied to anisic acid, in fact, its homologue, a step lower in the system, must exhibit a similar deportment. Mr. Baldwin Duppa has been occupied with this subject in my laboratory, and has already obtained the first term, the *sulpho-salicylic acid*,

$$C_{14}H_6S_2O_{12},$$

which forms extremely beautiful compounds.

On submitting salicylic acid to the action of an excess of sulphuric acid, at a temperature of 180°, the same phenomena present themselves which are noticed in the case of salicylic acid, a powerful evolution of carbonic acid ensues, and the solution now contains a new sulphur-acid, which is crystalline. As yet Mr. Duppa has not succeeded in obtaining this acid in a state of sufficient purity for analysis, but it may be assumed, without much hesitation, that it will be found to be

Disulphophenic acid.... $C_{12}H_6S_4O_{14}$.

IV. "On the Separation of Iodine, Bromine, and Chlorine, and the comparative degree of Affinity of these Elements for Silver; with some Analyses of their Combinations with that Metal occurring in Chili." By Frederic Field, Esq. Communicated by Dr. Hofmann, F.R.S. Received June 5, 1857.

Although both bromide and iodide of silver are decomposed by the action of chlorine at an elevated temperature, yet chloride of silver is completely decomposed by bromide of potassium, and both the bromide and chloride of silver by iodide of potassium. Even the action of hot strong hydrochloric acid has but little influence upon the iodide of silver; many days of continuous boiling are necessary for its entire decomposition. I believe that it has

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been the opinion of chemists that chlorine possesses an affinity for silver superior to all other elementary bodies, and we are told in Gmelin's Handbook that all salts of silver, even the insoluble ones, are converted into chloride by solutions of metallic chlorides. From the following experiments it appears to me that bromine has a greater affinity for silver than chlorine, and iodine a still greater affinity than bromine.

When a mixed solution of bromide of potassium and chloride of sodium is added gradually to a solution of nitrate of silver, not in excess, no trace of chloride of silver is precipitated, as long as any bromide remains in solution.

If to a similar solution, iodide and bromide of potassium and chloride of sodium be added, iodide of silver and nitrate of potassa are formed, the bromide of potassium and chloride of sodium remaining undecomposed.

When bromide of potassium is poured upon chloride of silver, an entire decomposition ensues, bromide of silver and chloride of potassium being produced.

When iodide of potassium is added to chloride of silver, iodide of silver and chloride of potassium are formed; and when iodide of potassium is added to bromide of silver, there is a similar decomposition, the iodine replacing the bromine.

When chloride of silver in excess is agitated with a solution of iodide of potassium and warmed for some hours, no trace of iodine can be detected in the solution: when however chloride of sodium is poured upon iodide of silver, no decomposition occurs, neither is there any action upon bromide of silver with the same salt: and when bromide of potassium is added to iodide of silver, there is no alteration in the union of the elements.

From a number of experiments made in illustration of the preceding statements, I deemed it possible that the separation of chlorine, bromine and iodine could be accomplished by this reaction.

The method which I have devised is simply this: After weighing three equal portions of the salts to be analysed, they are placed in three flasks with ground-glass stoppers, and about an ounce of water is added to each; nitrate of silver being then added, slightly in excess, to the three, the stoppers are replaced, and each flask agitated violently. The precipitates subside in a few minutes, leaving the

supernatant liquid perfectly clear. They are then filtered through separate funnels, and washed with hot water. No. 1 is dried and weighed. No. 2 is digested in bromide of potassium, dried and weighed; and No. 3 in iodide of potassium, dried and weighed.

To test the method, a mixture was made of 5 grains of iodide of potassium, 5 grains of bromide of potassium, and 5 grains of chloride of sodium. The following is a comparison of the theoretical and experimental results:—

	EXPERIMENT.	THEORY.
Iodine	3·69	3·81
Bromine	3·51	3·34
Chlorine	2·92	3·02

I have availed myself of this method in analysing several silver ores containing chloride, bromide and iodide of silver found in Chili, the formulæ of which I subjoin:—

Chloride of silver	Ag Cl.
Chlorobromide of silver	2Ag Cl, Ag Br.
Chlorobromide of silver	3Ag Cl, 2Ag Br.
Chlorobromide of silver	Ag Cl, 3Ag Br.
Bromide of silver	Ag Br.
Iodide of silver	Ag I.

V. "Note on the Density of Ozone." By THOMAS ANDREWS, M.D., F.R.S., Vice-President of Queen's College, Belfast, and P. G. TAIT, M.A., Fellow of St. Peter's College, Cambridge, and Professor of Mathematics in Queen's College, Belfast. Received June 17, 1857.

It is known that Ozone can only be obtained mixed with a large excess of oxygen. In a former communication by one of the authors of this note, it was shown that in the electrolysis of a mixture of 8 parts of water and 1 of sulphuric acid, the mean quantity of Ozone does not exceed ·0041 gramme in a litre of oxygen, or $\frac{1}{350}$th part. By using a mixture of equal volumes of acid and water, the relative quantity of Ozone may be doubled; but even with the Ozone in this