

A  
SYSTEM  
OF  
CHEMISTRY.

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A  
SYSTEM  
OF  
CHEMISTRY.

IN FIVE VOLUMES.

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By THOMAS THOMSON,  
M. D. F. R. S. E.

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*THE FOURTH EDITION.*

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# SYSTEM

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BOOK II. DIVISION III. OF PART I.

CONTINUED.

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## GENUS VIII. SULPHITES.

THESE salts are formed by saturating the alkaline and earthy bases with sulphurous acid. The easiest process is that which was followed by Berthollet, and afterwards by Vauquelin and Fourcroy. The proper mixture of sulphuric acid and mercury for obtaining sulphurous acid is to be put into a glass vessel, from which there passes a tube into a small bottle containing a little water. From this bottle there passes another tube into one of Woulfe's bottles, which contains the alkaline or earthy base designed to be combined with sulphurous acid, either dissolved or suspended in water. When the apparatus is properly adjusted, heat is applied to the mixture of mercury and acid; sulphurous acid gas passes over first into the bottle with water, where the sulphuric acid, if any, passes along with it, is detained; thence it passes into the Woulfe's bottle,

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where it combines with the base. When the base is saturated, crystals of sulphite often form spontaneously, or they may be obtained by evaporating the solution.

The sulphites were first pointed out by Stahl; but scarcely any of them were examined, except sulphite of potash, till Berthollet made a set of experiments on them about the year 1790\*. But a much more complete description of them was published by Fourcroy and Vauquelin; from their own experiments, in the year 1797†.

Sulphites are distinguished by the following properties:

Characters.

1. A disagreeable taste, analogous to that of burning sulphur.

2. When heated, they emit sulphurous acid and water, and then sulphur, which takes fire and burns with a violet flame, if the experiment be performed in an open crucible. A portion of sulphate remains behind.

3. When exposed to the air in a state of solution, they absorb oxygen, and are converted into sulphates.

4. When they are dropt into nitric acid, red vapours are disengaged in abundance, and the salts are converted into sulphates. Oxymuriatic acid produces the same effect, but partially.

The sulphites at present known amount to eight.

I. SOLUBLE  
SUL-  
PHITES.

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*Sp. 1. Sulphite of Potash.*

THIS salt was formed by Stahl, but was first accu-

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\* *Ann. de Chim.* ii. 54.

† *Ibid.* xxiv. 229.



rately described by Berthollet, Fourcroy, and Vauquelin. It was formerly known by the name of *sulphureous salt of Stabl*. It may be formed by passing sulphurous acid into a saturated solution of carbonate of potash till all effervescence ceases. The solution becomes hot, and crystallizes by cooling\*.

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Its crystals are white and transparent; their figure, that of rhomboidal plates. Its crystallization often presents small needles diverging from a common centre†. Its specific gravity is 1.586‡. Its taste is penetrating and sulphureous. At the common temperature of the atmosphere it is soluble in its own weight of water, but much more soluble in boiling water. When exposed to the air, it scarcely changes its appearance, loses about 2 *per cent.* of its weight, and then is gradually, but very slowly, converted into sulphate of potash. When exposed to a sudden heat, it decrepitates, loses its water and a portion of its acid; then a quantity of sulphur is disengaged from the remaining acid, and the residuum is sulphate of potash, with a slight excess of alkali. Nitric acid converts it into sulphate of potash by imparting oxygen. So does oxymuriatic acid, but imperfectly, as it drives off a portion of its acid unchanged.

Properties.

It decomposes the oxides of gold, silver, mercury, the red oxide of lead, the black oxide of manganese, and the brown oxide of iron. When the green oxide of iron, or the white oxide of arsenic, is boiled with it in water, and an acid added, a precipitate takes place, consisting of these oxides united to some sulphur, and

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\* Fourcroy and Vauquelin, *Nicholson's Journal*, i. 317.

† Ibid.

‡ Hassenfratz, *Ann. de Chim.* xxviii. 12.

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Composi-  
tion.

the salt is converted into a sulphate; at the same time sulphureted hydrogen gas is emitted.

From a course of experiments which I have made on this salt, it follows, that its component parts are in the following proportions :

43·5 acid  
54·5 potash  
2·0 water

---

100·0

*Sp. 2. Sulphite of Soda.*

THIS salt was first accurately described by Fourcroy and Vauquelin. It is white and perfectly transparent. Its crystals are four-sided prisms, with two very broad sides and two very narrow ones, terminated by dihedral summits. Its specific gravity is 2·9566 \*. Its taste is cool and sulphureous. It is soluble in four times its weight of cold water, and in less than its weight of boiling water. By exposure to the air it effloresces, and is slowly converted into a sulphate. When exposed to heat it undergoes the watery fusion, and afterwards exhibits precisely the same phenomena as the sulphite of potash. Metallic oxides and salts affect it precisely as they do sulphite of potash.

It is composed of 31 acid

18 soda

51 water

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100

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\* Hassenfratz, *Ann. de Chim.* xxviii. 12.

*Sp. 3. Sulphite of Ammonia.*

THIS salt was first described by Fourcroy and Vauquelin\*. It crystallizes in six-sided prisms, terminated by six-sided pyramids; or in four-sided rhomboidal prisms, terminated by three-sided summits. Its taste is cool and penetrating, like that of the other ammoniacal salts, but it leaves a sulphureous impression in the mouth. It is soluble in its own weight of cold water, and much cold is produced. Its solubility is increased by heat; so that a saturated boiling solution crystallizes on cooling. When exposed to the air it attracts moisture, and is soon converted into a sulphate. No other sulphite undergoes this change so rapidly. When heated it decrepitates, a little ammonia is disengaged, and the salt then sublimes in the state of super-sulphite of ammonia. Its habitudes with metallic oxides and salts are nearly the same with those of the above described sulphites, only it is capable of forming with several of them triple salts†.

It is composed of 60 acid

29 ammonia

11 water

---

100

*Sp. 4. Sulphite of Magnesia.*

THIS salt has only been examined by Fourcroy and Vauquelin. It is prepared, like the others, by saturating carbonate of magnesia with sulphurous acid; a vio-

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\* Nicholson's Jour. i. 317.

† Ibid.

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lent effervescence takes place, and the liquid becomes warm. The sulphite as it forms remains at the bottom in the form of a white powder: But if an excess of acid be added, it dissolves, and may be obtained in crystals by subsequent exposure to the air. Its crystals are white and transparent, and in the form of depressed tetrahedrons. Its specific gravity is 1.3802 \*. Its taste is mild and earthy at first, and afterwards sulphureous. It becomes opaque when exposed to the air; but is very slowly converted into a sulphate. At the temperature of 60° it is soluble in 20 parts of water. Boiling water dissolves a greater proportion of it; but the solution crystallizes on cooling. When its solution in water is exposed to the air, this salt is very soon converted into a sulphate. By exposure to heat, it softens, swells up, and becomes ductile like gum, and loses 0.45 parts of its weight. In a strong heat the acid is disengaged, and the earth remains pure.

It is composed of..... 39 acid

16 magnesia

45 water

---

100

*Sp. 5. Sulphite of Ammonia-and-Magnesia.*

THIS salt has only been mentioned by Fourcroy. It may be formed by mixing together the solution of sulphite of ammonia and sulphite of magnesia, or by pouring ammonia into the sulphite of magnesia. Its crystals are transparent, but the figure has not been determined. It is less soluble in water than either of its

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\* Hassenfratz, *Ann. de Chim.* xxviii. 12.

component parts. When exposed to the air, it is gradually converted into sulphate. Chap. III.

Its other properties have not been examined.

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*Sp. 6. Sulphite of Lime.*

II. INSOLU-  
BLE SUL-  
PHITES.

THIS salt was first mentioned by Berthollet, and described by Fourcroy and Vauquelin.

When obtained by the above described process, it has the form of a white powder; but if an excess of sulphurous acid be added, it dissolves, and crystallizes on cooling in six-sided prisms, terminated by long six-sided pyramids. It has scarcely any taste; however, when kept long in the mouth, it communicates to the tongue a taste which is manifestly sulphureous. It requires about 800 parts of water to dissolve it. When exposed to the air it effloresces very slowly, and its surface is changed into sulphate of lime. When heated, it loses its water of crystallization, and falls to powder. A violent heat disengages some sulphur, and converts it into sulphate of lime.

It is composed of   48 acid  
                          47 lime  
                          5 water

---

100

*Sp. 7. Sulphite of Barytes.*

THIS salt was mentioned by Berthollet; but it was first described by Fourcroy and Vauquelin. When prepared by the above described process, it is in the state of a white powder; but it may be obtained cry-

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stallized in opaque needles, or in transparent tetrahedrons with their angles truncated, by dissolving it in sulphurous acid and evaporating slowly. It has but very little taste. Its specific gravity is 1.6938\*. It is insoluble in water.

When heated strongly, sulphur is disengaged, and sulphate of barytes remains. A long exposure to the air is necessary before it is converted into a sulphate.

It is composed of	39 acid
	59 barytes
	2 water
	<hr/>
	100

*Sp. 8. Sulphite of Strontian.*

Unknown.

*Sp. 9. Sulphite of Alumina.*

THIS salt was first formed by Berthollet; it has been described by Fourcroy and Vauquelin.

When formed by the usual process it remains in the state of a white powder, and does not crystallize though dissolved in an excess of acid.

It is white and soft, and has an earthy and sulphureous taste. It is insoluble in water. When exposed to the air, it is gradually converted into sulphate. Its solution in sulphurous acid undergoes this change much more rapidly. When heated, its acid disengages, and the alumina remains behind, mixed however with a small proportion of sulphate of alumina.

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\* Hassenfratz, *Ann. de Chim.* xxviii. 12.

It is composed of 32 acid  
 44 alumina  
 24 water  
 ———  
 100

Chap. III.

SUCH are the properties of the sulphites, as far as they have been hitherto investigated. The following Table exhibits the solubility of each in water, and the proportion of base and water combined with 100 acid.

Sulphites of	Solubility in 100 Water.	Constituents.		
		Acid.	Base.	Water.
Magnesia	5	100	41	115
Ammonia	100	100	48.3	18.3
Soda	25	100	58	164
Lime	0.12	100	97.9	10.5
Potash	100	100	125	4.6
Alumina	0	100	137.5	75
Barytes	0	100	151	5.1

III. USES  
 OF THE  
 SULPHITES.

HITHERTO the sulphites have not been applied to any use, if we except the sulphite of barytes, which Fourcroy has proposed as a test of the purity of sulphurous acid, or of its being free from sulphuric acid. If the salt occasion a precipitate in the sulphurous acid, we may conclude that sulphuric acid is present.