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PROVISIONAL SPECIFICATION.

Improvements in the Manufacture of Sodium Chlorate.

I, ALFRED ROLAND DAVIS, of 32, Blackfriars Street, Manchester, Chemical Engineer, do hereby declare the nature of this invention to be as follows:—

This invention consists in subjecting finely divided dry anhydrous carbonate of sodium to the action of chlorine gas. If the sodium carbonate be exposed to the chlorine in very fine layers it is rapidly and almost completely converted into chloride and chlorate of sodium but it is preferable to periodically rake it or otherwise disturb it in order that a fresh surface may be exposed to the action of the chlorine. It will be at once seen that by using the carbonate of sodium dry and in powder a great advantage is gained over those processes wherein carbonate of sodium in solution or in a semi-dry state is acted upon by chlorine for the manufacture of chlorate as the dry powder is easier to manipulate and requires no treatment preliminary to its use as above described.

The operation of acting upon the carbonate of sodium with chlorine may be either continuous or intermittent. In the latter case though I confine myself to no particular mode of procedure the carbonate of sodium can be spread upon the floor of a suitable chamber and chlorine allowed to enter the said chamber. If necessary the partly transformed carbonate can then be raked or otherwise disturbed and subjected to the action of another dose of chlorine and so on until conversion is complete.

But I prefer to treat the carbonate of sodium with chlorine in a mechanical apparatus wherein the carbonate is caused to travel through and in the opposite direction to a current of chlorine so that the conversion of carbonate into chloride and chlorate is a continuous operation.

Seeing that chlorine as commercially manufactured often contains an appreciable quantity of aqueous vapour which has a tendency to cause the carbonate of sodium to cake or agglomerate and thereby be less perfectly converted into chloride and chlorate it is advisable to overcome this difficulty if it exists by drying the chlorine before using it for the manufacture of chlorate by this process. This may be done in an ordinary coke scrubber the efficiency of which may be increased if necessary by allowing strong sulphuric acid to run down it.

The mixture of chloride and chlorate resulting from the treatment of carbonate of sodium with chlorine as above described is then washed with the minimum quantity of hot water sufficient to dissolve out all the chlorate. It is preferable to have a number of batches of the mixed salts undergoing the washing operation at one time in different stages so that the weaker solutions resulting from finishing one batch may be strengthened by use upon another batch or other batches as in the case of the lixiviation of black ash in the Leblanc process for making alkali. The vessels in which the washing or lixiviating is performed are preferably heated by a steam jacket or otherwise in order that in the resultant solution the ratio of chlorate to chloride may be the highest practically attainable. The further separation of the two salts may be effected by concentration and crystallisation in a

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Davis's Improvements in the Manufacture of Sodium Chlorate.

manner that will readily suggest itself to any one possessed of ordinary technical chemical knowledge.

Dated this 19th day of May 1897.

ALFRED ROLAND DAVIS.

G. F. Redfern & Co.,

4, South Street, Finsbury, London, Agents for the Applicant.

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COMPLETE SPECIFICATION.

Improvements in the Manufacture of Sodium Chlorate.

I, ALFRED ROLAND DAVIS, of 32, Blackfriars Street, Manchester, in the County of Lancaster, Chemical Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

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This invention consists in subjecting finely divided anhydrous carbonate of sodium to the action of chlorine gas. If the sodium carbonate be exposed to the chlorine in very fine layers it is rapidly and almost completely converted into chloride and chlorate of sodium but it is preferable to periodically rake it or otherwise disturb it in order that a fresh surface may be exposed to the action of the chlorine. It will be at once seen that by using the carbonate of sodium dry and in powder a great advantage is gained over those processes wherein carbonate of sodium in solution or in a semi dry state is acted upon by chlorine for the manufacture of chlorate as the dry powder is easier to manipulate and requires no treatment preliminary to its use as above described.

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The operation of acting upon the carbonate of sodium with chlorine may be either continuous or intermittent. In the latter case though I confine myself to no particular mode of procedure the carbonate of sodium can be spread on the floor of a suitable chamber and chlorine allowed to enter the said chamber. If necessary the partly transformed carbonate can then be raked or otherwise disturbed and subjected to the action of another dose of chlorine and so on until conversion is complete.

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But I prefer to treat the carbonate of sodium with chlorine in a mechanical apparatus wherein the carbonate is caused to travel through and in the opposite direction to a current of chlorine so that the conversion of carbonate into chloride and chlorate is a continuous operation.

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Seeing that chlorine as commercially manufactured often contains an appreciable quantity of aqueous vapour which has a tendency to cause the carbonate of sodium to cake or agglomerate and therefore be less perfectly converted into chloride and chlorate it is advisable to overcome this difficulty if it exists by drying the chlorine before using it for the manufacture of chlorate by this process. This may be done in an ordinary coke scrubber the efficiency of which may be increased if necessary by allowing strong sulphuric acid to run down it.

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The mixture of chloride and chlorate resulting from the treatment of carbonate of sodium with chlorine as above described is then washed with the minimum quantity of hot water sufficient to dissolve out all the chlorate. It is preferable to have a number of batches of the mixed salts undergoing the washing operation at one time in different stages so that the weaker solutions resulting from finishing one batch may be strengthened by use upon another batch or other batches as in the case of the lixiviation of black ash in the Leblanc process for making alkali. The vessels in which the washing or lixiviating is performed are preferably heated by a steam jacket or otherwise in order that in the resultant solution the ratio of

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Davis's Improvements in the Manufacture of Sodium Chlorate.

chlorate to chloride may be the highest practically attainable. The further separation of the two salts may be effected by concentration and crystallisation in a manner that will readily suggest itself to anyone possessed of ordinary technical chemical knowledge.

5 Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. The employment of anhydrous sodium carbonate for the manufacture of chlorate of soda by acting upon said carbonate with chlorine.

10 2. The manufacture of chlorate of soda as a continuous operation by causing anhydrous sodium carbonate to be mechanically moved through an atmosphere of chlorine gas until the decomposition of the carbonate into chloride and chlorate is complete or practically complete.

15 3. The manufacture of chlorate of soda by treating anhydrous carbonate of sodium with dried chlorine gas and from the mixed chlorate and chloride so obtained extracting the chlorate by differential lixiviation in jacketted lixiviating tanks.

Dated the 19th day of February 1898.

20 G. F. REDFERN & Co.,
4, South Street, Finsbury, London, Agents for the Applicant.