UNITED STATES PATENT OFFICE.

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METHOD OF MANUFACTURING ARSENATE OF LEAD.

1,014,742. Specification of Letters Patent. Patented Jan. 16, 1912.

No Drawing. Application filed June 10, 1911. Serial No. 632,446.

To all whom it may concern:

Be it known that I, EDWIN O. BARSTOW, a citizen of the United States, and a resident of Midland, county of Midland, and State of Michigan, have invented a new and useful Improvement in Methods of Manufacturing Arsenate of Lead, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The improved method, or process, of manufacturing lead arsenate in hand, involves the precipitation of a soluble arsenate solution, as for example, sodium arsenate solution, by means of solid lead chlorid.

The several steps involved in carrying out the present process will be hereinafter fully described and particularly pointed out in the claims.

The following description sets forth in detail an approved mode of carrying out the invention, such disclosed mode, however, constituting but one of the several ways in which the principle of the invention may be used.

In accordance with the present method of procedure, the solid lead chlorid, obtained from any convenient source, is mixed in with a solution of a suitable arsenate, but in the presence of water insufficient in amount to dissolve the lead chlorid. Such chlorid is preferably utilized in finely divided form rather than in the coarsely crystalline form. It has been found that by stirring such mixture for a longer time than necessary where solutions are used, the lead chlorid will react upon the soluble arsenate to form the insoluble lead arsenate. The exact composition of the precipitate obtained by such reaction is dependent upon the ratio of base to arsenate in the arsenate solution. When sufficient base is present, normal lead arsenate $Pb_3(AsO_4)_2$, is obtained as represented by the following equation:—

$$2Na_3AsO_4+3PbCl_2=Pb_3(AsO_4)_2+6NaCl$$

while if less of such base is present, a lead arsenate higher in arsenic is produced. One reaction, which occurs when not enough base is present to produce a normal arsenate, is represented by the following equation:—

$$2Na_2HAsO_4+2PbCl_2=2PbHAsO_4+4NaCl.$$

It should further be explained that commercial sodium arsenate, which is a convenient soluble arsenate for use in this process, is usually a mixture of arsenates, containing both acid arsenates Na_2HAsO_4 and NaH_2AsO_4. If the normal lead arsenate is desired, a certain amount of a suitable alkali, such as soda ash Na_2CO_3, should be added, the proper amount of such alkali being such as will be the equivalent of the hydrogen in the arsenate, or mixture of acid arsenates above referred to. This soda ash does not necessarily go immediately into combination with the acid arsenate, since the disodium arsenate will not react. The effect, however, after the lead chlorid has been added, is the same as though both acid arsenates had been at once converted into the normal arsenate.

It might appear at first sight that the reaction between the soild lead chlorid and soluble arsenate could not be carried to completion, because, the resulting product being soild, all of the lead chlorid would not be reacted upon, but particles of it would be inclosed in an impervious coating of the lead arsenate. This tendency, however, it has been discovered can be successfully overcome by subjecting the mixture to prolonged stirring or agitation. This operation can be satisfactorily conducted in a wooden tank provided with a suitable stirrer and with the solution so concentrated that the resulting mass has the consistency of a thick cream.

After the conversion of the lead chlorid into the arsenate is complete, the charge is run to a filter, or filter press, and the excess of water thereby removed, the arsenate being left in a paste of the desired consistency to meet the requirements. If desired, of course, the mixture constituting the charge may be allowed to settle preliminarily to this separation step.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the process herein disclosed, provided the step or steps stated by any one of the following claims or the equivalent of such stated step or steps be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a method of making lead arsenate, the step which consists in mixing solid lead chlorid with soluble arsenate in the presence of water insufficient to dissolve said chlorid.

2. In a method of making lead arsenate,

the step which consists in mixing lead chlorid with sodium arsenate in the presence of water insufficient to dissolve said chlorid.

3. In a method of making lead arsenate, the step which consists in mixing lead chlorid with acid sodium arsenate in the presence of water insufficient to dissolve said chlorid.

4. The method of making lead arsenate, which consists in mixing solid lead chlorid in finely divided form with a solution of a soluble arsenate, the quantity of water present being insufficient to dissolve said chlorid; subjecting the mixture to prolonged stirring, whereby lead arsenate is formed; and then separating such arsenate from the solution.

5. The method of making lead arsenate, which consists in mixing solid lead chlorid in finely divided form with a solution of sodium arsenate, the quantity of water present being insufficient to dissolve said chlorid; subjecting the mixture to prolonged stirring, whereby lead arsenate is formed; and then separating such arsenate from the solution.

6. The method of making lead arsenate, which consists in mixing solid lead chlorid in finely divided form with a solution of acid sodium arsenate, the quantity of water present being insufficient to dissolve said chlorid; subjecting the mixture to prolonged stirring, whereby lead arsenate is formed; and then separating such arsenate from the solution.

Signed by me this 6th day of June 1911.

EDWIN O. BARSTOW.

Attested by—

G. LEE CAMP,

D. A. NEWLAND.