

UNITED STATES PATENT OFFICE.

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PROCESS OF MANUFACTURING TETRA-ETHYL LEAD.

No Drawing.

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This invention relates to the production of tetra-ethyl lead, and more particularly to the production of the same by the inter-
 action of lead-sodium-potassium alloy with
 5 chlorine.

In the manufacture of tetra-ethyl lead by the so-called chloride process, the method used in the past consists, in general, of heating together ethyl chloride and a very
 10 definite alloy of sodium and lead—PbNa. The conditions of temperature and pressure have been varied widely, although it may be stated that as a rule temperatures of
 15 somewhere in the neighborhood of 45° C. in the cooling-bath water have been employed in the laboratory. The precise method of carrying out the necessary mixing and heating have, naturally, varied widely,
 20 but the process has, basically, always been the heating of ethyl chloride with PbNa.

We have discovered that a still smoother reaction may be obtained if a different alloy is substituted for the lead-sodium alloy
 25 PbNa.

An object of the present invention is to secure greater yields of tetra-ethyl lead.

Other objects will appear as the description proceeds.

30 The present invention may be accomplished in the following embodiment in which we have found that the use of the alloy Pb(Na,K) in place of PbNa starts the reaction with ethyl chloride more readily,
 35 can be carried out at a lower temperature, and gives higher yields of tetra-ethyl lead. While it might appear from their positions in the periodic table that potassium could be substituted for sodium in the
 40 alloy PbNa, it is not predictable that the substitution of a small amount of the sodium by potassium would give such a pronounced improvement in yield and ease of operating.

45 As an illustration of the advantage to be gained by the use of the alloy Pb(Na,K) over PbNa, the following are typical results:

Temperature of cooling bath, 45° C.

50 A. Alkali metal content of alloy, 9.5% Na+0.75% K. Average yield after 4 hrs.

heating, 78.7%. Average yield after 6 hrs. heating, 84.9%.

B. Alkali metal content of alloy, 10% Na. Average yield after 4 hrs. heating, 70.9%.
 55 Average yield after 6 hrs. heating, 71.7%.

With the cooling bath temperature of 30° C., the difference is still more striking.

A. Alloy containing 9.4% Na+0.75% K. Yield after 8 hours heating, 82.5%.
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B. Alloy containing 10% Na. Yield after 8 hours heating, 64.6%.

As many apparently widely different embodiments of this invention may be made without departing from the spirit thereof,
 65 it is to be understood that we do not limit ourselves to the foregoing example or description except as indicated in the following patent claims.

We claim:

1. The process of producing tetra-ethyl lead which comprises treating lead, intimately associated with sodium and potassium,
 70 with ethyl chloride.

2. The process of producing tetra-ethyl lead comprising effecting a reaction in a closed vessel between ethyl chloride and an alloy containing lead, sodium, and potassium.
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3. In the process of producing tetra-ethyl lead, the step which comprises heating together ethyl chloride and an alloy of the composition Pb(Na,K).
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4. In the process of producing tetra-ethyl lead, the step which comprises effecting a reaction between ethyl chloride and an alloy of lead containing approximately 9 parts of sodium to one part of potassium.
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5. In the process of producing tetra-ethyl lead comprising mixing an alloy of lead containing sodium and potassium with ethyl chloride, heating the mixture and subjecting the mixture to a cooling bath.
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6. In the process of producing tetra-ethyl lead comprising mixing an alloy of lead containing sodium and potassium with ethyl chloride, heating the mixture and subjecting the mixture to a cooling bath of a temperature of 30° C. to 45° C.
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7. In the process of producing tetra-ethyl lead comprising mixing an alloy of lead containing sodium and potassium with ethyl
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chloride in a closed vessel, heating the mixture and then immersing the vessel and contents in a water bath.

- 5 8. In the process of producing tetra-ethyl lead comprising mixing an alloy of lead, containing approximately 9 parts of sodium to 1 part of potassium, with ethyl chloride, in a closed vessel, heating the mixture and then

immersing the vessel and contents in a water bath of a temperature of 30° C to 45° C. 10

In testimony whereof we affix our signatures.

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