

UNITED STATES PATENT OFFICE.

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METHOD OF MAKING BENZALDEHYDE.

1,272,522.

Specification of Letters Patent.

Patented July 16, 1918.

No Drawing.

Application filed September 18, 1916. Serial No. 120,590.

To all whom it may concern:

Be it known that I, MARK E. PUTNAM, 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 Making Benzaldehyde, 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.

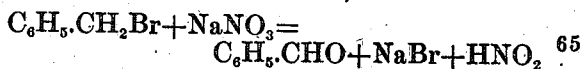
The present improved process of making benzaldehyde involves the use of benzyl bromid. I am aware that benzaldehyde has heretofore been made using benzyl chlorid (see Ullmann's *Enzyklopädie der Technischen Chemie* II., 301) by treating the same with a solution of lead nitrate. This method, however, has never proved of commercial importance for a variety of reasons, some of which are referred to in the text named, benzal chlorid having proven a better starting point, and the process involved differing essentially from the one just referred to.

I have found, however, that if instead of the chlorinated product of toluene, viz: the aforesaid benzyl chlorid, the bromid product, viz: benzyl bromid, is employed, it may be readily oxidized to the aldehyde not alone by the use of lead nitrate, for example, but much more readily and satisfactorily by the use of ordinary Chile saltpeter (sodium nitrate). The latter reagent will not react satisfactorily with the benzyl chlorid but as just indicated, produces entirely satisfactory results with the bromid,—better in fact than can be secured by treating such chlorid with lead nitrate, since the latter invariably results in the production of a certain amount of benzoic acid, which is undesirable in the connection in hand.

The present invention then consists of the steps hereinafter fully described and particularly pointed out in the claims, it being understood that the following description discloses only one of several ways in which the principle of the invention may be carried out.

As has already been indicated, the benzyl bromid ($C_6H_5.CH_2Br$) which is used as a starting point in the present process, is produced by brominating toluene ($C_6H_5.CH_3$),

the method by which such bromination is accomplished being no part of the present invention. The bromid is then mixed with a solution of sodium nitrate ($NaNO_3$), ordinary Chile saltpeter, as stated, being satisfactory for the purpose; and the mixture thereupon raised approximately to the boiling point with constant stirring. The reaction which occurs may be represented by the following symbolic formula, viz:



The resulting benzaldehyde ($C_6H_5.CHO$) being insoluble in water, may be readily separated from the solution of sodium bromid and nitrous acid, which are the other two products resulting from such reaction, and is found to be practically a pure product in contradistinction to that obtained not only by the treatment of benzyl chlorid with lead nitrate, to which reference has hereinbefore been made, but also to the other known processes which are commercially practised.

In place of sodium nitrate, I have found that calcium nitrate can also be used to oxidize the bromid to the aldehyde with satisfactory results, but the sodium salt is preferred because, at present, it is more readily obtainable and considerably less expensive than the other.

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. The method of making benzaldehyde, which consists in heating a mixture of benzyl bromid and a nitrate without other reagents being present, substantially as described.

2. The method of making benzaldehyde, which consists in heating a mixture of benzyl bromid and the nitrate of an alkali metal or alkaline-earth without other reagents being present, substantially as described.

3. The method of making benzaldehyde,

which consists in heating a mixture of benzyl bromid and an alkali metal nitrate without other reagents being present, substantially as described.

- 5 4. The method of making benzaldehyde; which consists in mixing together benzyl bromid and Chile saltpeter without other reagents being present, and then heating and

stirring the mixture, substantially as described.

Signed by me, this 15th day of Sept. 1916. 10

MARK E. PUTNAM.

Attested by—

A. N. PATRIARCHE,
JNO. F. OBERLIN.