

UNITED STATES PATENT OFFICE.

HANS SCHNEIDER, OF HAMBURG, GERMANY.

PROCESS OF GENERATING FORMALDEHYDE.

969,661.

Specification of Letters Patent.

Patented Sept. 6, 1910.

No Drawing.

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To all whom it may concern:

Be it known that I, HANS SCHNEIDER, doctor of philosophy, chemist, a subject of the German Emperor, and resident of Hamburg, Germany, have invented new and useful Processes of Generating Formaldehyde, of which the following is a specification.

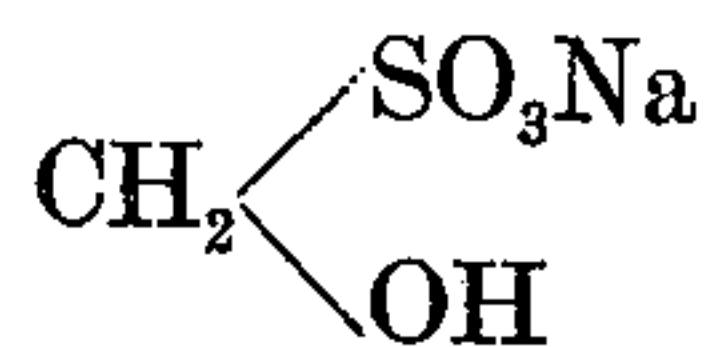
It is well known that the reaction of aqueous solutions of formaldehyde on permanganate of potash produces a violent reaction in which, in addition to considerable quantities of carbonic and formic acid, gaseous formaldehyde and water vapor are generated. This reaction has not been much used hitherto in practice for disinfecting rooms, the reason of which must be in the various disadvantages incident thereto. The chief of such disadvantages is the strong destructive action by oxidation of permanganate of potash on formaldehyde, whereby a great deal of the same is prevented from exercising its disinfecting action.

It has been found that formaldehyde derivatives, the substituting group of which is more readily oxidized than the formaldehyde itself and thus protects the formaldehyde against the pernicious effect of oxidation, are much more suitable for the purpose of disinfecting rooms, than formaldehyde itself. Among these substances, I found that the formaldehyde derivatives, the substituting groups of which are sulfur-containing acids of a lower degree of oxidation than that of the ordinary sulfuric acid, for example, the sulfurous acid, hydrosulfurous acid, sulfoxylic acid derivatives, etc., protect formaldehyde against oxidation most effectively. As is well known, the said acids, more particularly in the form of their salts can easily form compounds with formaldehyde. These derivatives enter into reaction with permanganate of potash in a very violent way and with a greater generation of heat, than solutions of formaldehyde alone. At the same time, there takes place a very powerful generation of formaldehyde and steam, if sufficient water has been added. They are, therefore, much more suitable for disinfecting rooms, than formaldehyde solutions alone.

Of special importance is the fact, that by means of the process described, it is possible to vaporize simultaneously with the gasified formaldehyde, a much greater quantity of water than in the well known per-

manganate-formaldehyde process. This point is of extreme importance, as from the investigations of Flügge and other hygienic authorities, it has been shown, that formaldehyde has a reliable disinfecting action only in the presence of water. Moreover, by the presence of a large quantity of steam in the atmosphere of the room, to be disinfected, it is possible to avoid the polymerization of the formaldehyde, which, as is well known, easily takes place and impairs the disinfecting action.

Example: 26 kgs. of a 40% solution of bisulfite of soda are mixed with 7.5 kgs. of a 40% solution of formaldehyde. The mixture becomes heated by itself to about 50° or 60° C., and the sodium salt of oxymethyl-sulfonic-acid is formed.



In this compound, the pungent smell of free formaldehyde has completely disappeared; on the contrary, it has a rather pleasant ester-like smell. If 1 to 4 parts of the above solution are poured on one part of permanganate of potash (in powder or small crystals), after a few seconds, such a violent reaction takes place with strong generation of formaldehyde and steam, that after a few seconds there remains an almost dry residue.

In place of permanganate, other persalts, such as potassium perchlorate can be used with the same success. The sodium salt of the oxymethyl-sulfonic-acid can also be mixed with formaldehyde-solutions or with polymeric formaldehyde.

I claim—

1. The process of producing formaldehyde which consists in reacting with a persalt containing a large amount of oxygen on formaldehyde derivatives the substituting groups of which are more readily oxidized than formaldehyde itself.

2. The process of producing formaldehyde which consists in reacting with a persalt containing a large amount of oxygen on formaldehyde derivatives the substituting groups of which are more readily oxidized than formaldehyde itself in the presence of other formaldehyde substances.

3. The process of producing formaldehyde which consists in reacting with a per-

salt containing a large amount of oxygen on formaldehyde derivatives the substituting groups of which are sulfur-containing acids of a lower degree of oxidation than sulfuric acid.

4. The process of producing formaldehyde which consists in reacting with a persalt containing a large amount of oxygen on formaldehyde derivatives the substituting groups of which are sulfur-containing acids of a lower degree of oxidation than sulfuric acid in the presence of other formaldehyde substances.

5. The process of producing formaldehyde which consists in reacting with a persalt containing a large amount of oxygen on a formaldehydebisulfite substance.

6. The process of producing formaldehyde which consists in reacting with a persalt containing a large amount of oxygen on a formadehydebisulfite substance in the presence of other formaldehyde substances.

7. The process of producing formaldehyde which consists in reacting with permanganate of potash on formaldehyde derivatives the substituting groups of which are more readily oxidized than formaldehyde itself.

8. The process of producing formaldehyde which consists in reacting with permanganate of potash on formaldehyde derivatives the substituting groups of which are more readily oxidized than formalde-

hyde itself in the presence of other formaldehyde substances.

9. The process of producing formaldehyde which consists in reacting with permanganate of potash on formaldehyde derivatives the substituting groups of which are sulfur-containing acids of a lower degree of oxidation than sulfuric acid.

10. The process of producing formaldehyde which consists in reacting with permanganate of potash on formaldehyde derivatives the substituting groups of which are sulfur-containing acids of a lower degree of oxidation than sulfuric acid in the presence of other formaldehyde substances.

11. The process of producing formaldehyde which consists in reacting with permanganate of potash on a formaldehydebisulfite substance.

12. The process of producing formaldehyde which consists in reacting with permanganate of potash on a formaldehydebisulfite substance in the presence of other formaldehyde substances.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this 20th day of February 1908.

HANS SCHNEIDER.

Witnesses:

ERNEST H. L. MUMMENHOFF,
OTTO W. HEILMICH.