

711,468

UNITED STATES PATENT OFFICE.

KARL BOSCH, OF LUDWIGSHAFEN-ON-THE-RHINE, GERMANY, ASSIGNOR TO BADISCHE ANILIN & SODA FABRIK, OF LUDWIGSHAFEN-ON-THE-RHINE, GERMANY, A CORPORATION.

SAPONIFICATION OF ALKALINE-EARTH CYANIDS.

No. 911,468.

Specification of Letters Patent.

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Application filed January 4, 1907. Serial No. 350,844.

To all whom it may concern:

Be it known that I, KARL BOSCH, doctor of philosophy and chemist, subject of the King of Prussia, residing at Ludwigshafen-on-the-Rhine, Germany, have invented new and useful Improvements in the Saponification of Alkaline-Earth Cyanids, of which the following is a specification.

The usual method hitherto employed of obtaining ammonia from cyanids of the alkaline earths has consisted in saponifying the said cyanids by heating them with steam at temperatures between 300° and 500° C. (see for instance Dingler *Polyt. Journ.*, 1860, p. 316; Mond, German Patent No. 21,175, p. 2; Alder, German Patent No. 12351, p. 5). The ammonia obtained according to this process, however, contains considerable quantities of gases which are produced as by-products, such for instance as carbon monoxid and hydrogen, moreover when a fairly pure cyanid containing only small quantities of free oxid is employed, a considerable quantity of hydrocyanic acid does not become saponified, but, combined with the ammonia which has been produced, distils over in the form of ammonium cyanid. Consequently this process is open to the objections that impure ammonia is obtained and a part of the nitrogen is not converted into ammonia. If the reaction be carried out at lower temperatures, although the formation of carbon monoxid and of hydrogen may be avoided, yet a part of the hydrocyanic acid remains unsaponified and distils over with the ammonia, which is thus obtained in an impure condition. I have now discovered that the saponification of the cyanids of the alkaline earths can be carried out so that the whole of the nitrogen contained in the said cyanids is converted into ammonia by heating the raw cyanid with water, or steam, at temperatures not exceeding 250° C., provided that the heating be carried out under pressure. The ammonia is thus obtained in the pure condition. In carrying out my invention, the time and the

temperature employed can be varied within certain limits and the process be carried out at a lower temperature for a longer time, or at a higher temperature for a shorter time.

The following is an example of how my invention may be carried out, but my invention is not confined to this example. The parts are by weight. Reduce four hundred (400) parts of barium cyanid to a coarse powder and introduce it into six hundred (600) parts of water in a steam-jacketed autoclave provided with a stirring apparatus. While stirring, raise the temperature, slowly, to one hundred and fifty (150) degrees centigrade and maintain this temperature for about five (5) hours until the pressure in the autoclave remains constant, thus showing that the saponification is complete. On opening the autoclave the ammonia, which is saturated with aqueous vapor, but is otherwise pure, streams out and can be freed from water by cooling and, if necessary, by passing through quicklime, and can then be compressed, or treated, or employed, in any other desired manner. The yield of ammonia is almost theoretical. The residue remaining in the autoclave can be worked up in any desired manner and yields formic acid, also in almost theoretical amount.

Now what I claim is:

1. The process of saponifying cyanids of the alkaline earths which consists in heating such cyanids with water under pressure at a temperature not exceeding two hundred and fifty degrees centigrade.

2. The process of saponifying barium cyanid by heating it with water under pressure at a temperature not exceeding two hundred and fifty degrees centigrade.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

KARL BOSCH.

Witnesses:

ERNEST F. EHRHARDT,
J. ALEC. LLOYD.

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