

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE DISPOSAL OF WASTE CYANIDE SOLUTIONS

Helmut Beier, Frankfurt A/Main, Germany;
vested in the Alien Property Custodian

No Drawing. Application filed November 25, 1939

My invention relates to a process for the disposal of waste cyanide solutions, more particularly of solutions which contain practically no metal salts.

Hitherto it was known to convert waste solutions or liquids containing cyanide, copper and, for instance, other metals, such as zinc, into non-toxic solutions by a treatment with caustic potash, lime or the like whereby the grade of alkalinity is specially adjusted for the oxidising treatment. In order to obtain a practically complete conversion of the cyanide into cyanate and copper the waste liquids are treated with oxidising means such as halides, for instance, chlorine, hypochlorite, hydrogen peroxide and the like at elevated temperature until all cyanide is completely converted into cyanate and copper in its bivalent form. The copper oxide which is precipitated from the alkaline solution is then separated from the detoxicated solution.

Object of my invention is a process for the disposal of cyanide containing liquids, more particularly, waste solutions which contain practically no metal salts. These waste solutions will be found, for instance, at case hardening processes of iron and steel with cyanide or, generally, at industries where hydrocyanic acid is present in the waste solutions.

According to my invention the detoxication of the cyanide containing waste solutions which are substantially free from metal salts, is carried out in such a manner that the solutions are adjusted to the suitable degree of alkalinity by alkaline substances whereupon the cyanide containing solutions are subjected to an oxidising conversion treatment with the formation of a cyanate.

The solution may be rendered alkaline by caustic potash, soda, caustic lime, furthermore in combination also, for instance, of caustic lime and caustic potash. As suitable oxidising means halides, particularly chlorine, hypochlorite, for instance, sodium hypochlorite or calcium hypochlorite, further hydrogen peroxide and the like may be utilized.

The oxidising treatment may be carried out either at room temperature or at elevated temperature, for instance, at about 40 to 80° centigrade. This treatment is continued until all cy-

anide has been converted into non-toxic cyanate. The cyanate undergoes thereby a more or less extensive saponification.

I have found that waste solutions or the like which are alkaline per se can generally not be treated according to my invention without a further addition of alkaline substances, such as caustic potash or caustic lime, in order to secure a smooth and complete running of the oxidation. The amount of the alkaline addition substances depends on the kind of waste liquor, kind of addition substances and kind of the oxidising treatment. The grade of alkalinity which is best suited for the oxidation may easily be detected by simple preliminary tests.

It has been found advantageous to use quick lime for the alkalisation of the solution whereby the heat thereby developed may be utilized for the heating up of the solution itself. In the same way, for instance, the introduction of chlorine in strong alkaline solutions yields heat of neutralisation which may be used for the above mentioned process.

Examples

1. 200 grs of bleaching powder or equivalent quantities of any hypochlorite (about 35% active chlorine) are added at room temperature to 25 ltrs of a cyanide containing waste liquid with a content of 1 g KCN/liter which is made alkaline by 200 grs caustic soda. The suspension is stirred for some time and afterwards filtered. The filtrate is free from cyanide.

2. 400 grs slaked lime and 400 grs bleaching powder are added to 50 liters of a cyanide containing waste solution with 1 g KCN/liter. The dissolved mixture is stirred for some time and clarified by deposition. The water separated from the precipitate is detoxicated.

3. In 50 ltrs of a waste solution, made alkaline with 400 grs of slaked lime and heated to about 40 to 60° C., with a content of 1 g KCN/liter, chlorine is passed under stirring until the whole cyanide is oxidised or the hereby formed cyanide partly or wholly saponified under development of ammonia and formation of bicarbonate.

HELMUT BEIER.