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PROCESS OF DECOMPOSING THIOCYANIC ACID

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2 Claims. (Cl. 23—119)

The present invention relates to a process of decomposing thiocyanic acid, more particularly it relates to a process of decomposing thiocyanic acid and salts thereof by means of sulfuric acid in the presence of ammonium sulfate and in apparatus being constructed of or lined with chromium-nickel steel.

It is known that thiocyanates are hydrolyzed by means of dilute acids, such as sulfuric acid, phosphoric acid or similar acids or also mixtures of these acids with the production of the ammonium salt corresponding to the acid. This is effected by heating thiocyanates with these acids advantageously under pressure, to temperatures exceeding 100° C., for example, to 140 to 180° C.

The reaction proceeds according to the following steps:

$$2NH_4CNS+H_2SO_4=2\ HCNS+(NH_4)_2SO_4$$
$$2HCNS+2H_2O=2NH_3+2COS$$
$$COS+2H_2O=2CO_2+2H_2S$$
$$2NH_3+H_2SO_4=(NH_4)_2SO_4$$

or summarized:

$$2NH_4CNS+2H_2SO_4+4H_2O=2(NH_4)_2SO_4+2CO_2+2H_2S$$

This process has however been found to be very difficult to carry out from the point of view of the apparatus employed since almost all the metallic materials coming into question are strongly attacked by the hot acids or by the thiocyanic acid primarily produced. Even the chromium nickel steels which consist of 15–40% of Cr, 20–4% of Ni and up to 1% of C; or 6–25% of Cr, 20½% of Ni and up to 1% of C; or 18–24% of Cr, 7–20% of Ni, 2–6% of Cu and 0.1–0.4% of C; or 18–30% of Cr, 20–4% of Ni, 2–4% of Mo and 0.1–0.4% of C, which otherwise are very resistant to acids have been found not to be durable in the process described.

In accordance with the present invention the attack on the metallic apparatus in the hydrolysis of the thiocyanic acid by means of sulfuric acid is considerably reduced, provided that the reaction is carried out in the presence of ammonium sulfate.

Particularly resistant to corrosion are in this case steels, which consist of 18–30% of Cr, 20–4% of Ni, 2–4% of Mo and 0.1–0.4% of C, as, for instance, a steel having the following composition:

	Percent
C	0.15
Si	0.62
Mn	0.59
P	0.037
S	0.002
Ni	9.7
Cr	16.56
Cu	0.2
Mo	2.55

Fe—residue

Obviously it is not necessary to construct the whole apparatus of this molybdenum steel, it is sufficient to line with this special steel those parts of the apparatus coming into contact with the reaction solution. In the case of apparatus lined with acid resistant masonry only the fittings—(for example heating and thermometer-tubes)—need be constructed of molybdenum steel.

The following example illustrates the invention without restricting it thereto:

Example.—A mixture of 3 parts by weight of ammonium thiocyanate, 4 parts by weight of concentrated sulfuric acid and 120 parts by weight of an aqueous solution containing 35–40% of ammonium sulfate is heated for several hours to 150–180° C. in an autoclave consisting of chromium-nickel steel containing molybdenum. Complete hydrolysis of the ammonium thiocyanate then occurs with formation of ammonium sulfate and the apparatus is not substantially corroded.

I claim:—

1. In the process of decomposing thiocyanic acid by means of a mineral acid the step which comprises heating the thiocyanic acid in the presence of sulfuric acid and ammonium sulfate which has been added before the reaction to a temperature between about 100 and 180° C. in an apparatus the corrodable parts whereof consist at least on the surface of chromium-nickel steel.

2. In the process of decomposing thiocyanic acid by means of a mineral acid the step which comprises heating the thiocyanic acid in the presence of sulfuric acid and ammonium sulfate which has been added before the reaction to a temperature between 100 and 180° C. in an apparatus the corrodable parts whereof consist at least on the surface of chromium-nickel-molybdenum steel.

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