SYNTHESIS REACTIONS BASED ON ACETYLENE

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ANNOTATSIYA

Vinyl chloride is one of the most important monomers, mainly for the production of polyvinylchloride, as well as for the acquisition of sopolimers with vinyl chloride, vinilatsetate, acrylonitril, methylmetakrilat, etc. It is also used in the extraction of vinyldenxloride and methyl chloroform [1].

The hydrochlorized vinyl chloride extraction of acetylene is characterized by the following reaction:

$CH\equiv CH+HCl\rightarrow CH_2=CHCl$ + 112,4 kj/mol (1)

During the reaction, 1.1-dichloretan is produced.

$CH_2=CHCl + HCl\rightarrow CH_3CHCl_2$ (2)

Muvozanat konstantalarining temperaturaga bog'lanishi quyidagicha ifodalanadi:

$lgKp_1=794/t+0.72$ $lgKp_2=456/t-3,25$

When the temperature is < 300oC (1), the reaction is almost irreversible. At 200°C, a small amount [at 0.12% mass 1 MPa] can be produced from 1,1 dichloretan, especially when pressure is increased.

Kalit so'zlar: atsetilen, vinylatesetet, acrylonitrile, vinyl xloride, gidroxlorlash,catalyst,reactor, atsetaldegid.

Log in

The process is carried out in the presence of a catalyst in the gas phase. In order to ensure high conversion (98-99%) and selectivity (≥99%) of the first reagents, mercury (II)chloride absorbed into the activated charcoal surface is used as a catalyst. Coal activated in this catalytic system is not only an inert base but also an active component, and therefore its chemical nature and structure have a significant impact on the properties of the catalyst. The most important for the catalyst in the industry is the economic indicators-catalyst stability, its flour and selectivity. These indicators are mainly determined by the catalyst's deactivation, which depends on the return of copper(II) chloride and metal state to a certain extent the basis nature and structure. In industrial conditions, the catalyst's service life ranges from 0.5 to 1 year.

The basic structure is determined by its porousness-macro-micro- and the presence of deep holes. The intermolecular force from all these filaments is enough to support more than $r_{C_2H_3Cl}=0,816\text{нм}$ $r_{C_2H_2}=0,581\text{нм}$ the gec π weight—$r_{HCl}=0,472\text{нм}$ when it is skittering upside down across a globe! Therefore, microorganisms smaller than 1.0 nm in diameter cannot participate in the hydrochlorization process. In this process, the main role is played by holes: the higher the number of holes, the more active the mercury dixloride is adsorbed, and the more active and stable the catalyst. The chemical nature of the foundation is determined by the presence of functional groups on its surface: carboxyl, carbon dioxide, and hydroxyl (phenol and alcohol type). The stability and activity of the catalyst decreases due to an increase in the number of carbon dioxide groups; Phenol groups, on the other hand, can increase stability due to oxidation up to xinons.

1.Atsetilenni gidroxlorlash jarayonlari

In order to improve the stability of the symphis catalyst, specially prepared activated coal surfaces are absorbed along with mercury (II)-chloride, as well as organic amino acids and their salts. Due to the high activity of the mercury catalyst, its kinetic capabilities are very difficult to use. This, on the one hand, depends on the very exothermicity of the atsetylene hydrochloride reaction, while on the other hand, the maximum temperature of the reaction is limited to 150-180oS due to the high triency of the mercury dichloride. The problem of heat reduction, which is given to the reactor, can be solved by hydrochlorizing the promoted mercury catalyst in the pseudosuyuq layer by adding lantan chloride. In order to eliminate the harmful effects of anorganic compounds (silicon, aluminum, iron compounds) contained in activated coal, coal is washed with mineral acid before the mercury dichloride is absorbed [92]. But even if the amount of vinyl chloride derived from the catalyst unit increases 5-7 times in such a process, the conversion rate of acetylene is not high enough.

When conducting the reaction in a stationary layer, tube reactors that resemble heat exchangers are used to provide a convincing distance of heat. Usually the diameter of the pipes is 50-80 mm and the length is 3-6 m, their number in the reactor is ≈1000 pieces, and this is determined by structural boundaries. Such reactors have a capacity of 10,000 tons of vinyl chloride a year. Even when small diameter tubes are used, the reaction passes in a relatively narrow zone: as the catalyst is eaten (the transfer and deactivation of mercury dichloride), this zone moves in the direction of the reagents inside the tube. The kinetics of the hydrochloration reaction were studied in a differential reactor and a reactor model was created to verify and calculate the optimal parameter of the process of hydrochloride synthesis of acetylene [93]. Optimization has shown that differential heat extraction across zones can significantly increase the reactor flour. The reactor flour can be increased even when the reactor is filled with two layers of catalyst under isotermic mode: the first layer consists of 15-20% mercury dichloride in activated coal, the second is stabilized with the oxide and the silicagel surface consists of 1-5% mercury dichloride. The procedure is $^{\text{carried}}$ out at 90-250 C and 0.01-0.15 MPa. Instead of applying two layers of catalyst, two reactors can also be used sequentially, the initial mixture reacts partially first in the first reactor filled with the catalyst used at 110-150oC, then proceeds at a second reactor filled with a new catalyst at 70-115oC. In order to achieve better stability and rapid operation of the catalyst, heated (100-110oC) reaction gases must be sent to the reactor first. The process begins when hydrogen chloride is abundant or when there is an inert gas that provides an optimal volume speed.

Refrigerating the catalyst is a very interesting method that allows you to reduce the use of mercury twice while improving the working characteristics of the reactor. At the same time, the catalyst consists of a mixture of 8-15% mercury dichloride-pumped activated charcoal (2-1):(1-2), but the average amount of mercury dichloride in the mixture should be more than 4% (mass). Liquefiing the catalyst with an inert material is also used; only the first layer of catalyst in the direction of gases is liquefied. This will prevent overheating and catalyst deactivation in these areas. The process is performed in a temperature-changing mode along the layers of the catalyst.

Studies of the effect of mercury dichloride concentration on catalyst life showed that the initial activity of the catalyst and subsequent decrease in the rate of substance rotation were dependent on the initial concentration of the mercury dichloride [94].

When hydrochloride atsetylene in a gas phase dichloride mercury catalyst, the mercury dichloride must be cleaned. To clean the reaction gas from mercury dichloride, adsorption or absorption in strong chloride acid is used in active coal. The use of a solution of iron chloride in chloride in the second method allows you to clean the reaction gas not only from mercury dichloride, but also from mercury [95].

In recent years, data have emerged on the volumeal study of the reaction when hydrochloride of acetylene is carried out in the gas phase. In the absence of a catalyst, acetylene hydrochloride can be amplified by adding 1% chlorine. The kinetics of the reaction between 160-330oC have been studied and the mechanism has been proposed.

Technological scheme for hydrochloride of acetylene in the gas phase is given in [96]. Carbon monoxide is a colorless, odorless gas that kills by stopping red blood cells from delivering oxygen in the body. The resulting acetylene is purified from phosphorus compounds, sulfur, ammonia and high gomologists of acetylene. If necessary (obtained with acetylene hydrocarbon pyrolysis), it is concentrated in solvent mode and dried with dry diarrhea or sulfuric acid until its humidity is 1.5 g/m3.

Dried acetylene is injected into the mixer and later gases are also sent there refined and dried hydrogen chloride. Usually acetylene: the chlorovodorod ratio is 1.0:(1.1-1.05). Then a mixture of gases is given to the top of the reactor. The reactor is made of carbon steel (Fig. 1); the height of the pipes is 3-6 m, diameter is 50-80 mm. Typically, a catalyst of 6-12 m3 is inserted into the reactor. The temperature in the reaction zone is 150-180oC.

Then the reactive gases end up in consecutive cleaning colonies. After the reactor, the gases are washed in a nasal colony in order to separate the mercury dichloride, which is transported by 20% chloride. Then the reactive gas is washed with diarrhea solution to clean it from hydrogen chloride, acestaldehyde and carbon dioxide (IV). Then the gas is cooled in a condenser, where it is cooled with a saline solution, and the moisture is lost and sent to rectification. The recitation system consists of two tarpaulin colonies: the first produces high-boiling mixtures, mainly a mixture of 1.1 and 1.2 dichloretans, and the second produces low-boiling

mixtures. The resulting recectipe passes through a colony of drying a finished product filled with solid sodium hydroxide to completely dry and neutralize vinyl chloride. The main disadvantages of the technology of obtaining vinyl chloride in the gas-phase hydrochloride of acetylene include:
Relatively short catalyst service time, the use of low quality (containing many ashes and iron) active charcoal;
Due to the application of mercury dichloride as an active mass of catalyst, etc.

2. Hydrochloride of acetylene in liquid phase

This can be done in the environment of water or organic solvents. As catalysts, mainly mercury chlorides and copper(I)chloride or their mixture are used. A mixture of copper chloride with ammonium chloride, calcium chloride, trietanolamine, mono-, di- and trimetilamin chlorides is also used. The catalyst can be both dissolved and in a suspension state.
Hydroxloration in the aquatic environment is complicated by the formation of acetaldehyde as a result of a yonaki reaction. To eliminate burnt processes, phosphin and alkilarilfosfin are added to mercury and copper chlorides. In order to avoid the deactivation of the catalyst by the returners, which are present as additives in acetylene, iron chloride is added to the solutions in the mercury dichloride water.
As dehydrated solvents, dimetylformamide and N-methylpirrolidon chlorgidrates and tin (IV)-chloride are offered.
The main difficulty in the hydrochloride of acetylene in the liquid phase is the choice of structural material for the reactor, pump, armature, etc. In the liquid phase, hydrochloride is carried out in damper-type reactors at 50-95 oC. The concentration of hydrogen chloride in water should not be less than 5%. The conversion of acetylene in one transition is 40-50% in copper catalysts and 75-90% in mercury. The main advantage of the liquid-phase process is the enlarging of the lightweight solution to the heat extraction problem and thereby the reaction apparatus. Among the shortcomings can be the relatively low conversion and selectivity of acetylene and the difficulty of equipping the reaction part and technological scheme with equipment.
The liquid-phase hydroxlorization variant of acetylene proposed by G.K. Oparin and R.M.Flid [97] stands close to the gas phase in terms of its technological and technological sequence. The solution of mercury dichloride and copper chloride is the most active and stable. The concentration of the mercury dichloride solution should not exceed 3 molecules/l, otherwise the stability of the solution will decrease.
Tests have shown that the reaction in the hydrochloride reactor of acetylene is complicated by diffusion, and that the real kinetic laws of the process are determined by the actual kinetics of the reaction and the mass and heating conditions.

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