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Silver acetylide

Silver acetylide is a primary explosive. There are two forms of this salt:

- Ag_2C_2
- $Ag_2C_2 \cdot AgNO_3$ ($Ag_3C_2YEAH_3$)

The first one is created when acetylene is passed through an ammoniacal solution of silver nitrate. The second salt is formed when acetylene is passed through an aqueous solution of silver with the addition of nitric acid. In principle, the second form should be systematically called trisilver dicarbide nitrate, but it is also colloquially called silver acet. We will deal with the second salt because the first one has weaker initiating properties and is much more sensitive.

$Ag_2C_2 \cdot AgNO_3$ obtained using a typical method, it has the form of a very fine powder, so fine that it sticks to the hands like powder. The color ranges between white and almost black, what with the moment at which we stop passing acetylene through, as well as its purity (after some time, acetylene begins to reduce silver, which results in the formation of a black suspension). It is insensitive to friction. Impact sensitivity is lower than lead azide. Excitation occurs after the fall of a 2 kg weight from a height of 3.4 cm (for PbN_6 - 3.2 cm). Exposed solar radiation is covered with a thin black layer containing metallic silver for a period of approximately 6 hours, but this does not significantly affect its detonation parameters. In rehearsal gives a bulge of 145 cm^3. It detonates at a speed of 3460 m/s and a density of 3.96 g/cm^3. The excitation temperature is 217°C and the explosion temperature reaches 5740°C.

Field tests have shown that 30 mg of acetylide excites 3 g of PETN in the primer. Assessing its usefulness, it can be safely said that it is a suitable substitute for lead azide. Additionally, the reagents are relatively easy to obtain and their low toxicity, unlike the reagents used in the synthesis of lead azide.

The decomposition reaction equation is as follows:

$$Ag_2C_2 \cdot AgNO_3 \rightarrow 3\ Ag + CO_2 + CO + 0.5\ N_2 \quad \Delta H = -753.6\ kJ/mol\ (180\ kcal/mol)$$

Receiving

Reagents

- Silver nitrate $AgNO_3$
- Calcium carbide (carbide) CaC_2
- Nitric acid, HNO_3 65%
- Demineralized water
- Spirit C_2H_5OH
- Acetone $(CH_3)_2$WHAT

Equipment

- Flask with side tube (e.g. suction cup) 250 ml
- Dropping funnel or funnel
- Rubber hose (can be one from a pet store for the pump)

- Beaker 100 ml
- Glass gas tube (can be a syringe needle) Filter
-

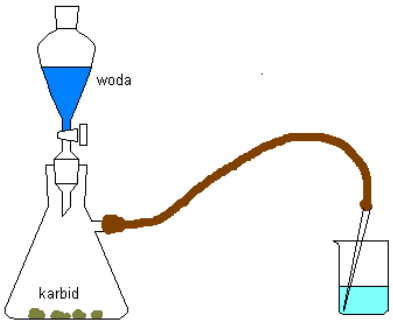
Replacement equipment (visible in photos)

- Conical flask 250 ml
- Rubber hose
- 2 ml syringe
- Beaker 100 ml
- 2 syringe needles

Comments

Silver nitrate should be of reagent purity, it can be made yourself from silver, but this method is more expensive and may make the acetylide contaminated and sensitive.

First we assemble the apparatus. Depending on the equipment we have, we do it as shown in the drawing or in the photos.



After assembling the apparatus, we throw a few pieces of carbide into the flask, place a dropping funnel or funnel into which we pour distilled water. We weigh 10 g of nitrate, place it in a beaker and add 40 ml of demineralized water. When the nitrate dissolves, add 6 ml of nitric acid. Introduce the tube into the solution, ending with a needle, the end of which should be at the bottom of the beaker. Now add water onto the carbide to obtain a constant flow of acetylene with an average, even pressure (bubbles should fly out of the needle slightly faster than they can be counted).

We will almost immediately notice the appearance of turbidity, which slowly covers the entire liquid. A sign of the end of the reaction is a slight darkening of the solution (the beginning of ion reduction. Then, cut off the acetylene supply. The feeding needle should be immersed in the solution during the entire synthesis, otherwise the surface of the solution will turn black as a result of the reduction. Bottom the beaker of alcohol and wait until our acetylide sinks to the bottom.

The next step is to filter the obtained precipitate. We use a filter or coffee filter for this purpose. We wash the precipitate successively with spirit and acetone. Dry in a dark, dry place

Security

As mentioned in the introduction, silver acetylide is a primary explosive. This means that it must be handled with the utmost care. Overall it is safe and you should be extremely careful!! Keep away from sources of fire, heat and light. Although this MWI shows no signs of reacting with metals upon short contact, it should be avoided. During the synthesis, we produce flammable acetylene - appropriate precautions must be taken (exhaust fume hood, no sources of ignition, good ventilation). You should not synthesize large amounts of this compound

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Source:

- Power Labs Silver Acetylide Synthesis

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