

SELF-MADE GLASS TUBES REACTORS FOR SCHOOL ORGANIC SYNTHESIS

Denis Zhilin

Moscow Institute for Open Education, 125167, Aviacionnyj per., 6, Moscow, Russia; School #192 (Moscow)

E-mail: zhila2000@mail.ru

Organic synthesis requires sometimes expensive reagents and equipment. Meanwhile the products of synthesis usually are thrown away. It means that for school organic synthesis small amounts of reagents are needed. But then they will get smeared on the walls of the vessels. We use tube reactors. They are made of glass tubes with inner diameter ~5-6 mm by several blower operations alternating with charging by reagents. It allows working with about one gram of reagents that is enough to make quantitative reactions with products and to smell them. Small amounts of substances and high surface/volume ratio of small reactors facilitates cooling them when necessary. These reactors are very cheap and thus throwaway.

The simplest reactor is long tube sealed at one end. It is used to heat reaction mixture for a quite long time (for example, for esterification). The vapours are cooled in the upper part of the tube by air or wet tissue. When necessary the upper part could be cut off and the products poured wherever it is necessary. 1-shape reactor (Fig. 1) is used for thermal decomposition of substances (decarboxilation, synthesis of ketones from calcium carboxilates etc) condensing products in a test-tube. Reactor at Fig. 2 is used for catalytic decomposition of vapours (for example for alcohol dehydration).

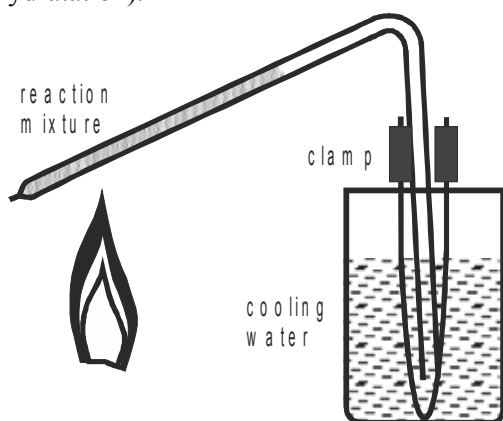


Fig. 1. 1-shape reactor

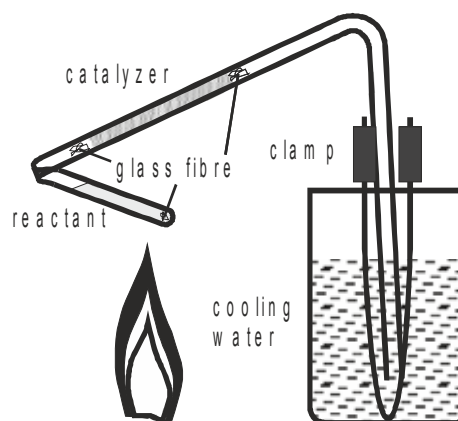


Fig 2. Reactor for catalytic decomposition

Initially students of 10th grade (15-16 y.o.) spent about one hour to make 1-shape reactor, however later the time shrank significantly. There are the following hazards: (a) students burn their fingers with hot glass while blowing (especially for the first time); (b) reactors can be destroyed if they are heated in a not proper way and the reactants can inflame. It is not very dangerous because of the small amount of reactants but quite striking.