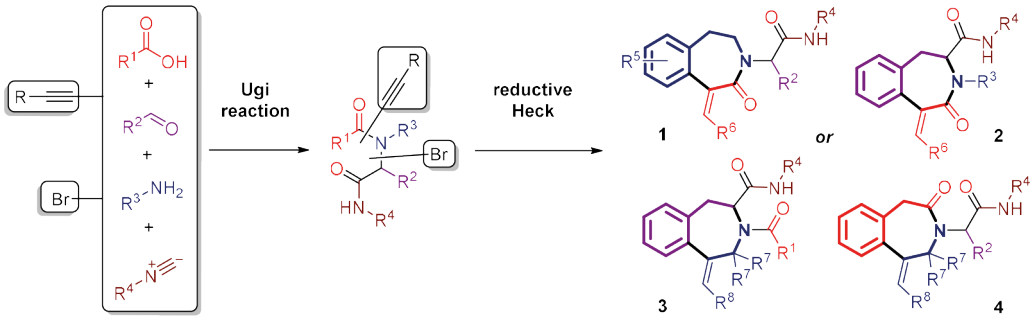
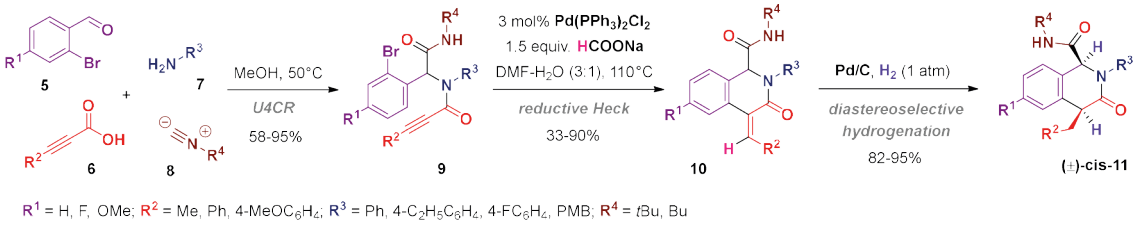


Scheme 1. *Strategy towards 3-benzazepines **1–4** using U4CR/reductive Heck sequence*



R^1 = H, F, OMe; R^2 = Me, Ph, 4-MeOC$_6$H$_4$; R^3 = Ph, 4-C$_2$H$_5$C$_6$H$_4$, 4-FC$_6$H$_4$, PMB; R^4 = *t*Bu, Bu

Scheme 2. *Diastereoselective synthesis of tetrahydroisoquinolines **11** via post-Ugi reductive Heck cyclization and subsequent double bond hydrogenation*

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ALKALINE HYDROLYSIS FOR RECYCLING PET

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Most items, which we use on a daily basis, are made of plastic. After using it is sent to landfills consisting of large areas near localities. Consumption and production of different plastics increases the amount of industrial and domestic waste in the form of plastic products, which is already enormous. Plastic waste does not destruct. In any case, plastics and other polymers increase environmental hazard [1]. We can only imagine how the planet will be damaged unless we give due consideration to the issues and concerns relating to the use of recycled products.

Polyethylene terephthalate (PET) is the foremost waste, both industrial and domestic. PET is a saturated polyester of terephthalic acid and ethylene glycol. We all know it as plastic bottles, packing containers for food or even fibres for textile. PET has reasonably stable mechanical properties. For instance, good thermal stability; long polymer molecule, therefore, mechanical strength; resistance to organic solvents; low index of water absorption. As a result, secondary material on its basis is readily recyclable [2]. In general, PET waste is not toxic, but due to its large production, developments of various recycling technologies of polymeric materials are the current line [1]. There are several avenues nowadays.

To start with, PET waste can be incinerated to produce the heat. Calorific value of 2 tons plastic packaging waste is equivalent to calorific value of 1 ton oil (calorific value of PET – 22700 kJ/kg, calorific value of oil – 46600 kJ/kg). However, combustion causes air pollution, impacts negatively on the population's health and the environment. There-

fore, there is a need to use expensive filters to avoid dangerous gases releasing into the atmosphere [3].

Then, mechanical method or regranulation. Plastic film, tapes, hollow cores are recycled of into homogenous bulk regranulate. The greatest disadvantage of this method is the limitations of the use of the regranulate. It can be exploited for producing of construction blends.

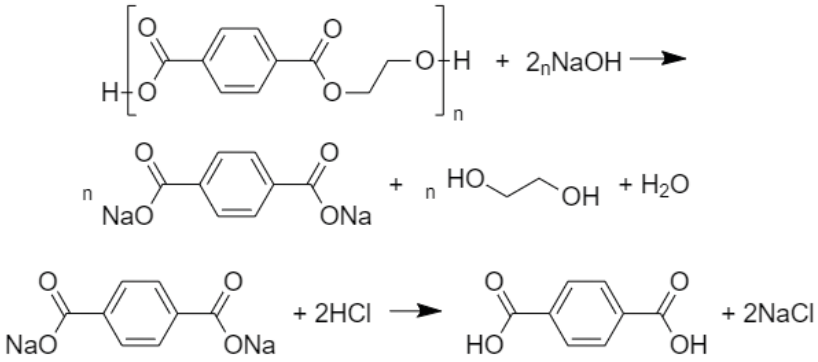
Finally, PET-bottles can be subjected to acidic or alkaline hydrolysis with release of terephthalic acid and ethylene glycol. Obviously, chemical method is not economically profitable. Hydrolysis is especially interesting, because it is the only way of recycling, which allows to obtain raw materials to produce something new. Moreover, hydrolysis is the most environmentally safe recycling method, consequently it is promising avenue [3].

The aim of this work was to explore the process of hydrolysis of secondary PET with a release of the main products terephthalic acid and ethylene glycol.

The reaction of alkaline hydrolysis is presented in chart:

For series of experiments 5 g of crushed PET-bottles were processed with aqueous solution of NaOH (20 ml of H_2O, 4 g of NaOH) at a temperature of 100–150 °C for several hours. Sodium terephthalate and ethylene glycol were produced by the reaction of hydrolysis. With the containing by hydrochloric acid the terephthalic acid precipitated. After separating, the terephthalic acid was cleaned and dried. Yield of the reaction products was determined. The percent degradation of PET was calculated using the following equation: $w = \frac{m - m_0}{m} \cdot 100\,\%$, where m – initial weight of PET, m_0 – final weight of PET.

The work resulted in research of hydrolysis of primary and secondary PET. It has been determined that secondary polymer has higher degradation. The effect of alkaline solution concentrations on the degradation of PET and release of the main products was studied. The most optimal concentration is 10 %. The terephthalic acid was produced from the secondary PET, its properties (melting temperature) were defined, structure was confirmed with IR spectroscopy. The obtained terephthalic acid has a fair degree of purity for the further use.



Scheme 1.

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