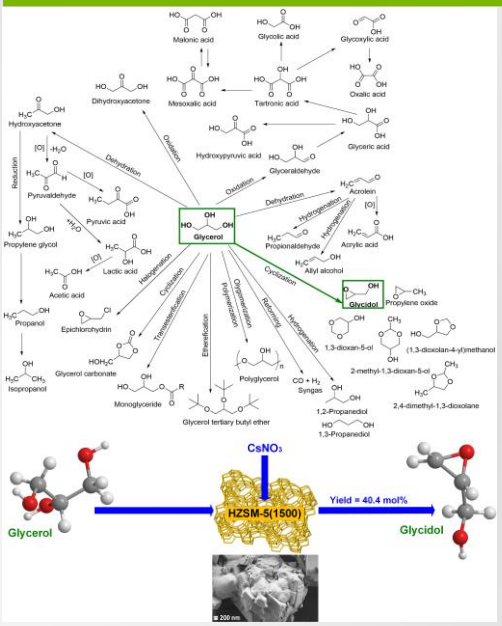
NATIONAL INSTITUTE OF CHEMISTRY

RESEARCH DOMAINS: Heterogeneous catalysis engineering

INDUSTRIES: Biodiesel, pharmaceutical, production chemicals with high added value

ONE-STEP SYNTHESIS OF GLYCIDOL FROM GLYCEROL IN GAS-PHASE FIXED-BED CONTINOUS FLOW REACTOR OVER ALKALI METAL PROMOTED ALUMINOSILICATE ZEOLITE CATALYST



Glycerol is the main byproduct (≈10 wt%) of the biodiesel industry. According to recent studies, glycerol has been recognized as one of the top 12 most important bio-based chemicals in the world. Glycerol can be dehydrated, oxidized, reduced, halogenated, etherified, esterified and epoxidized to obtain alternative commodity chemicals. The development of novel, selective and efficient chemical pathways towards application of glycerol-derived products remains a key scientific and industrial challenge.

Very recently, because of the unique molecule structure, the glycidol received a special attention as a valuable product from glycerol with many potential applications as an important monomer and semi-product in the synthesis of surface-active agents, high-boiling polar solvent, polyurethanes, polyamides, polycarbonates, polyesters, surfactants, lubricating oils, components of cosmetic preparations for skin moisturizing and purifying, hair shampoo, toothpaste, laundering detergents, disinfectants and etc. One of the most important applications of glycidol is the synthesis of analgesic and antiviral drugs, where the latter is the active compound fighting with the human immunodeficiency virus (HIV).

Technology

The present invention relates to the use of alkali metal promoted aluminosilicate zeolite catalyst for the direct gas-phase conversion of glycerol to glycidol, as well as to a process for the production of glycidol from glycerol in a fixed-bed continuous flow reactor in the presence of such a heterogeneous catalyst. The method comprises conversion of glycerol to glycidol in the range of temperature 250-450 °C, glycerol concentration 1-60 wt%, total gas hourly space velocity 100-2500 h^{-1}, weight of catalyst 0.5-5.0 g.

Main advantages

- A green and sustainable way for the glycidol production from glycerol over heterogeneous catalyst;
- High catalyst performance;
- One-step synthesis;
- Cost-effective reaction;
- Good eco-efficiency;
- Cheap heterogeneous catalyst;
- Atmospheric pressure;
- No need H donor;
- Gas-phase reaction;
- Fixed-bed continuous flow reactor.

Key words

HZSM-5; Cesium nitrate; Glycerol; Dehydration; Glycidol.

TYPE OF COOPERATION
R&D cooperation and technology licensing opportunity

INTELLECTUAL PROPERTY
EP20171608

DEVELOPED BY
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MORE INFORMATION ABOUT THE INVENTION

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