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Chapter

Introductory Chapter: A Brief Insight about Glycerol

Mattia Bartoli, Luca Rosi and Marco Frediani

1. Toward sustainability: glycerol and integrated conversions

Over the last century, oil-based economy drove the mankind on the edge of environmental collapse [1, 2]. Moreover, the continuous increment of oil consumption has rapidly decreased the worldwide reserves [3]. During the last decades, the increased accountability of companies with regards to environmental issues has represented a formidable driving force for the development of sustainable industrial processes together with innovative products. As a consequence, the production of fuels and chemicals has started to use recycled or renewable feedstocks in place of oil-based raw materials attempting to improve process sustainability [4]. Biodiesel commodities have been of the main driving forces of the sustainable economy simultaneously decreasing the emission of carbon dioxide and producing affordable biofuels for worldwide market. Actually, biodiesel production is mainly performed through transesterification of triglycerides using small chains alcohols (i.e., methanol, ethanol, etc.) leading to the massive production of glycerol as byproduct. A general estimation based on the actual production evaluate for 2020 an annual surplus of glycerol around to 4.2×10^6 ton/year [5].

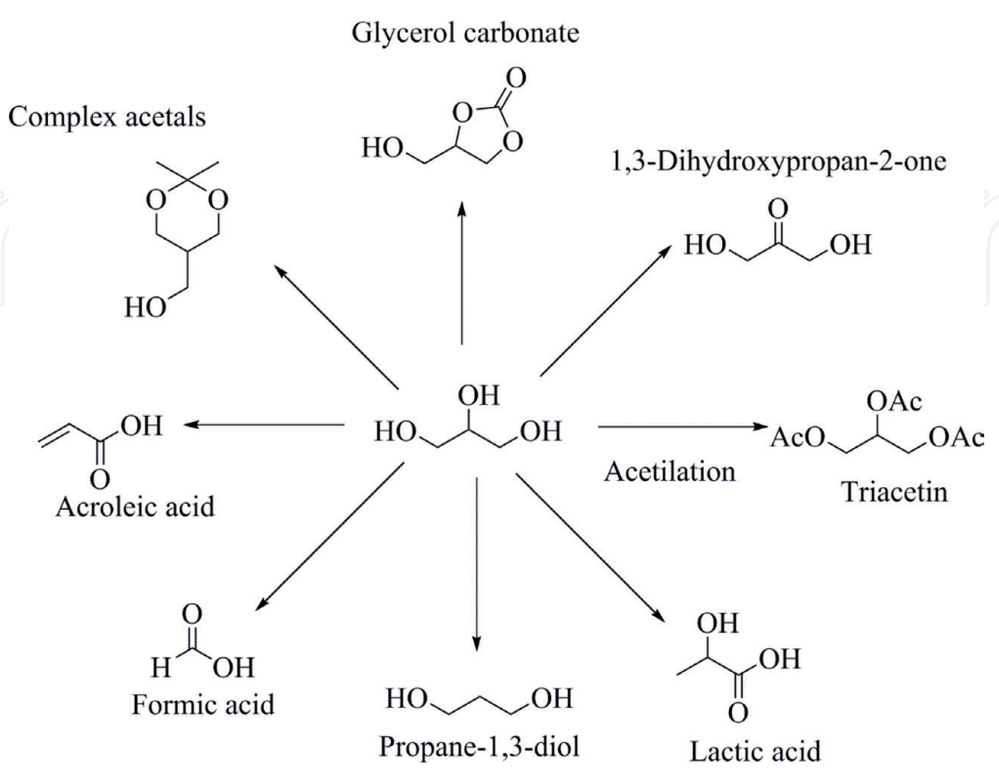


Figure 1.
Glycerol as sound candidate for multiconversion platform for chemicals production.

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Despite its large availability, producing refined glycerol from those recovered in the biodiesel stream is far more expensive than common production cause the costs of purification process. Thus, glycerol becomes an attractive molecule without a well-known industrial destiny [6]. Many authors have recognized its value as feedstock for a lot of conversions (i.e., oxidation, hydrogenolysis, etherification, esterification, etc.) without proposing a breakthrough technology for its valorization. Despite this, glycerol processing is one of the most polyhedral bio-derived molecules for enforcing chemical and biochemical conversions platforms [7]. The great versatility of glycerol led to its incorporation in multi approach bio-based processes dedicated on obtaining several chemicals (i.e., glycerol carbonate, drugs synthones, etc.), **Figure 1**.

The astonishing possibilities of glycerol are still unexploited. Nonetheless, it could become the resource for further development in the field of both green chemistry and blue economy.

2. Approaching the readers

The simultaneous glycerol conversion requires multidisciplinary approach that takes into account chemistry, engineering, and biological sciences.

Available literature generally lacks in a comprehensive point of view, focusing more on one single aspect of the problem. In this book, we collected contributes that tries to paint a complete and multidisciplinary picture on the great possibilities related to glycerol.

Through the chapters, we reported the use of glycerine as solvent, food additive, monomer for textiles polymers, and drugs. We discuss a lot about successful achievements of converting glycerol into value-added products, using a lot of approaches to enlighten the technical and scientific issues and solutions of each of them.

Furthermore, we would like to give readers a handy and effective tool to easily understand how this field is interesting and diverse.

Through its chapters, this monographic opera presents an overview on whether glycerol-based processes are convenient and economically sound considering both traditional and unconventional approaches.

This book could be easily used by any reader with a strong scientific background ranging from scientific company advisors to academia members. Nonetheless, students enrolled in scientific undergraduate and graduate programs could be consulted to this text for any further and deeper investigation.

In the end, we proposed a very high scientific content book that could represent the reference text for any consideration and future study about glycerol for the next years.

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