

Q&A for the lectures bio-oils production processes (Dr Sharma)

Q1: Please add your question here.

[Ans:](#)

Q2: Please add your question here.

[Ans:](#)

Q3: Please add your question here.

[Ans:](#)

Q4: Please add your question here.

[Ans:](#)

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Questions from previous years

Q1: Where is the methanol for the process coming from? I assume to be a fully sustainable/biomass-based process, another whole fermentation process chain has to be added? If so, are there synergies to biodiesel production?

Ans: Methanol can be from renewable or nonrenewable sources. The stoichiometric quantity of methanol varies between 10-15 vol% of oil (11.3 vol% for rapeseed oil). Instead of methanol, bioethanol can also be used for the production of biodiesel. Bio-methanol is produced by thermochemical conversion (i.e., gasification, synthesis and separation), whereas bioethanol is produced by biochemical route (i.e., fermentation and separation). If we integrate biodiesel and bio-methanol production, there would be some synergies. The waste heat available from the bio-methanol production that can be used in the biodiesel production.

Q2: What is the cost share of methanol, is that included in the feedstock cost?

Ans: Yes, the cost analysis includes costs of all raw materials (oil, methanol and catalyst), and utility (steam and water). It is possible to calculate the cost share of methanol, using the information available in the process flow diagram and tables in <https://doi.org/10.1016/j.fuel.2012.05.035>.

Q3: What is the source of nitrogen and phosphorus in the waste water?

Ans: If vegetable oil contains some impurities of nitrogen, sulphur or phosphorus, they may end-up in the biodiesel product.

Q4: Why do heavy-duty vehicle emissions change when blending diesel with biodiesel? Is it simply due to the new thermodynamic equilibria at the vehicle catalyst?

Ans: Emissions depend on the type of engine and properties of biodiesel. Properties of biodiesel (i.e., oxygen content, energy content, cetane number, viscosity and density) are influenced by the source of biodiesel (soyabean, rapeseed, etc.). Biodiesel is an oxygenated fuel that can reduce unburnt hydrocarbons. High oxygen content in biodiesel (compared to diesel) is responsible for higher NO_x emissions.

Q5: To which extent is the solvent (hexane) recovered after extracting the remaining oil ?

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Ans: 1.5 to 2 litres of solvent (hexane) is lost in processing 1 tonne of oil seed (soya).

Q6: Are the homogeneous catalysts recovered in the esterification and transesterification reactions? Why not use a heterogeneous catalyst?

Ans: Homogeneous catalysts are not recovered after esterification and transesterification reactions. Homogeneous catalysts are neutralised (acid catalyst using alkali, and alkali catalyst using acid) after the reactions. Heterogeneous catalysts are certainly a good choice, but they are in the development phase to achieve better activity, reaction rate and catalyst stability.

Q7: What is the ratio of the biomass used for biodiesel production to that used for food?

Ans: About 15% of vegetable oil production (mostly palm oil, soybean oil and rapeseed (canola) oil) go into biodiesel production. [Reference](#)

Q8: Could we find a greener alternative to the use of hexanes?

Ans: Yes, bio-ethanol can be used.

<https://www.sciencedirect.com/science/article/abs/pii/S0959652619335309>

Q9: What is the status of heterogeneous catalysts usage in biodiesel production?

Ans: Novel heterogeneous catalysts have been studied extensively, and could be commercialised in the near future. The following article gives a good background of different types of catalysts for biodiesel production.

<https://www.frontiersin.org/journals/energy-research/articles/10.3389/fenrg.2020.00101/full>

Q10: Is biodiesel deoxygenated possible?

Ans: Yes, it is possible to remove oxygen from the biofuels. Please check the following article. <https://doi.org/10.1016/j.rser.2019.06.031>