Nature of Invention: Process design

Applicant: SynthoChem

Inventors: Sneh Omer, Nitish Kumar Trivedi

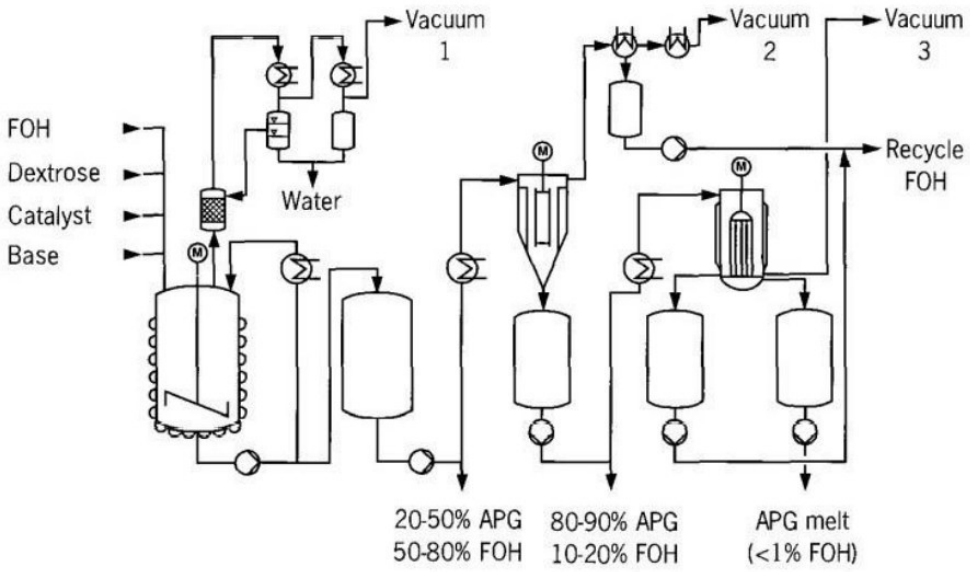
Chemical Formula: R(OCH2CH(OH)CH2)n(OGl)c where R=C8 to C10 alkyl chain and Gl = Glucose Unit

Chemical Name: Alkyl Polyglucoside (AGP-0814)

Process Title: Acid Catalysed reaction of Alcohol and Glucose

Process Description:

a. Block diagram:



b. Material Balance:

Assumptions

- Product Yield – 65%
- Plant Capacity – 1000 kg/day
- Fatty alcohol used is Decanol (Molecular Weight = 158g/mol)
- Degree of Polymerisation = 2 (two glucose unit in polymeric chain)

Molecular Weight of Glucose = 180 g/mol
Molecular Weight of Decyl Polyglucoside (DPG) = 518 g/mol

Since the yield is 65%, so for producing 1000kg of DPG, we should aim for [(1000/0.65)kg = 1538.5kg] of DGP production.

Assuming excess glucose in the reaction.
Mass of glucose = (Mass of DPG / Molecular weight of DPG) x (1 mol glucose / 1 mol DPG) x (180 g/mol)

Mass of glucose = (1538.5 kg / 518 g/mol) x (1 mol glucose / 1 mol APG) x (180 g/mol)
Mass of glucose = 534.44 kg
Mass of Decanol = (Mass of DPG / Molecular weight of DPG) x (2 mol Decanol / 1 mol DPG) x (158 g/mol)
Mass of fatty alcohol = (1538.5 kg / 518 g/mol) x (2 mol Decanol / 1 mol DPG) x (158 g/mol)
Mass of fatty alcohol = 938.54 kg
Therefore, to produce 1000 kg of DPG, we would need 534.44 kg of glucose and 938.54 kg of Decanol.

c. List the capacity of reactors needed and evaluate the cost. Use Glass lined Carbon steel (GS lined CS) as the material of construction (MOC). Use the pressure according to reaction conditions. You will use only 70% of the total volume. If you design a 1000 L reactor, you can only fill 700 L reaction mixture.

Capital cost (only for the reactor):

example:

Equipment	Design Capacity (L)	No. of units	Cost/unit ($ for year 2014)	Total Cost ($ for year 2014)
Reactor 1 (Mixer, GS lined CS,60 mbar)	2200	1	36,850	36,850
Reactor 2 (Vacuum Distillation unit, GS lined CS, 60 mbar)	2000	4	33,500	33,500

References: Provide reference for a research paper or an actual patent.

https://www.brillachem.com/news/requirements-for-the-industrial-production-of-water-soluble-alkyl-polyglycosides/

List the contributions of each author:

- Sneh Omer – has done research finding the block diagram for the process. She also worked on material balance and cost analysis of the process.

- Nitish Kumar Trivedi – has evaluated the capacity and cost of the plant. He also worked on material balance and cost analysis of the process.

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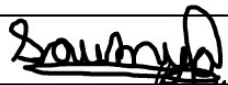
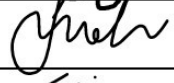
Saumya Gupta (CEO)	210944	
Sneh Omer	211041	
Nitish Kumar Trivedi	210680