Nature of Invention: Process design

Applicant: BCG

Inventors: Naman Goyal, Avi Gupta and Priyanka

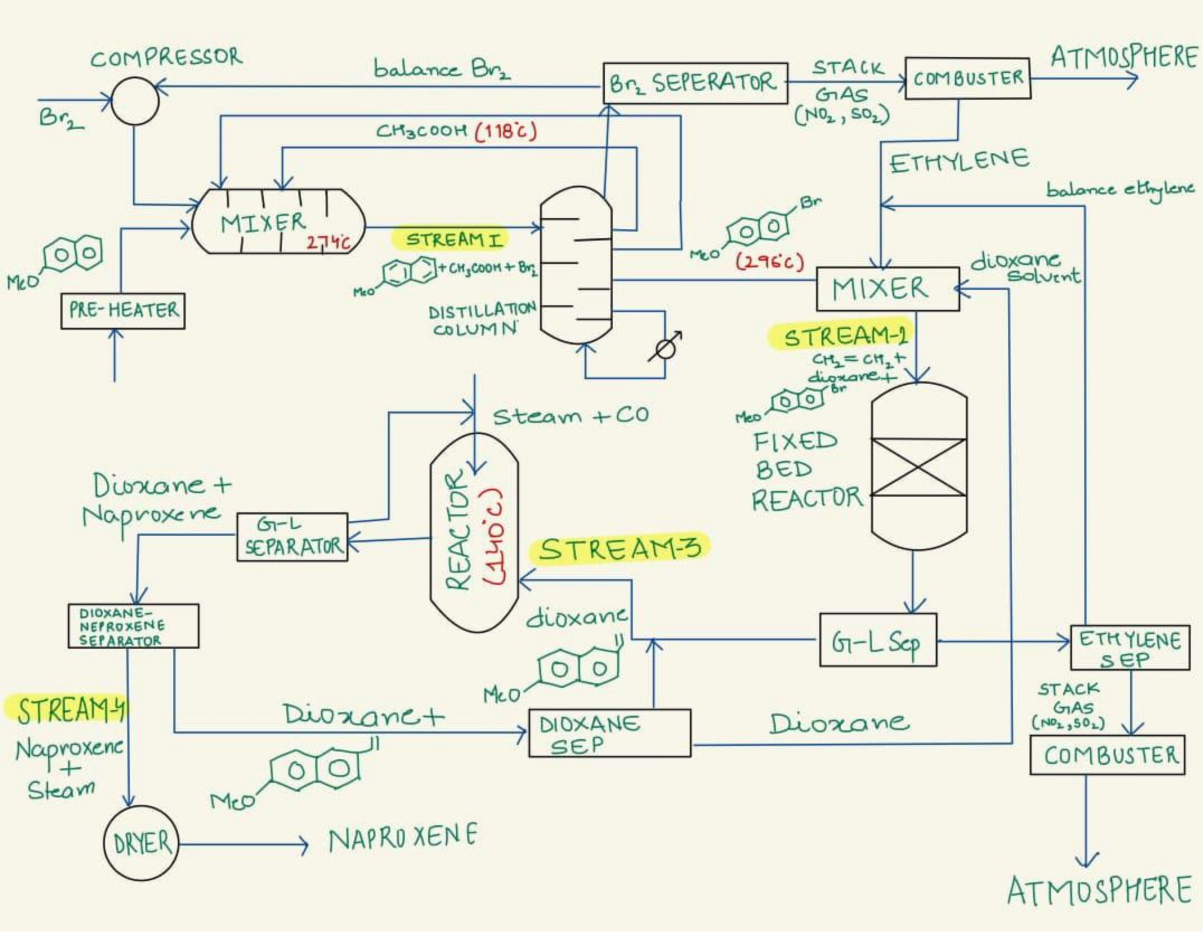
Chemical Formula: C14H14O3

Chemical Name: (S)-6-Methoxy-α-methyl-2-naphthaleneacetic acid

Process Title: Production of Naproxen from Methoxy Napthylene

Process Description:

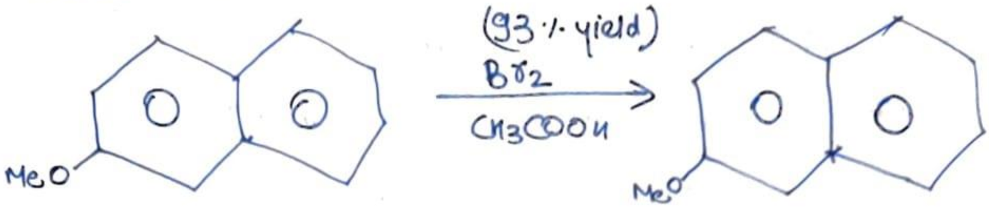
a. Block Diagram:



Catalysts for Fixed Bed Reactor are: Pd(OAc)2 and PPh3

b. Material Balance:

Material Balance:



Assumption: We have x Moles of Methoxy Napthylene (~~$C_{10}H_7$~~ $C_{11}H_{10}O$)

~~After~~ Recyled Moles : y moles

After Recycling we have $(x+y)$ moles of $C_{11}H_{10}O$

$$\Rightarrow 0.07(x+y) = 0.93y$$

$$\frac{0.07x}{0.93} = y$$

$$y = 0.075x$$

Total moles in ~~Str~~ Reactor/Mixer $= 1.075x$

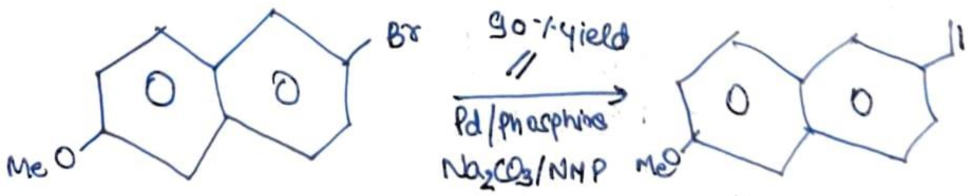
We need 1 mol of Br_2 for reac^n with 1 mol of $C_{11}H_{10}O$ so we need total $1.075x$ mole of Br_2 in Reactor

Recyled/Purge of Br_2 moles $= 1.075x \times 0.07$
$= 0.075x$ moles

Initial moles of Br_2 Required $= x$ moles

Total Moles of 2-Bromo 6 Methoxy Napthalene $= (x+y) \times 0.93$
$= 1.075x \times 0.93$
$= x$ moles

Heck Rx^n:



Total Moles after Recycling of 2-Bromo-6 Methoxy Napthylene going into reactor $= (x + y)$ moles

where y is Total moles recycled

$$0.1(x + y) = y$$

$$\frac{x}{9} = y$$

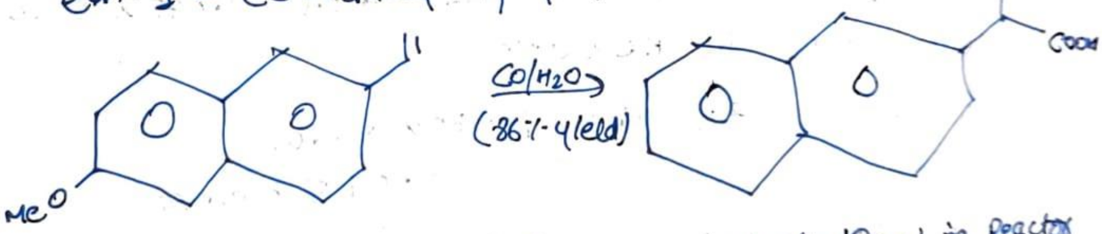
Total Moles of 2-Bromo-6 Methoxy Napthylene in Reactor $= \frac{10x}{9}$ moles

Required Moles of Ethylene In Reactor $= \frac{10x}{9}$ moles

UnReacted/Recycled Moles Of Ethylene $= \frac{10x}{9} \times \frac{1}{10} = \frac{x}{9}$ moles

Required Moles of Ethylene $= x$ moles

Now final Part is to convert Eth-1-(6 Methoxy Napthylene) to Naproxene

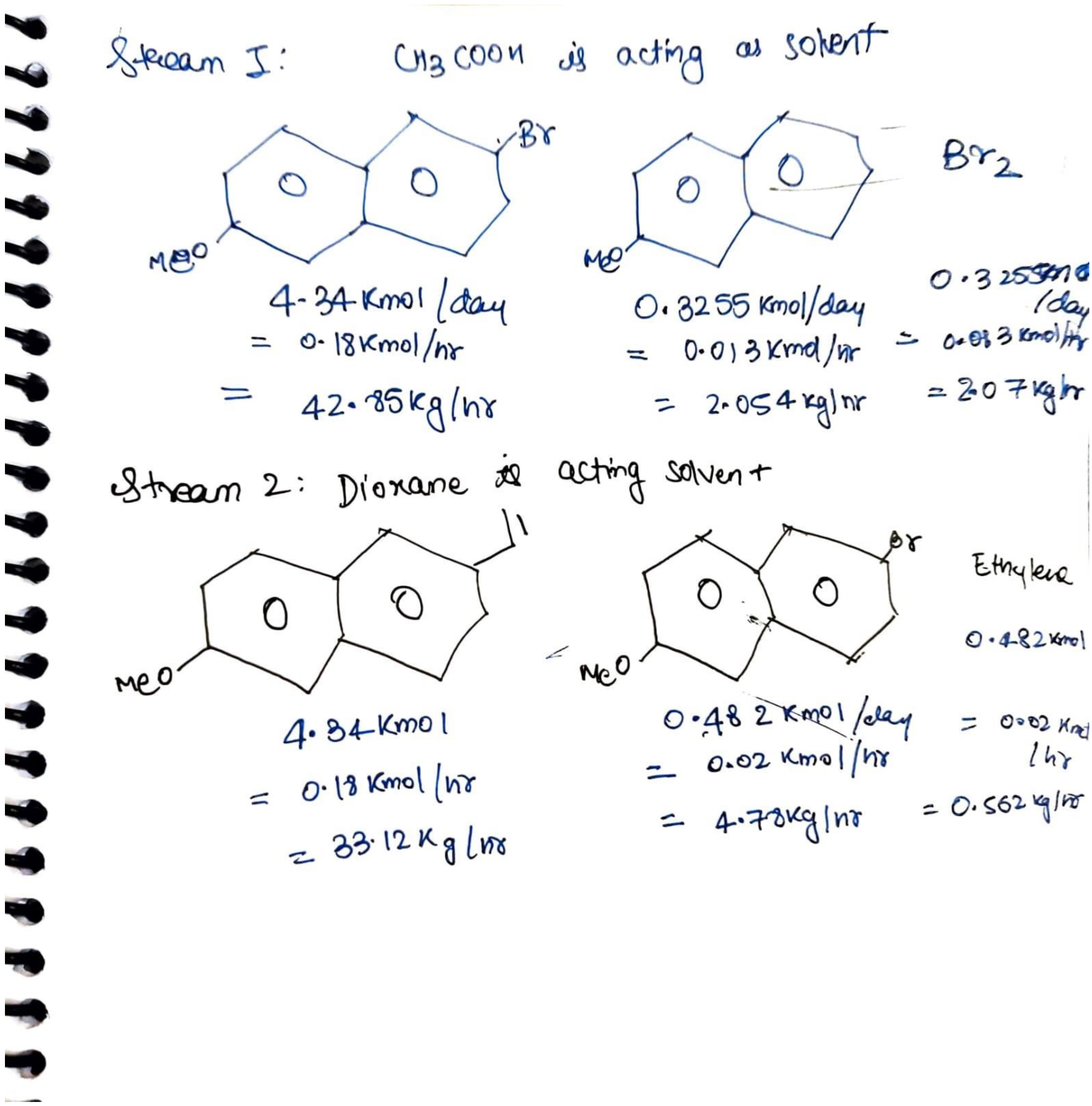


Total Moles of Eth-1-(6 Methoxy Napthylene) in Reactor $= (x + y)$ mols where y is recycled mols

We need 1 mol of CO for the rx^n with 1 mol of Eth-1-(6 Methoxy Napthylene)

$$\Rightarrow 0.14(x + y) = y$$

$$\boxed{\frac{0.14x}{0.86} = y}$$



c. Capital Cost

References:.

1. http://www.matche.com/equipcost/Reactor.html
2. https://www.sciencedirect.com/topics/engineering/fixed-bed-reactor
3. https://www.sciencedirect.com/topics/engineering/distillation-column
4. https://www.mdpi.com/2073-4344/7/9/267

List the contributions of each author:

- Avi Gupta and Naman Goyal designed the Block Diagram
- Naman Goyal did the Material Balance

- Avi Gupta and Priyanka calculated Capital Cost

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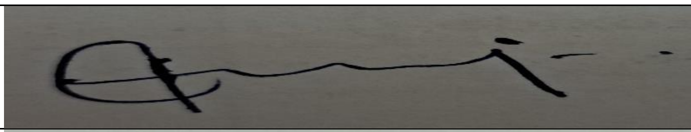
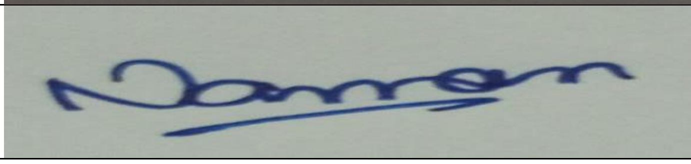
Abhinaba Mukherjee	210028	
Naman Goyal	210646	
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