Applicant: UltravioletChemicals

Inventors:

- Asjad Raza
- Pranjal Bharadwaj
- Amber Singh

Chemical Product Formula: $C_{12}H_{14}O_4$

Chemical Product Name: Diethyl Phthalate

Process Title: Peakall Process

EHS Summary:

a. List the wastes generated and their quantity of generation.

The waste generated during the production of DEP by the Peakall process can include:

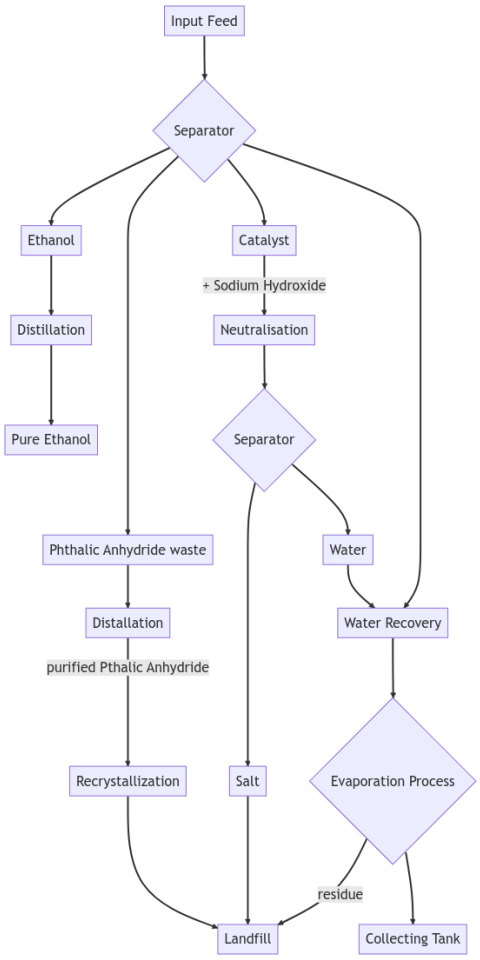
- **Phthalic anhydride waste**: Phthalic anhydride is the starting material for DEP production, and any unreacted phthalic anhydride can be a waste product.
- **Ethanol waste**: Ethanol is used as a reactant in the Peakall process, and any excess or unreacted ethanol can be a waste product.
- **Catalyst waste**: The catalyst used in the reaction, such as sulfuric acid, can be a waste product.
- **Water waste**: Water is typically used as a solvent in the production process, and any excess water can be a waste product.
- **Impurities**: Impurities generated during the reaction, such as unreacted starting materials, can be considered as waste products.

The production of 1 ton of DEP using the Peakall process generates **approximately 3.4 tons of waste,** including phthalic anhydride waste, ethanol waste, catalyst waste, water waste, and impurities. However, it is important to note that the quantity of waste generated can vary widely depending on the specific production conditions and waste management practices used.

b. What the current regulations for the above waste materials. (Limits to which it can be disposed in the environment)

The Environmental Protection Agency (EPA) has established regulatory limits for the amount of DEP that can be released into the environment. These limits are set based on the potential health and environmental risks associated with exposure to DEP. For example, the EPA has established a Maximum Contaminant Level (MCL) of **0.006 milligrams per litre (mg/L) for DEP in drinking water.**

c. Describe the treatment procedure for wastes with block diagram. Your chemical plant must be a zero liquid discharge plant.



d. Are there any safety concerns for the chemicals. Give exposure limits: Time Weighted Average (TWA) for 8 hours and short-term exposure limit (STEL) for 15 minutes.

There are a few safety concerns –

- DEP production involves high temperatures and pressures, which increases the **risk of fire and explosion.**
- DEP production may involve the use of other chemicals that can pose health risks to workers, such as phthalic anhydride and ethanol.
- Phthalic anhydride is a corrosive substance that can cause **skin and eye irritation**, and exposure to high levels can lead to **respiratory problems**.
- Ethanol is a flammable solvent that can cause **skin and eye irritation**, as well as **respiratory problems** if it is inhaled.

TWA exposure limit 5 mg/m^3

STEL exposure limit 10 mg/m^3

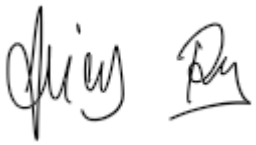
References:

1. D3256 (qualityexcipients.com)
2. Diethyl phthalate | Public Health Statement | ATSDR (cdc.gov)

List the contributions of each author:

- Author 1 determined the waste generation quantity.
- Author 1 and 2 carried out the literature search and found the current regulations.
- Author 2 and 3 found necessary treatment steps and prepared the block diagram.
- Author 3 obtained TWA and STEL data.

Sign the pdf and upload.

Name	Roll No	Signature
Mohd Hamza	210619	
Asjad Raza	210225	
Pranjal Bhardwaj	210741	
Amber Singh	210117