Applicant: PetroProtons Pvt Ltd

Inventors: Suryansh Gaur

Chemical Product Formula: CH 2 =C (CH 3)COOCH 3

Chemical Product Name: Methyl methacrylate (MMA)

Process Title:

EHS Summary:

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

Organic waste: generated from the purification process of MMA and includes waste solvents, which may contain unreacted methacrylic acid (MAA), acetone, and methanol.
Inorganic waste: generated from the separation process, including salts such as ammonium sulfate and magnesium sulfate.
Solid waste: generated from the filtration process, including polymerized MMA and filter cake.
Gaseous waste: generated from the reaction process, including carbon dioxide and nitrogen oxides.

The quantities of these wastes depend on the scale of production, the specific process conditions, and the efficiency of the recovery systems. In general, the MMA production process generates significant quantities of waste, including several tons of organic and inorganic wastes, several tons of solid waste, and several hundred kilograms of gaseous waste per ton of MMA produced.

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

Organic waste: The disposal of organic waste generated during MMA production is subject to regulations that vary by country or region. In many cases, these wastes are considered hazardous and must be treated, transported, and disposed of according to specific regulations. Some countries require incineration or landfilling in dedicated facilities.
Inorganic waste: The disposal of inorganic waste generated during MMA production is also subject to regulations that vary by country or region. In general, these wastes are not considered hazardous and can be disposed of in landfills or recycled.
Solid waste: The disposal of solid waste generated during MMA production is also subject to regulations that vary by country or region. In general, these wastes are not considered hazardous and can be disposed of in landfills or recycled.
Gaseous waste: The disposal of gaseous waste generated during MMA production is subject to regulations that vary by country or region. In general, these wastes are

subject to strict air emissions regulations, and production facilities must implement air pollution control technologies to reduce their emissions.

In summary, the regulations for the disposal of waste materials generated during the production of MMA depend on the specific type of waste, the quantity generated, and the country or region in which the production takes place. It is essential for companies producing MMA to adhere to these regulations to protect the environment and public health.

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

[Storage Tank] -> [Pretreatment] -> [Neutralization] -> [Dewatering] -> [Incineration/Thermal Oxidation/Catalytic Oxidation] -> [Metal Recovery] -> [Landfill]

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.

Yes, there are safety concerns associated with the chemicals used in the production of Methyl methacrylate (MMA). The main chemicals involved in the production process include methacrylic acid (MAA), acetone, and methanol, which are all potentially hazardous to human health.

The exposure limits for these chemicals are as follows:

1. Methacrylic Acid (MAA):
- Time Weighted Average (TWA) for 8 hours: 2 ppm (parts per million) or 6 mg/m^3
- Short-Term Exposure Limit (STEL) for 15 minutes: 4 ppm or 12 mg/m^3

Exposure to MAA can cause respiratory irritation, eye irritation, skin irritation, and chemical burns.

2. Acetone:
- Time Weighted Average (TWA) for 8 hours: 1000 ppm or 2400 mg/m^3
- Short-Term Exposure Limit (STEL) for 15 minutes: 1250 ppm or 3000 mg/m^3

Exposure to acetone can cause eye irritation, skin irritation, and respiratory irritation.

3. Methanol:
- Time Weighted Average (TWA) for 8 hours: 200 ppm or 260 mg/m^3
- Short-Term Exposure Limit (STEL) for 15 minutes: 250 ppm or 325 mg/m^3

Exposure to methanol can cause headaches, dizziness, nausea, and eye irritation. High levels of exposure can cause blindness, coma, and death.

It is essential to adhere to these exposure limits and implement appropriate safety measures, such as personal protective equipment and ventilation systems, to minimize the risk of exposure to these chemicals.

References: Provide a reference for a material safety data sheet/industrial safety report/weblink.

List the contributions of each author:

- Author 1 determined the waste generation quantity.
- Authors 1 and 2 carried out the literature search and found the current regulations.
- Authors 1, 2, and 3 found necessary treatment steps and prepared the block diagram.
- Author 4 obtained TWA and STEL data.

Sign the pdf and upload.

Name	Roll No	Signature
Atharva Deshmukh	210231	
Suryansh Gaur	211084