Company: PetroProtons Pvt. Ltd.

CEO: Atharva Deshmukh

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Chemical Formula: $C_5H_8O_2$

Chemical Name: Methyl methacrylate (IUPAC: methyl 2-methylpropenoate)

Use case:

What is the use of this compound?

- The principal application, consuming approximately 75% of the MMA, is the manufacture of polymethyl methacrylate acrylic plastics (PMMA). Methyl methacrylate is also used for the production of the co-polymer methyl methacrylate-butadiene-styrene (MBS), used as a modifier for PVC. Another application is as cement used in total hip replacements as well as total knee replacements**.**

Are there any alternatives to this compound? Name a few.

- There are several alternatives to MMA, including styrene, vinyl acetate, and ethyl acrylate. These compounds can be used as substitutes in some applications, but they may have different properties and may not be suitable for all uses.

Why is this compound superior to its alternatives?

- MMA is often preferred over its alternatives due to its excellent clarity, impact resistance, and weatherability. It can also be easily polymerized and processed into a variety of products, making it a versatile building block for many different applications**.**

Is this compund imported in India? What is the magnitude of imports?

- According to the latest available data (2020-21), India imported approximately 21,000 metric tons of MMA, with a total value of around $30 million USD.
- As per Volza's India Import data, Methyl methacrylate import shipments in India stood at 17.9K, imported by 586 India Importers from 702 Suppliers.
- India imports most of its Methyl methacrylate from Singapore, South Korea and Germany and is the largest importer of Methyl methacrylate in the World.
- The top 3 importers of Methyl methacrylate are India with 17,862 shipments followed by Vietnam with 16,087 and United States at the 3rd spot with 8,894 shipments**.**

Economic feasibility:

a. **What input raw materials are needed for its synthesis (same as reported in the Patent application)?**

https://drive.google.com/file/d/1C5wQWCI1VOG9ORhrG5oRKVbsw7FrwE-I/view?usp=share_link

Methyl methacrylate (C5H8O2) is typically synthesized from acetone (C3H6O) and hydrogen cyanide (HCN) in the presence of a catalyst, such as sulfuric acid. The reaction produces cyanoacetone, which is then hydrolyzed to produce methyl methacrylate:

In addition to acetone and hydrogen cyanide, the synthesis of methyl methacrylate may also require other chemicals such as sulfuric acid, sodium cyanide, and methanol. The process is complex and involves multiple steps and reactions, so the specific raw materials required can vary depending on the particular method used.

b. **Provide preliminary economic feasibility based on cost of raw materials, solvents and product selling price.**

Acetone: The current price of acetone is around $900-$1,000 per metric tonne.

Hydrogen cyanide: The current price of hydrogen cyanide is around $1,200-$1,500 per metric tonne.

Sulfuric acid: The current price of sulfuric acid is around $50-$100 per metric tonne.

Methanol: The current price of methanol is around $200-$300 per metric tonne.

Based on the above prices, the cost of raw materials needed to produce methyl methacrylate would be around $1,250-$1,900 per metric tonne.

The selling price of methyl methacrylate can vary depending on the market conditions and demand. The current selling price of methyl methacrylate is around $2,000-$2,400 per metric tonne.

Based on the above estimated costs and selling price, the economic feasibility of producing methyl methacrylate appears to be positive.

References:

1. https://en.wikipedia.org/wiki/Methyl_methacrylate
2. https://www.volza.com/p/methyl-methacrylate/import/import-in-india/
3. https://www.spglobal.com/commodityinsights/en/ci/products/methyl-methacrylate-chemical-economics-handbook.html

List the contributions of each author:

- Nitin Babu (Author 1) , Narottam Kumar Pankaj (Author 2) , Rohit Kumar (Author 3) and Bhanupratap (Author 4) carried out the market research for chemical trade data.
- Nitin Babu(Author 1) prepared the use case.
- Narottam Kumar Pankaj (Author 2) looked at economic feasibility.

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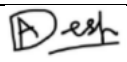
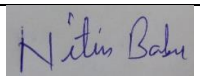
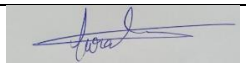
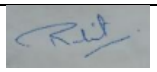
CEO Name : Atharva Deshmukh	210231	
First author Name : Nitin Babu	210677	
Second author Name : Narottam Kumar Pankaj	210652	
Third author Name : Rohit Kumar	210873	
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