

# Petrochemical Waste Treatment using Plasma Technology

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*Abstract:* This paper briefs the application of plasma technology in treating the waste generated in petrochemical industries. Various possible waste products were identified, and discussion is made on how the technology can be used for treating them.

*Key words:* Petrochemical waste; plasma arc technology; plasma technology; waste products in the petrochemical industry.

## 1. Introduction

### *Plasma Arc Technology as Petrochemical Waste Treater:*

Those of us who have been associated with petrochemical industries will be aware of its operation, market potentials, challenges, etc. Earlier, the petrochemical industries were not showing much interest in the waste management. But in recent years, the waste management has become great issue or challenge to be encountered. Other side, the petrochemical industries, and its relevant sectors were made mandatory for following sustainable norms. This has resulted in the development of waste management techniques. Like this, many factors influence the petrochemical industries. These factors include [1]:

- Economic growth and demand
- Economies of scale
- Environment
- Price of crude oil
- Political uncertainties
- Shale gas development
- Technology

Among the above influential factor, environment is one of the essential one, where most of the people worried about the petrochemical industry impacts. Concerns over health issues raised due to problems associated with petrochemical supply and consumption. People strongly believes that, waste generation in petrochemicals is the reason for the issues. In petrochemical industries, waste generation and relevant products are common. In the three

category operation of petrochemicals i.e. upstream, midstream, and downstream, different kinds of waste products were generated. These include residues and catalyst materials, metals, pollutants etc. Major waste products are oily sludges, oily cakes, zeolite, hazardous streams, organic pollutants, heavy metals, hexachlorobenzene, chlorinated biphenyls, other waste products [2]. For treating these wastes, industrial experts and researchers proposed several methods, however, these methods have their own benefits and drawbacks. In recent years, due to advancements seen in chemical engineering fields, a new technology called plasma arc is emerged. Plasma is generally associated with the energy content added into the matter. For example, as we go on add energy into a matter (Heating of matter under high temperature) it starts changing its phase from solid to gas, if further the energy is added into the gas plasma is formed. In simple, with the continuous addition of energy, the solid matter disassociates into plasma [3].

## 2. Conclusion

Here, this technology can be applied in the petrochemical waste products like oily sludges, oily cakes, zeolite, hazardous streams, organic pollutants, heavy metals, hexachlorobenzene, chlorinated biphenyls, other waste products to disassociate into useful inert materials that can be further utilized in different applications. Plasma might sounds to be a new name, but it is everywhere, we see it every day. Examples include sparks, lights, arc etc. Applying plasma technology to treat

petrochemical waste products could be a great choice for the industries. Technically, it helps in treating most the harmful petrochemicals wastes but studies have to be carried out further to deal with the economic feasibilities.

### References

- [1] Susan Nash, *Key Challenges in the Oil Industry: 2017 and Beyond*, 22 February 2017.  
<URL:  
<http://www.aapg.org/publications/blogs/learn/article/Articleid/37719/key-challenges-in-the-oil-industry-2017-and-beyond>>
- [2] *Tetronics Hazardous Waste Brochure*, Tetronics (International) Limited 2018.  
<URL:  
<https://tetronics.com/assets/Hazardous-Waste-Brochure1.pdf>>
- [3] *What is plasma?* Tetronics (International) Limited 2018.  
<URL:  
<https://tetronics.com/our-technology/what-is-plasma/>>