

**INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH
TECHNOLOGY****OIL INDUSTRY – ANALYSIS, EFFECT AND REMOVAL OF HEAVY METALS**¹Abhishek T.Sose, ²Dr.Sunil J. Kulkarni *, ³Meera T.Sose¹Program Analyst, IDrive, Bangalore, India^{2,3}Chemical Engineering Department, Datta Meghe College of Engineering, Airoli, Navi Mumbai, Maharashtra, India

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Abstract

In petroleum industry, the exploration of fuel from the source rocks brings about the heavy metal pollution. Heavy metal sources include oil spillage. The heavy metal pollution is prominent at terminals, tanker accidents and spills due to wars, offshore oil exploration and land based industrial and urban sources, recreational and agricultural development. Removal of heavy metals such as Cu, Pb, Zn, Cd, Fe, Mn, and Ni continues to be important area of research. Studies indicate that there has been considerable development in analysis for heavy metal detection. Also various methods such as biosorption, adsorption and other physicochemical methods can be used for heavy metal removal.

Keywords: analysis, biosorption, trickling filter, sludge, parameters.**I. INTRODUCTION**

Heavy metal affects water quality. In petroleum industry, the exploration of fuel in the from the source rocks brings about the heavy metal pollution. Heavy metal sources include oil spillage. The heavy metal pollution is prominent at terminals, tanker accidents and spills due to wars, offshore oil exploration and land based industrial and urban sources, recreational and agricultural development. Removal of heavy metals such as Cu, Pb, Zn, Cd, Fe, Mn, and Ni continues to be important area of research[1-4]. Many investigations are reported on removal of heavy metals by using biological methods[5-9]. Removal of heavy metals by adsorption is widely investigated area of investigation[10-12]. The batch and column studies have been reported on heavy metal removal by low cost adsorbents[13]. The heavy metal removal is very important because of its effect on man and environment [14-17]. Investigations are reported on specific treatment for removal of certain specific pollutants. Current review summarizes research and studies on heavy metal removal in petroleum industries.

II. ANALYSIS AND EFFECTS

Freije carried out studies on heavy metals, trace elements and petroleum hydrocarbons pollutions in the Arabian Gulf [18]. Their study indicated that heavy metals and trace elements are present in coastal seas in limited amounts. These are nonbiodegradable forms of heavy metals. These heavy metals are also non-degradable non-toxic naturally occurring free elements. Few of these heavy metals are dangerous to living organisms due to their capacity to bind with short carbon chains. Studies carried out by Abha and Singh indicated that hydrocarbon contamination is major environmental problem [19]. These studies indicated that co-contamination has considerable effect on bioremediation. Akpoveta et.al. analyzed presence of Cd, Cr, Cu, Pb and Zn in petroleum products[20]. According to them, lead and copper is present due to various factors such as presence of anthropogenic sources such as additives applied during refining process, absorption of the metals from storage tanks and supply vessels as well as natural presence of the metals in the source rock from which the crude was obtained.

Akporido and Ipeaiyeda carried out an investigation on oil and toxic heavy metal profiles of sediments in area adjacent to the lubricating oil factory[21]. They observed that geoaccumulation indexes of Pb and Zn were between 3 and 4. Their investigation also indicated that the area under consideration was polluted with toxic heavy metals (Pb and Zn). An investigation was carried out by Wuyep et.al. on biosorption of Cr, Mn, Fe, Ni, Cu and Pb metals from petroleum refinery effluent[22]. In their investigation, they used calcium alginate immobilized mycelia of *Polyporus squamosus*. pH value of pH 4 – 6 favoured the removal. Igile et.al. carried out an investigation on environmental quality of area near petroleum industries and refineries[23]. Their studies suggested that a large number of people may be exposed to hazardous and toxic emissions. They emphasized need for greater awareness and extensive research for environmental and safety aspects. Khuhawar et.al. carried out an investigation on analysis of heavy metals in crude oils[24]. According to their studies, a significant improvement in the analytical instruments has taken place. Odinga et.al. carried out an investigation on physicochemical and hydrocarbon content of effluent from petroleum refining company[25]. Their studies confirmed presence of the polycyclic aromatic hydrocarbon in the effluent. Abdel-Raouf reviewed studies on heavy metal treatment by using biomass based material[26]. According to them, presence of chemical contaminants in heavy metal is major concern for human health.

III. REMOVAL OF HEAVY METALS

An investigation was carried out by Marcus and Ekpete for studying impact of discharged process wastewater from an oil refinery[27]. These studies indicated that the petroleum discharge has considerable effect on the levels of mercury, lead, nickel, vanadium and cadmium in water. They found that mercury was not present and the amount of metals like lead, nickel, vanadium and cadmium was well below the limit in their country. An investigation was carried out by Musa et.al. on bioremediation of petroleum refinery wastewater effluent[28]. They suggested use of augmented native microbes. Their studies indicated that bioaugmentation with native microbes was very robust and cost effective alternative for the wastewater treatment in petroleum refineries.

A review was carried out by Hu et.al. on sludge treatment in the petroleum industry[29]. According to them, sludge treatment technology depends on sludge characteristics, treatment capacity, costs, disposal regulatory requirements, and time constraints. Tripathi and Ranjan carried out an investigation on heavy metal removal [30]. Their investigation indicated that the petroleum wastewater contains considerable amount of heavy metals. Their review indicated that adsorption was one of the major methods to remove heavy metals from wastewater. Dwivedi et.al. carried out investigation on isolated fungi[31]. They carried out investigation by using two fungi namely *Aspergillus flavus* and *Aspergillus niger*. These two fungi were able to remove various amounts of Pb, Ni and Cr. Akaninwor et.al. carried out investigated physico chemical properties of effluents from a beverage company along with heavy metal characteristics[32]. Their investigation indicated that Mg in downstream water samples differed significantly ($p < 0.05$) from those of upstream. Ismail et.al. investigated Zeolite performance for wastewater treatment[33]. By using zeolite, they obtained significant removal of COD, BOD, Fe, Zn, Mn and turbidity.

IV. CONCLUSION

Heavy metal pollution is important aspect of environmental engineering investigations. In oil industry, oil exploration and related activities are reason for the heavy metal pollution. Studies indicate that the heavy metal pollution is prominent at terminals, tanker accidents and spills due to wars, offshore oil exploration and land based industrial and urban sources, recreational and agricultural development. Removal of heavy metals such as Cu, Pb, Zn, Cd, Fe, Mn, and Ni continues to be important area of research. Studies indicate that there has been considerable development in analysis for heavy metal detection.

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