

## Characterization of Paint Sludge from an Automobile Industry

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**Abstract:** One of the major sources of waste generated in an automobile industry from painting process is paint-sludge. Paint-sludge is categorized as "Hazardous Material" according to the Hazardous Wastes [Management and Handling] Rules, 1989". Therefore, research work was aimed to characterize paint sludge. The sludge of an automobile industry was characterized for physico-chemical parameters viz; moisture content, ash content, calorific value, pH, calcium, magnesium, iron, chromium, copper, nickel, mercury, zinc, lead. Characterization was done for raw and treated sludge. The results of the samples were analysed and comparing it with the Indian Standards. It is found that the parameters tested were within the permissible limits. On the basis of these outputs and their interpretations the disposal methodology of the waste paint sludge can be worked out.

**Keywords:** Automobile, Disposal Methodology, Hazardous Waste, Permissible limit, Physico-chemical parameters.

### I. Introduction

The automobile industry has an annual production of 23.37 millions of vehicles. Wastewater produce from ETP is 2.7 MGD while treating the wastewater, release from automobile industry huge volume of sludge is produced In 2014-15 Mahajan, et al.(2016). This paper aims to utilize hazardous paint-sludge by studying its characteristics. Paint-Sludge is a hazardous waste having substantial or potential threats to public health and to the environment. The regulation in the treatment, storage and disposal of hazardous waste is as per Hazardous Waste Management & Handling Rules, 2008 in India. The main characteristics of paint-sludge are corrosivity, reactivity, ignitability, Explosivity, toxicity. It is characterized by high calorific and ignition values and content of VOCs and toxic chemicals. This Paint-Sludge if thrown freely anywhere on the ground it disintegrate the fertility of soil and the leachates generated by it polluted the ground water. It is harmful for the agricultural land and destroys the flora and fauna of the area wherever it is disposed off. There have been many attempts of recycling paint sludge to create various useful smart materials or byproducts. This process is time consuming and costly. Correspondingly, a simple process is needed for effective use of all the paint-sludge generated in an industry through various operations. It is necessary to check the physical and chemical characterization of the paint sludge sample for further treatment procedure. This paper suggest the possible method of disposal of paint-sludge or its recovery.

### II. Methodology Adopted

#### 2.1. Waste Collection

The hazardous paint-sludge sample were collected from the industrial premises. The paint-sludge waste was appeared as pure red oxide form and its mix proportions got collected. The appearance of paint-sludge is as shown in fig.1.



FIG.1 APPEARANCE OF PAINT-SLUDGE

## 2.2 Study Of Properties Of Waste Component

It is very essential to understand the properties of research component by scientific method and for conforming the nature of waste and its characteristics. The properties of the waste sludge was found as per the guidelines of TCLP method and Calorific Value as per IS 1350 ( Part 2 ) 2017.

### III. Results And Discussion

Usually the paint-sludge is considered as hazardous due to presence of heavy metals in it. However as compare to different characteristics of paint sludge analysis to following parameters like moisture content, ash content, organic matter, calorific value and heavy metals like nickel, Zinc,

Copper, Iron, Chromium, Lead are tested Gopalkrishna, et al.( 2016). By studying the results of the tested parameters, disposal methods should be as :

Sludge Disposal Methods :

There are two disposal methods are suggested (1) land filling (2) Incineration The method of disposal use of the paint sludge are incineration as hazardous waste or combustion at cement kilns, because of high dissolved organic carbon content of the paint, the paint sludge cannot be accepted by landfills according to European union legislation produced in 2014-15 salihoglu,et al. (2015). But the permissible limit and it is safe to use this hazardous paint sludge in making concrete material and it also safe to discharge the curing water Gopalkrishna, et al. (2016). In 2002 the large amount of waste which is generated and directly discharged into the surface water bodies without treatment. There are two disposal methods is used i.e., land filling and incineration David Jr, et al. (2016).

Table 1 and table 2 showed the values of physico-chemical parameters nearly same to the different paper studied, the both parameters were present in such a quantity that there is no adverse effect on any disposal method. If sludge is disposed by landfilling there is no chance of formation of lechates, because the content responsible for it were present in negligible amount.

**Table 1 Physical Characteristics Of Paint Sludge**

Sr.No	Parameter	Unit	Value
1	Moisture Content	%	54.5
2	Ash Content	%	24.83
3	Organic Matter	%	75.66
4	Calorific Value	Kcal/kg	5705

**Table 2 Chemical Characteristics Of Paint Sludge**

Sr.No	Parameter	Unit	Value
1	pH	-	7.6
2	Total Hardness	mg/lit	90
3	Iron	mg/lit	0.025
4	Chromium	-	NIL
5	Copper	-	NIL
6	Nickel	mg/kg	0.19
7	Mercury	-	NIL
8	Zinc	mg/kg	0.12
9	Lead	-	NIL

Solubility/resuspension of Paint Sludge was tried in distilled water, hexane, alcohol, xylene. Also solubility was tested in the liquid waste from paint shop called “Thinner Waste”

It was observed that the sludge was resuspended in thinner and xylene and not in any other solvent. It shows the another recyclable option for the waste which can be used within the industry.

### IV. Conclusions

The paint-sludge generated from automobile industry when tested for its physico-chemical properties, it was found that both physical and chemical parameters were found within the permissible limits as per Indian Standards. As the calorific value of the sample is 5705 Kcal/kg, which is very close to the coal so it can be suitably disposed by the method of pyrolysis or incineration with consumption of less amount of energy. Other than this the paint-sludge having soluble property in Xylene and Thinner waste, the smart materials are expected to be recovered. The materials like primer should be recovered from the waste paint-sludge, which is 15% cheaper than the virgin primer as per research. This study also suggests the two disposal methods land filling and incineration, there would be no adverse environmental impact or health risk.

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