

WHY NATURAL SUBSTANCES ARE IMPORTANT IN INDUSTRIAL EFFLUENT TREATMENT?

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Environmental pollution is a problem that has received a little attention in the developing world. Some of the important contributors of the pollution are increasing population and urbanization which results in an expansion of industrialization. Metal finishing, textile and dyeing, rubber processing are some of the main industries present in Sri Lanka. Since these industries use fresh water for their industrial processes, their industrial effluents must be in an acceptable condition before discharging them in to natural water bodies unless it can cause many adverse effects on human being, animals and also plants. Many industries release their effluents with several pollutants such as heavy metals, sulphates, phosphates, nitrates, dyes etc., which are very harmful to the environment (Priyantha and Bandaranayaka, 2011).

For instance, the adverse effects due to heavy metal contamination on human are metal fume fever, lung cancers, hypertension, cardiovascular diseases, DNA damages, hemolysis, renal and liver failures, allergies and even gradual death. Eutrophication, on the other hand, is a greater problem in the environment due to the high level of phosphorous and nitrates. Higher nitrogen levels in ground water cause the blue baby syndrome and stomach and gastrointestinal cancers. Diarrhea and some laxative effects may result from sulphate contamination.



Considering above facts, Central Environmental Authority (CEA) has enforced standard limits to release industrial effluents to the environment. This is mainly applied for industries which use large amount of water daily for their processes. These standards limits are on basic water quality parameters which gives a measure on the quality of water. pH, Conductivity, Turbidity, Salinity, Total suspended solids (TSS), Chemical oxygen demand (COD), Biological oxygen demand (BOD), nitrate, sulphates, phosphates and heavy metals are some of the key parameters.

In order to remove these substances, physical, chemical and biological treatment methods are used in industries. Many industries use physical and biological treatment methods to treat biodegradable waste while chemical treatment methods are in place to treat industrial effluents containing heavy metals and their compounds and other pollutants. Since chemical coagulants, flocculants and pH controlling agents are in use for the chemical treatment processes, these added chemicals and products formed during the treatment processes may finally affect to the ground water quality resulting in huge environmental problems.

To overcome these issues, many attempts have been made to minimize the above mentioned risks. Natural substances, such as bio-sorbents, coconut shell, brick clay, rice husk, coir dust and saw dust, feldspar and dolomite have been used to remove some heavy metals, anions and dyes from



Brick clay



Rice husk



Saw dust



Coir dust



Feldspar



Dolomite

industrial wastewater (Priyantha and Perera, 2001). Since these environmentally-friendly substances successfully remove pollutants from effluents, such an approach has become highly attractive in comparison to classical methods involving chemicals. Main characteristics which are effective for such removal by these natural sorbents are porosity and their surface charge. Because of above characteristics, most of ions bind to the surface tightly and such bound ions can be removed by using

many desorption techniques. The desorption process is very much important in order to develop these techniques in large scale because the reusing ability of an adsorbent is a key practical issue.

According to literature, it has been reported that these substances can be applied very effectively to remove pollutants from effluents at considerable levels. The efficiencies of these treatment techniques are somewhat similar to other classical treatment techniques.

| Natural adsorbent | Pollutant (adsorbate) |
|-------------------|---|
| Rice Husk | Cd, Cr, Cu, Zn, Pb, Ni |
| Brick Clay | Cd, Cr, Cu, Zn, Pb, Ni, Phosphate, Dyes |
| Saw dust | Cd, Cr, Cu, Zn, Pb, Ni, Sulphate |
| Dolomite | Sulphate |
| Feldspar | Sulphate, Phosphate, Dyes |

Since these techniques are still in experimental stage, it will take some time to utilize these approaches in real treatment systems. The most of the listed adsorbents are waste materials and readily available in the environment and treatment plants utilizing said substances will be environmentally friendly. The main disadvantage of this method is difficulty in producing large quantities of adsorbents for industries. Therefore, in real application, it is necessary to find a way to preserve the adsorbent materials whenever it is necessary to be used.

Therefore, if these methods can be adopted even in combination with other treatment technologies, it will help to keep the longevity of our fresh environment for future generations as well.

References:

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