Assessment of Different Treatment Options To Recycle The Treated Effluent In Pesticides Manufacturing Industry

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Abstract- *In the present study, a adsorption process is used to treat and recycle the pesticides manufacturing unit's wastewater with Banana Peels, Fly ash & Coconut Shell is used as adsorbent. Also the concentration of COD found in secondary treated wastewater is high. So tertiary treatment got disturbed due to high concentration of COD. Fouling and Scaling in RO system was observed and frequency of the RO cleaning also increased. So the unit is not able to recycle the wastewater. After gone through various literature review to mitigate the current issue and to achieve the Recycling of wastewater, Modification in treatment process shall be initiated using Banana Peels, Fly Ash & Coconut Shell as adsorbent. The optimum dosage of the adsorbent for high treatment efficiency of wastewater under experimental conditions shall be examined. After implementation of this treatment process, recycling of wastewater shall be achieve.*

Keywords- Adsorption process, COD removal by Banana peels, Coconut Shell & Fly Ash, RO (reverse osmosis) inlet norms for treatment, Recycling of pesticides industry wastewater.

I. INTRODUCTION

Water is a vital element of our environment. It is widely considered as the main force that keeps creatures alive in the earth. It is a must for any living thing. According to definition Water is a transparent fluid which forms the world's stream, lakes, oceans and rain, and is the major constituent of the fluids of living things. Water is also extensively used in manufacturing plants and different industries as the major resource. Expansion in industrialization, growth in urbanization, rapid growth in population, use of non-renewable energy and generation of wastes derived from domestic and industrial sources have converted many water sources unwholesome and hazardous to man and the environment in developing countries like India.

In this research we are taking trials with various treatment options to recycle the wastewater in the pesticides manufacturing industry. While taking the trials we have observed that there is specific norms to be obtained before giving the RO treatment. To comply with the inlet norms of the RO system, we have given the treatment with different adsorbents made from coconut shells, fly ash and banana peels. All the studies are carried out after making the ash of every adsorbing media.

After detailed analysis of the parameters like pH, TDS, COD and TSS, we came to know that the fly ash has the highest capacity to reduce the pollution concentration.

II. LITERATURE SURVEY

In the treatment of waste water to remove toxic effluents, highly porous power plant waste ashes can be utilized. An indigenous bed is made which could replace expensive treatment facilities such as reverse osmosis (RO), granulated activated carbon (GAC) bed etc. A lot of work has been reported on fly ash for adsorption and other construction related uses. But a little or no work so far has been reported for the use of fly ash for the treatment of wastewater. The use of fly ash resolved the environmental issues and disposal by treating wastewater. The treatment bed comprised of three layers of sand, fly ash, pebbles. Each layer has equal thickness. Alow-cost filter media was prepared and used for the removal of impurities such as Chemical oxygen demand(COD), total suspended solids(TSS), total dissolved solids (TDS) and pHof the effluent. It is found that COD is reduced from 300ppm to 80ppm. TDS is reduced from 2000ppm to 700ppm. TSS reduced from 3500ppm to 70-80 ppm and pH dropped from 7.58 to 5.6.the dissolved oxygen(DO) is increased to 2.75 to 12mg/l It is also reported here that for efficient treatment of wastewater filter bed thickness 10mm-20mm is recommended.

Coal fly ash bed is an inexpensive and effective for removal of COD, TSS, TDS and pH reduction due to its high porosity and adsorption capacity. Fly ash is available in abundance at coal fed electric power plants can be effectively used for treatment of wastewater. When fly ash is used as filter bed of 10mm, 20mm, 30mm, and 40 mm thickness, the

parameter value is reduced to great extent from initial value in 10-20 mm thick. It is concluded that the fly ash is better option for the treatment of waste water treatment. The obtained result values are within the permissible limits. Environmental pollution issues can also be minimized by using coal fly ash bed in waste water treatment.

Coal and sugar manufacturing power generation plants are engender million tons of fly ash as waste per annum. It creates serious disposal and environmental problems. There is no alternative usage for its utilization in industries. In this regard, efforts were taken to utilize fly ash waste in the treatment of highly toxic and polluted dyes effluents. In this advanced research, characterization of fly ash properties, preparation of adsorbent, utilization for the optimum reduction of dyes effluent pollutants, determination of adsorptive capacity and study of isotherm adsorption models were accomplished. Treatment efficiency was optimized using these ashes as adsorbent at optimum dose. Sugarcane bagasse fly ash (SBFA) could reduce the higher concentration of COD (51%), color (70%), turbidity (71%) and TSS (96%) from dyes effluent. All used fly ashes could reduce higher concentration of effluent pollutants at 4 g dosing. SBFA has high porosity, which resulted in high adsorption of effluent pollutants as compared to other fly ashes. The adsorptive capacity of all used fly ash was declined on increasing adsorbent dosing. Langmuir and freundlich isotherm models were evaluated for the determination of chemical adsorption behavior of fly ashes.

Low cost adsorbents were prepared from collected fly ash samples and were utilized for the treatment of industrial dyes effluent for an effective reduction of organic pollutants in the course of adsorption technique.

The initial COD concentration of collected dyes effluent sample was 1164 mg/lit. Industrial dyes effluent samples (100 ml) were treated through prepared ash adsorbents for effluent's COD removal at different doses. SBFA dose (4g) and CFA dose (8g) could reduce COD by 51% and 49% respectively.

Industrial wastewater reuse and zero liquid discharge (ZLD) has been a growing trend due to increasing water scarcity and tightening environmental regulations Reverse osmosis (RO) has been widely used as a desalination technology for industrial wastewater reuse. A typical RO process recovers about 75% of water as permeate while generates about 25% more concentrated wastewater as concentrate.

The first approach is to remove the hardness almost completely in the pretreatment through lime softening and cation ion exchange and operate the RO process at elevated pH, which represents the so-called high efficiency reverse osmosis.

The hardness needs to be removed by chemicals, which represents a significant portion of the operation cost especially when the hardness of the feed water is high.

Considering its technical advantages in achieving high water recovery and reducing operation cost, the seeded precipitation assisted RO process was proposed for wastewater reuse and ZLD.

III. EXPERIMENTS AND RESULTS

After preparing the materials we have taken trials for various treatments options like Banana peels, Fly Ash and Coconut shells as adsorbents.

Characteristics of Wastewater of secondary treated effluent :

Sr. No	Parameters	Unit	Results	
			Inlet	Outlet
1	pH	--	9-10	7-8
2	Chemical Oxygen Demand	Mg/l	1500-2500	250-400
3	Hardness	Mg/l	1200-1500	1500-2000
4	Total Dissolved Solids	Mg/l	7000-9000	6500-9000

Specifications required for RO :

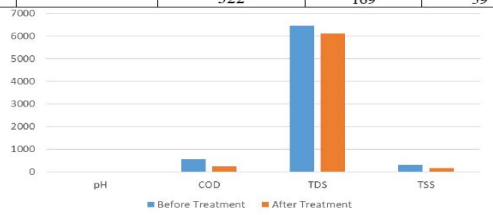
SrNo	Parameters	Unit	Specification Required
1	pH	--	7-8
2	Chemical Oxygen Demand	mg/l	200-250 mg/l
3	Total Suspended Solids	mg/l	100-150 mg/l
4	Total Dissolved Solids	mg/l	below 7000 mg/l

To Obtained the above mentioned we have taken trials for various adsorbents from 10 gm to 100 gm dosage.

For Banana Peels :

Experimental Analysis Results
Result for 70 gm dosage of Banana peels :

Sr. No	Parameter	Before Treatment	After Treatment	% Reduction
1	pH	7.87	8.02	NA
2	COD	565	241	58
3	TDS	6458	6109	3
4	TSS	322	169	59

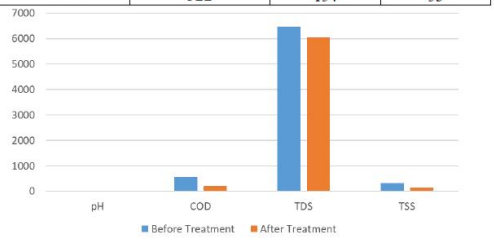


At 70 gm of Banana Peels dosage, we have achieved maximum reduction in COD is 58%.

For Fly Ash :

Experimental Analysis Results
Result for 60 gm dosage of Fly Ash :

Sr. No	Parameter	Before Treatment	After Treatment	% Reduction
1	pH	7.87	7.82	NA
2	COD	565	214	63
3	TDS	6458	6039	7
4	TSS	322	154	53

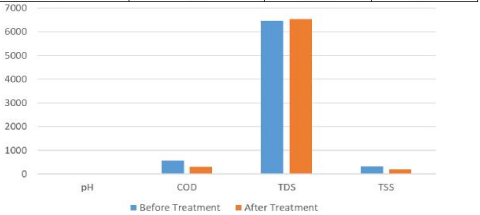


At 60 gm dosage of Fly Ash, We have achieved maximum reduction in COD is 63%.

For Coconut Shell :

Experimental Analysis Results
Result for 70 gm dosage of Coconut Shell:

Sr. No	Parameter	Before Treatment	After Treatment	% Reduction
1	pH	7.87	7.83	NA
2	COD	565	304	47
3	TDS	6458	6541	-1
4	TSS	322	196	40



At 70 gm dosage of Coconut Shell, We have achieved maximum reduction in COD is 47%.

After completion of the detailed analysis, we can suggest the Fly ash as adsorbent as it is widely available. In thermal power plants the generation of fly ash is huge in numbers and it is difficult to dispose. So the large scale industries can afford to use fly ash in their water treatment plant as adsorbent.

IV. CONCLUSION

As per the result achieved after detailed analysis of wastewater we can suggest the treatment of adsorbent followed by RO.

In adsorbent treatment we have achieved highest reduction with fly ash is 63%.
Fly ash is widely available as one of the waste in the coal based thermal power plant.

The adsorbent treatment is only to meet inlet design parameters of RO9Reverse Osmosis).

After achieving the inlet norms we can recycle the secondary treated water in pesticides industry.

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