REMOVAL OF DAIRY WASTE WATER CHARACTERISTICS BY USING NATURAL AND CHEMICAL COAGULANT

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ABSTRACT
Dairy plants consist of huge amount of clean water. Around 80% of clean water gets convert into waste water which leads to the environmental problem. Discharging dairy waste water without treatment even can cause public health problem. Comparison of different coagulants such as alum and ferrous sulphate as a chemical coagulant and moringa oleifera as a natural coagulant. The optimum doses were from 100mg/lit and 200mg/lit for alum and ferrous sulphate. Similarly, 65mg/lit for moringa oleifera to treat Dairy waste water characteristics like BOD, COD and pH. By using alum (chemical coagulant), 67.77% C.O.D, 94.78% B.O.D. and pH decreases were removed, by using ferrous sulphate (chemical coagulant), 66.62% C.O.D, 92.72% B.O.D. and pH decreases were removed but by using natural coagulant, 62.17% C.O.D., 89.93% B.O.D. and pH decreases were removed. According to result it can be concluded that chemical coagulant is more effective than natural coagulant.

Keywords: B.O.D., C.O.D., Coagulation, Moringa Oleifera, Dairy Waste Water.

1.INTRODUCTION:

Dairy industry is one of the biggest industries in India. A dairy needs large volume of water for various purposes and the wastewater discharge from a dairy is also equally large in volume with highly variable pollution characteristics. Waste water from dairy plants consist of washing from cans, dairy equipment, floors etc. [1].Dairy industries can introduce some serious problems for the environment by producing wastewater with high biological oxygen demand (BOD) and chemical oxygen demand (COD) [2]. Due to high pollution load of dairy waste water, the milk processing industries discharging untreated/partially treated wastewater cause serious environmental problem [2]. Dairy waste waters are characterized by high B.O.D. and C.O.D, It is estimated that about 2% of the total milk processed is wasted into drains [2]. The most common used coagulant in water and wastewater treatment are the inorganics that are trivalent aluminum and iron salts, despite the performance and cost effectiveness of these coagulants proven, there is still certain amount of residual aluminum content after treatment. It has recently been the subject of discussion, due to be evidence that alzheimer's disease may be linked to aluminum present in water intended for human consumption. [3].The waste water of this industry is treated by physical, chemical and biological methods. Principally biological treatment methods need a lot of energy. In anaerobic treatment method the removal of nutrients is less than other methods. Hence at the end of process, treated wastewater should be treated again with the other methods. Dairy wastewater can be treated by adjusting pH and using few strong chemical coagulants. These coagulants break any a

emulsion caused by cleaning agents and sanitizers. These chemicals also precipitate solids and fats. In general, added chemical cause de emulsification, precipitation, coagulation. [4]

2. LITERATURE REVIEW

Rana Kabbout, [2011] had studied the physicochemical treatment of waste water in Dairy industry by coagulation-flocculation using Aluminum sulphate Al2(SO4)3 as a coagulant because it reduce the hardness and the load of phosphate in the wastewater and found that removal of 33 % of chemical oxygen demand and 45% of the turbidity.

Monali Gotmare, [2011] had studied a U.A.S.B. reactor for treating dairy wastewater and found that reactor removes 87.06% C.O.D, 94.50% B.O.D, and 56.54% T.S.S.

U. B. Deshannavar, [2012], had studied the upflow an-aerobic fixed-bed reactor for digestion of dairy industry effluent using polypropylene pall rings as a packing media and found that average C.O.D. removal efficiency was 87%.

Mashid Loloei, [2013] had studied a coagulation process in wastewater treatment of dairy industries using mineral and organic coagulants and found that alum removes 95% turbidity and 68% C.O.D. whereas ferrous removes 95% turbidity and 62% C.O.D.

3. MATERIAL AND METHODOLGY

3.1 Efluent Collection And Coagulant Collection.

Dairy waste water collected from Krishna dairy which is situated at belhe. Tal. Junnar, Dist. Pune.

3.2 Instuments Used

pH meter, B.O.D. incubator, B.O.D. Bottle's , C.O.D. digester and Jar Test Apparatus.

3.3 Experimental Procedure Of Moringa Oleifera

1. Dry seeds used for all experimental use were procured from local area in alephata in Maharashtra state of India.
2. After removing seed wings and coat the kernel was ground to a fine powder using the laboratory crusher. Fine colloidal suspension of this powder was prepared with distilled water. Proper doses of this suspension were given to raw water to achieve coagulant doses in the range of 30 mg/L to 90 mg/L.
3. Results of coagulation studies with Moringa Oleifera shows the optimum dose of alum to be 65 mg/l.
4. Experimental runs were conducted using Jar Test apparatus. Quick mixing at 100 rpm for 2 minutes and slow mixing at 30-40 rpm for 20 minutes followed by 45 minutes settling was observed during experimental runs.

Fig 1: Moringa oleifera Seeds

Fig 2: Moringa oleifera plant

3.4 Experiment Procedure Of Alum And Ferrous Sulphate

1. Results of coagulation studies with alum shows the optimum dose of alum to be 100 mg/l.

2. Results of coagulation studies with ferrous sulfate shows the optimum dose of ferrous sulfate to be 200 mg/l.

3. The standard jar testing procedure was employed in a lab test of coagulation process of examined wastewater.

5. The parameters of raw wastewater samples were determined in accordance to standard procedure and these were COD (chemical oxygen demand), BOD (biological oxygen demand) and pH value. The same characteristics were determined for wastewater samples collected after coagulation process.

4. RESULT

As we earlier discussed this paper consists of three parts, the results of these parts are discussed separately,

4.1 Natural Coagulant ,Chemical Coagulant (Alum And Ferrous Sulphate).

Table1: The initial and final parameters of dairy effluent by using alum (chemical coagulant).

Sample no	Initial parameter			Final Parameter		
	BOD	COD	PH	BOD	COD	PH
S 1	1900	2800	7.3	1800	1900	7.2
S 2	1900	2750	7.3	1785	1850	7.1
S 3	1850	2770	7.3	1770	1900	6.9

Table2: The initial and final parameters of dairy effluent by using ferrous sulphate (chemical coagulant).

Sample no	Initial parameter			Final parameter		
	BOD	COD	PH	BOD	COD	PH
S 1	1800	2700	7.2	1650	1700	7
S 2	1800	2650	7.2	1665	1720	6.9
S 3	1750	2500	7.1	1650	1800	6.9

Table3: The initial and final parameters of dairy effluent by using moringa oleifera (natural coagulant).

Sample no	Initial parameter			Final parameter		
	BOD	COD	PH	BOD	COD	PH
S 1	1800	2700	7.2	1600	1600	6.8
S 2	1800	2650	7.2	1585	1650	6.9
S 3	1750	2500	7.1	1570	1625	6.8

CONCLUSION

According to the result, removal of B.O.D, C.O.D, and pH are more in alum and ferrous sulphate but moringa oleifera removes less B.O.D, C.O.D. and pH than alum and ferrous sulphate hence by comparison of chemical coagulant i.e. (alum and ferrous sulphate) and natural coagulant i.e. (moringa oleifera) it can be concluded that chemical coagulant is more effective than natural coagulant.

REFERENCE

1. D.S. Bhutada, M.T. Datar and S.N. Kaul (2006), Use of herbal coagulant for primary treatment of dairy wastewater, Pune, India.
2. Mrs. Bharati S. Shete, Dr. N.P. Shinkar (2013), Comparative study of various treatments for dairy industry wastewater, Amravati, Maharashtra, India.
3. Gabriele Wolf, Roselene maria Schneider, Milene Carvalho Bongiovani(2015),
4. Mashid Loloei, Hosein Alidadi, Gholamabbas Nekonam, Yousef Kor, Study of the coaulation process in wastewater treatment of dairy industries, Gorgan, Iran.