Effect of New ERA Coagulant on Paper Mill Waste Water

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Abstract— **The waste water discharge from industry possess a potent threat to the existence of aquatic wildlife, mainly due to presence of high value of COD, TSS, Acidity and Alkalinity. The treatment of such waste water is today's inevitable necessity. Therefore, a more convenient way of treatment considering economic constraints needs to be suggested. This paper delves into the realm of exploiting the impact of new era coagulants on the properties of identified industrial effluent. This paper deals with the review of comparative study of performance of new era coagulants viz. poly aluminium chloride (PAC), aluminium chlorohydrate (ACH), magnesium chloride and poly-glu which can contribute to make primary treatment in a more comprehensive manner.**

***Keywords**— Paper mill waste water, Aluminium Chloride (PAC) Aluminium Chlorohydrate (ACH) Poly-glu.*

I INTRODUCTION

Now a days, it is very important to treat the industrial waste waters on a serious note. The large amount of growth in industrial waste waters is to be observed with respect to increasing number of industries. The direct discharge of such industrial waste water into the environment sources create harmful effects to humans, animals and plants. The self-purification capability of the industrial waste waters is less in order to neglect the various pollution problem. The two major sources of adulterated waste water are industrial and domestic waste. Domestic sewage carries approximate 70% of waste water and remaining is carried by industries and other. More effective method is required to treat industrial waste water. In these paper, used new era coagulant for the treatment of paper mill waste water like

1. Aluminum Chlorohydrate (ACH)
2. Magnesium Chloride (MgCl2.6H2O)
3. Poly Aluminum Chloride (PAC) and
4. Poly-Glu

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II. LITRATURE REVIEW

Sr. No	Name of Author & Journal	Title Of Paper	Conclusion
1	A.P. Baksh, A.M. Mokadam International Research Journal of Engineering and Technology (IRJET) Feb2019	Effects of New Era Coagulants on Properties of Industrial Wastewater: An Overview	80% Effect of pH on %COD removal for different coagulants (CuSO4.5H2O = 5 gm/1, AlCl3 = 5 gm/1, PAC = 5 ml/1) COD reduction)
2	Akshaya Kumar Verma, Puspendu Bhunia, and Rajesh Roshan Dash International Journal of Environmental Science and Development, Vol. 3, No. 2, April 2012	Supremacy of Magnesium Chloride for Decolourisation of Textile Wastewater: A Comparative Study on the Use of Different Coagulants	Decolourisation and COD reduction efficiency of coagulants significantly depends upon the pH of wastewater. Pre-hydrolysed coagulants such as PACl and ACH were found to be effective in decolourising the wastewaters containing direct and disperse dyes. Further, magnesium chloride in combination with lime was found to be the best over the other coagulants for decolourisation and CODreduction of textile wastewater containing all the three dyes.
3	Meena Solanki, S. Suresh*, Shakti Nath Das, Kanchan Shukla ICGSEE-2013[14th – 16th March 2013] International Conference on Global Scenario in Environment and Energy	Treatment Of Real Textile Wastewater Using Coagulation Technology	The higher charge density of poly aluminium chloride Species often results in a decrease in the coagulant dose and the associated solids production. These coagulants have the advantage of being more effective at lower temperatures and a boarder pH range than alum

III.METHODOLOGI

- Sample collection, transportation and preservation
- Pre-treatment parameters determination
- Sample preparation
- Treatment
- Post-treatment parameters determination
- Recording and analysis of results

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IV RESULT

Table 4.1: Optimum dose determination for PAC
Sample: 500 ml, pH: 4

Dose (mg/L)	Initial			Final			Percent reduction		
	COD (mg/L)	TSS (mg/L)	Turbidity (NTU)	COD (mg/L)	TSS (mg/L)	Turbidity (NTU)	COD	TSS	Turbidity
500	925	990	670	435	105	82.7	54.4	90.3	86.5
1000	925	990	670	440	71	65.9	41.2	91.35	89.56
1500	925	990	670	415	82	71	50.12	91.02	87.5
2000	925	990	670	395	105	86	54.3	90.6	85.2
2500	925	990	670	385	125	94.6	55.4	88.84	83.5
3000	925	990	670	370	375	124.5	58.4	87.5	81.41

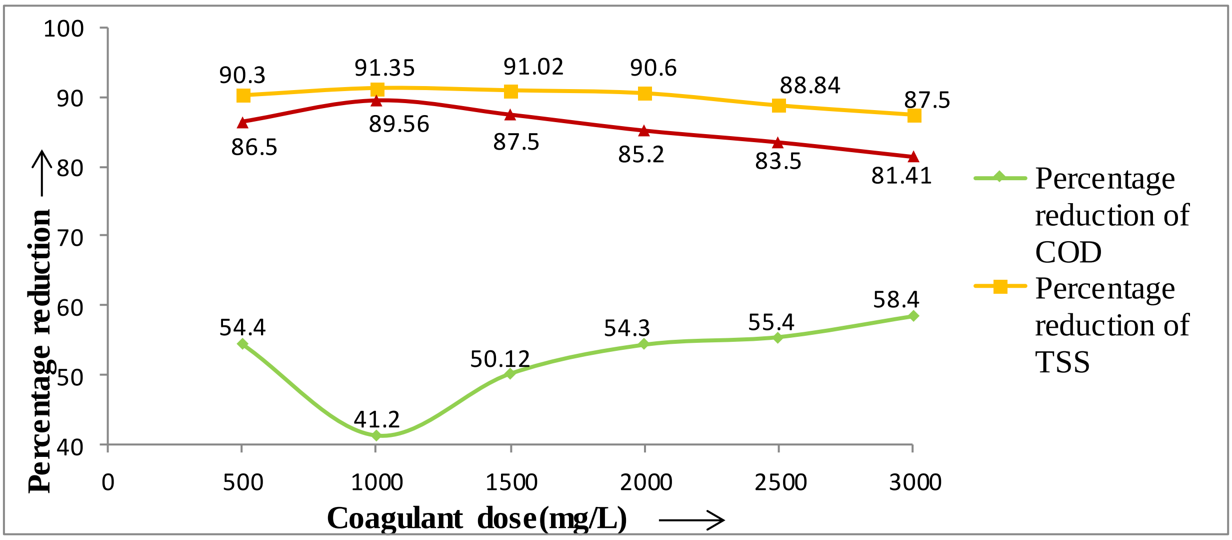

Table 4.2: Optimum dose determination for ACH
Sample: 500 ml, pH: 4

Dose (mg/L)	Initial			Final			Percent reduction		
	COD (mg/L)	TSS (mg/L)	Turbidity (NTU)	COD (mg/L)	TSS (mg/L)	Turbidity (NTU)	COD	TSS	Turbidity
200	880	990	670	250	235	117.6	70.48	74.5	82.44
400	880	990	670	220	222	103.7	72.5	76.8	84.51
600	880	990	670	225	189	85.1	74.8	77.5	87.29
800	**880**	**990**	**670**	**215**	**160**	**73.3**	**75.46**	**79.5**	**89.05**
1000	880	990	670	180	194	79.8	76.8	78.2	88.08
1200	880	990	670	150	210	93.2	78.9	76.8	86.08

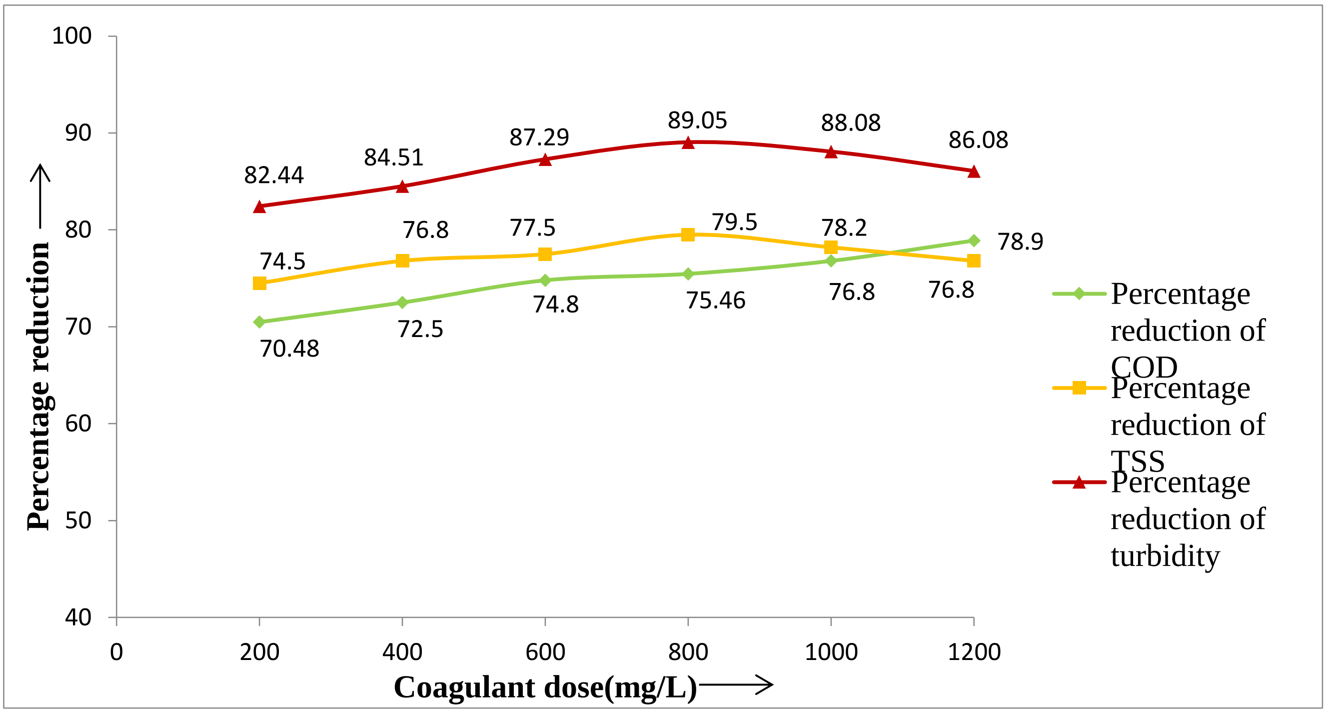

Table 4.3: Optimum dose determination for $MgCl_2$
Sample: 500 ml, pH: 4

Dose (mg/L)	Initial			Final			Percent reduction		
	COD (mg/L)	TSS (mg/L)	Turbidity (NTU)	COD (mg/L)	TSS (mg/L)	Turbidity (NTU)	COD	TSS	Turbidity
2500	845	990	670	375	208	113.6	55	70	80
3000	845	990	670	340	177	87.8	58	75	81.5
3500	**845**	**990**	**670**	**335**	**157**	**72.9**	**59.8**	**76.4**	**83.5**
4000	845	990	670	360	191	81.3	58	75.4	82.2
4500	845	990	670	320	197	85.2	58.3	74.5	81.27
5000	845	990	670	315	214	98.4	58.2	72	82.31

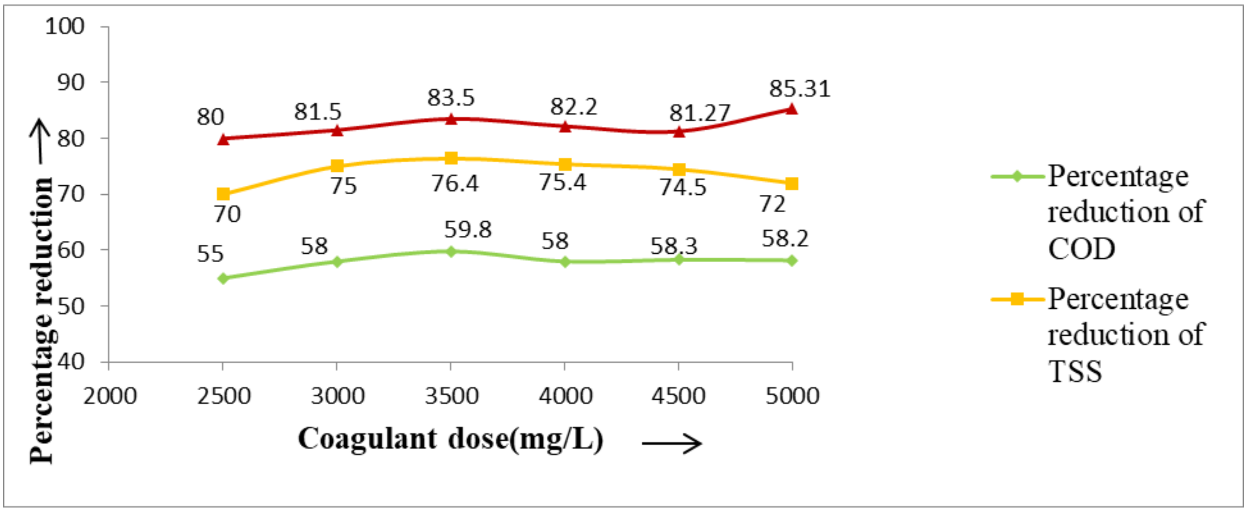

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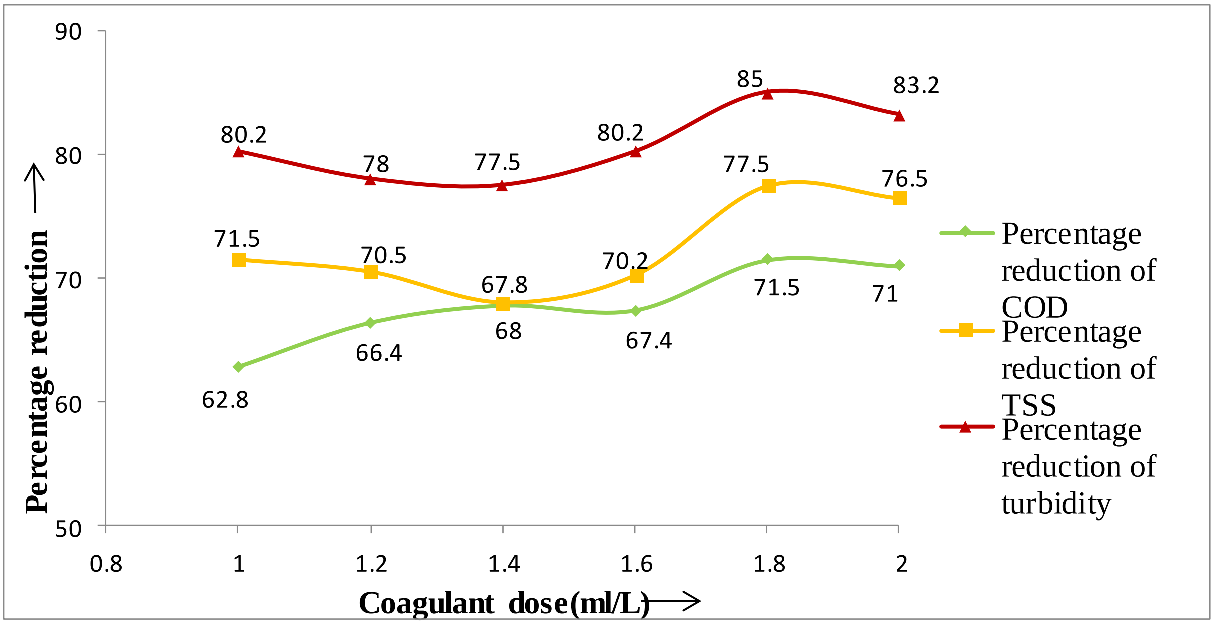
Table 4.4: Optimum dose determination for Poly-Glu
Sample: 1000 ml, pH: 8

Dose (ml/L)	Initial			Final			Percent reduction		
	COD (mg/L)	TSS (mg/L)	Turbidity (NTU)	COD (mg/L)	TSS (mg/L)	Turbidity (NTU)	COD	TSS	Turbidity
1	795	990	670	280	266	117.1	62.8	71.5	80.2
1.2	795	990	670	250	278	134	66.4	70.5	78
1.4	795	990	670	245	306	142.9	67.8	68	77.5
1.6	795	990	670	240	275	124	67.4	70.2	80.2
1.8	**795**	**990**	**670**	**220**	**205**	**75.6**	**71.5**	**77.5**	**85**
2	795	990	670	215	214	104.9	71	76.5	83.2



V EFFICIENCY ANALYSIS (H)

Table 5.1: Efficiency for Poly Aluminium Chloride (PAC)

Parameter	Weight(A)	Optimum percentage(B)	A x B
COD	30	41.2	1236
Turbidity	35	91.35	3197.25
TSS	35	89.56	3134.6
	∑ = 100		∑ = 7567.85

$$\eta = \frac{7568}{100} = 75.68\ \%$$

Table 5.2: Efficiency for Aluminium Chlorohydrate (ACH)

Parameter	Weight(A)	Optimum percentage(B)	A x B
COD	30	75.46	2263.8
Turbidity	35	79.5	2782.5
TSS	35	89.05	3116.75
	∑ = 100		∑ = 8163.05

$$\eta = \frac{8163}{100} = 81.63\ \%$$

Table 5.3: Efficiency for magnesium chloride

Parameter	Weight(A)	Optimum percentage(B)	A x B
COD	30	59.8	1794
Turbidity	35	76.4	2674
TSS	35	83.5	2922.5
	∑ = 100		∑ = 7390.5

$$\eta = \frac{7391}{100} = 73.91\ \%$$

Table 5.4: Efficiency for Poly-Glu

Parameter	Weight(A)	Optimum percentage(B)	A x B
COD	30	71.5	2145
Turbidity	35	77.5	2712.5
TSS	35	85	2975
	∑ = 100		∑ = 7832.5

$$\eta = \frac{7833}{100} = 78.33\ \%$$

VI CONCLUSIONS

Summary of the conclusions from the experimental investigations are summarized below.

- It is low cost method for industrial waste water treatment.
- The treatment system is eco-friendly.
- The efficiency of ACH is good than the other coagulant
- The new era coagulant removed approximate COD (84%), BOD (92%), TSS (87%), and total hardness (70%) from the industrial waste water.
- The overall performance of the new era coagulant is excellent than the conventional coagulant
- These treatment technology is alternative to conventional treatment.

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