

A Study on Use of Cactus In Different Sizes To Remove Turbidity

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Abstract- In the present study, experiments were conducted in lab to find out the effect of size variation of Cactus to remove the turbidity by using synthetic turbid water. As we know natural coagulants are in general, used in less developed communities as they are economical when compared with chemical coagulants. Cactus is easily available in india & biodegradable. By using grinder Cactus can be easily crushed in different sizes as 600, 300, 180 μ m & used for treatment of waters with low to high turbidity (30-400NTU). Size variation to remove turbidity for varying pH was also studied. Use of Cactus to remove turbidity plays a vital role in sustainable environment technology as they are renewable resources.

Keywords- Cactus, Synthetic turbid water, Alum, pH etc.

I. INTRODUCTION

The production of drinkable water from most raw water sources involves coagulant use at Coagulation/Flocculation stage to remove turbidity in the form of suspended & colloidal material. Different types of coagulants are widely used in conventional water treatment & are classified into organic & inorganic. Basically, aluminium salts (Alum) are cheap & most widely used coagulant in water treatment. Now days, natural coagulants which is produced from micro-organism, animal or plant tissue are also used. These natural coagulants produce readily biodegradable & less voluminous sludge compare to alum. Study of natural coagulants is not a new idea, but in this study the main focus is on use of cactus as a natural coagulant in different powder sizes as 600,300 & 180 μ m to find varying effect with respect to pH & time. cactus is found in tropical & semitropical region easily so it is considered as cost effective. Use of plant based coagulant for treatment of water is limited up to rural places, so study of effect of size variation on % turbidity removal efficiency is done.

1.1 Methodology

Experiments were carried out in laboratory by using cactus powder in different sizes to remove turbidity from synthetic turbid water. Locally available natural clay was used To prepare this water by soaking the clay for 24 hrs in tap

water & then blending it for 10 min, this stock suspension is used for preparation of different turbidities such as low (31.4NTU), medium (153NTU) & high (387NTU).

The size of the cactus powder is maintained as 600,300 & 180 micron by using sieve set. A mature cactus, after sun drying is heated in oven and after that crushed in grinder & size variation is kept during grinding itself. Experiments were conducted in following two stages

- Batch coagulation –sedimentation test : In this jar test were conducted on synthetic turbid water samples as low , medium & high turbidity . cactus powder in different sizes were added as a natural coagulant , and residual turbidity was measured
- Effect of varying pH : The effect of pH on turbidity removal was also studied by varying pH of turbid water. Medium turbid water (100-150NTU) was used for this study. pH of the suspension was adjusted to the desired value by adding 0.1 M HCl solution.



Fig-1 : Sample doses in mg

1.2. Result

As the Cactus is used as coagulant for varying pH it gives large variation in % removal efficiency. Residual turbidity goes on decreasing with increase in time interval. The results were obtained for batch coagulation sedimentation test for low, medium & high turbidity are tabulated as below

Table-1: For Batch Coagulation [Cactus]

pH	Particle size of coagulant	Sample dose Mg/lit	Initial turbidity	Residual turbidity	% turbidity removal
7-7.5	600	0	31.4 (low)	29.39	6.4
		10		19.44	38.1
		20		11.87	62.2
		30		10.86	65.4
		40		11.24	64.2
		50		11.27	64.1
		0	153 (medium)	131.27	14.2
		10		62.58	59.1
		20		51.56	66.3
		30		41.16	73.1
		40		41.62	72.8
		50		42.99	71.9
	0	387 (high)	328.56	15.1	
	10		200.08	48.3	
	20		132.35	65.8	
	30		63.47	83.6	
	40		65.02	83.2	
	50		73.53	81.0	
	300	31.4 (low)	0	28.83	8.2
			10	18.46	41.2
			20	9.23	70.6
			30	8.92	71.6
			40	9.04	71.2
			50	9.20	70.7
153 (medium)		0	128.37	16.1	
		10	56.30	63.2	
		20	43.91	71.3	
		30	31.82	79.2	
		40	33.35	78.2	

		50	387 (high)	36.57	76.1	
		0		320.44	17.2	
		10		187.31	51.6	
		20		143.58	62.9	
		30		45.67	88.2	
		40		49.92	87.1	
	75		50	31.4 (low)	52.25	86.5
			0		28.17	10.3
			10		17.14	45.4
			20		7.76	75.3
			30		7.60	75.8
			40		8.35	73.4
		50	153 (medium)	8.70	72.3	
		0		125.15	18.2	
		10		51.26	66.5	
		20		40.70	73.4	
		30		25.40	83.4	
		40		28.92	81.1	
		50	387 (high)	34.73	77.3	
		0		302.63	21.8	
		10		159.83	58.7	
		20		125.00	67.7	
		30		60.76	84.3	
		40		27.86	92.8	
		50		34.44	91.1	

II. CONCLUSION

From above results we conclude that for batch coagulation test as we increase the concentration of cactus dose of smaller particle size means 180 micron it shows more % turbidity removal efficiency for highly (387 NTU) turbid water as compared to greater particle size efficiency. Means, finer size of cactus gives good result for high turbid water. Also natural coagulants like cactus, give satisfactory results

for pH value in between 7-7.5, for finer particle size coagulant dose. Means, change in pH value greatly affect the % turbidity removal efficiency.

REFERENCES

- [1] G. Vijayaraghavan, T. Sivakumar, A. Vimal Kumar “Application of plant based coagulants for waste water treatment “International Journal of Advanced Engineering Research and Studies E-ISSN2249– 8974, Vol. I/ Issue I/October-December, 2011, pp 88-92.
- [2] Tasneembano Kazi, Arjun Virupakshi “Treatment of Tannery Wastewater Using Natural Coagulants” International Journal of Innovative Research in Science, Engineering and Technology, Vol. 2, Issue 8, August 2013, pp 4061-4068.
- [3] Milind R. Gidde, Anand R Bhalerao, Chetan N.Malusare “Comparative Study of Different Forms of Moringa Oleifera Extracts for Turbidity Removal” International Journal of Engineering Research and Development ISSN: 2278-067X, Volume 2, Issue 1 (July 2012), PP. 14-21.
- [4] N.E. Nwaiwu and A.A. Bello “Effect of Moringa oleifera-alum Ratios on Surface Water Treatment in North East Nigeria” Research Journal of Applied Sciences, Engineering and Technology 3(6): 2011, pp-505-512.