A COMPARATIVE STUDY OF BIO MATERIALS AS A COAGULANT FOR WASTE WATER TREATMENT.

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ABSTRACT

A comparative study of plant-based coagulant sources, processes, effectiveness and relevant coagulating mechanisms for treatment of water and waste water. The neem leaf powder, orange peel powder and banana pith juice is natural based coagulant that can be utilized in coagulation process of waste water. The efficiency of plant based coagulants are studied and compared. These Biomaterials are, in general, used as coagulant in less-developed communities since they are relatively cost-effective compared to chemical coagulants, can be easily processed in usable form and biodegradable. These natural coagulants, when used for treatment of waters with low-to-medium turbidity range (50–500 NTU), are comparable to their chemical counterparts in terms of treatment efficiency. These natural coagulants function by means of adsorption mechanism followed by charge neutralization or polymeric bridging effect. The biochemical oxygen demand is reduced from 150 mg/l to 99 mg/l by using neem leaf powder as coagulant, The chemical oxygen demand is reduced from 44mg/l to 9.6mg/l using banana pith as coagulant, The total solids is reduced from $8x10^3$ to $2x10^3$(mg/l) using of neem leaf as coagulant and The pH is reduced from 8.2 to normal standard of water by natural coagulants.

1-INTRODUCTION

Water is the scarce resource for much of the World's population. Global warming, world population increases the water demand. It is estimated that by 2024 more than 40% of water will be used to meet the human needs. In industrialized countries water is used for non potable purposes such as industrial applications, toilet flushing and irrigation. Hence it is required to treat waste water to protect the natural water resources.

Coagulants are the chemical process that involves neutralization of the charges. On addition of coagulants, the fine non settling particles are clumped together to form larger and heavier masses called as floc and settled down. In waste water treatment, suspended particles cannot be removed only plain sedimentation, so coagulants are added.

The plant based coagulants are broadly utilized for the purification of contaminated water in less urbanized areas, because they seems to be low cost as compared to artificial coagulants . Plant based coagulants are assumed to treat water showing low-to-medium turbidity range (50–500) NTU. The plant based coagulants tested are namely, azadirachta indica (neem leaf), citrus sinensis(orange peel powder), musu paradisiaca (banana pith).

2-METHODOLOGY

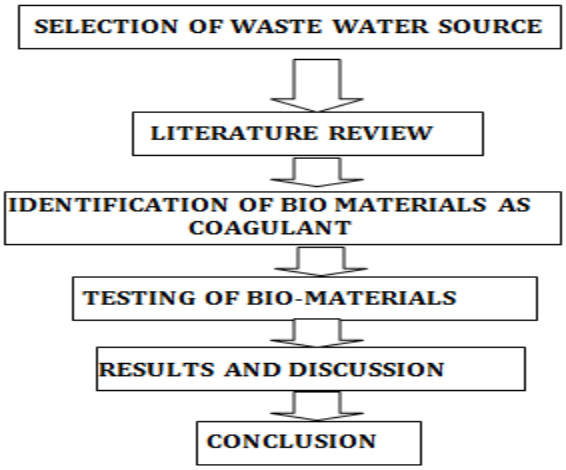

Fig 1.1 Methodology

3-EXPERIMENTAL PROCESS

A. MATERIALS USED

No.	Materials used
1	Aluminium salt (Alum)
2	Azardicta indica (Neem leaf powder)
3	Citrus sinensis (orange peel powder)
4	Musa paradisiacal (banana pith juice)
5	Jar test apparatus

B. PROCEDURE

The jar test is a common laboratory procedure used to determine the optimum operating conditions for water or wastewater coagulation-sedimentation treatment . This method allows adjustment of pH, variation in coagulant or coagulant aid dose, alternating speeds, or testing of different coagulant or polymer types, on a laboratory scale coagulation sedimentation process units in order to predict the functioning of a large scale treatment operation. Jar test apparatus was selected to be used for coagulation-sedimentation studies. Time constraints followed in coagulation sedimentation studies are: Rapid mixing- 2 min (100 rpm), Slow mixing- 20 min (40 rpm) and Sedimentation- 45 min. Orange peel powder and neem leaf powder is applied in five doses in the range of 0.2g, 0.4g, 0.6g, 0.8g, 1g, 1.2g . The alum and banana pith juice is added as solution in five dosages as 2ml,4ml,6ml,8ml,10ml,12ml and the experiment was conducted.

4-RESULT AND DISCUSSION

The biochemical oxygen demand is reduced from 150 mg/l to 99 mg/l by using neem leaf powder as coagulant.
The chemical oxygen demand is reduced from 44mg/l to 9.6mg/l using banana pith as coagulant.
The total solids is reduced from $8x10^3$ to $2x10^3$(mg/l) using of neem leaf as coagulant.

SAMPLE	TURBIDITY	BOD	COD	TOTAL SOLIDS (mg/l)	pH
WASTE WATER SAMPLE		150 mg/l	44mg/l	$8x10^3$	8.2
ALUM	8ml	90mg/l	8.8mg/l	$4x10^3$	3.99
NEEM	6mg	99 mg/l	29.2 mg/l	$2x10^3$	7.4
ORANGE	8mg	120mg/l	12.8mg/l	$6x10^3$	7.49
BANANA	12ml	135mg/l	9.6mg/l	$4x10^3$	

4.1 COMPARISON OF TURBIDITY GRAPH:

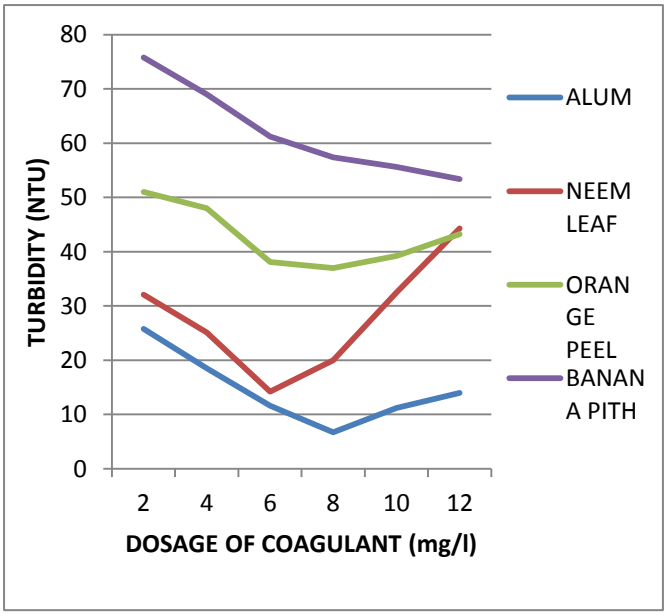

Fig 4.1 comparison of turbidity graph

4.2 COMPARISON OF BIO-CHEMICAL OXYGEN DEMAND:

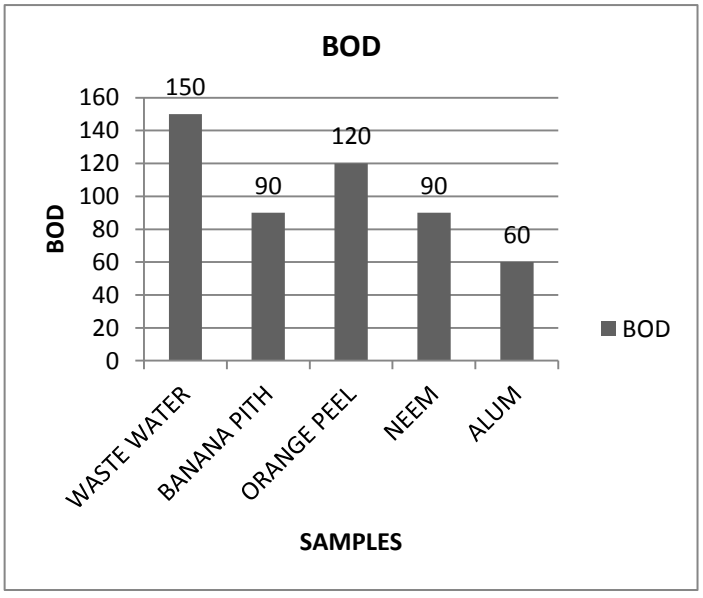

Fig 5.2 comparison of BOD graph

4.3 COMPARISON OF CHEMICAL OXYGEN DEMAND:

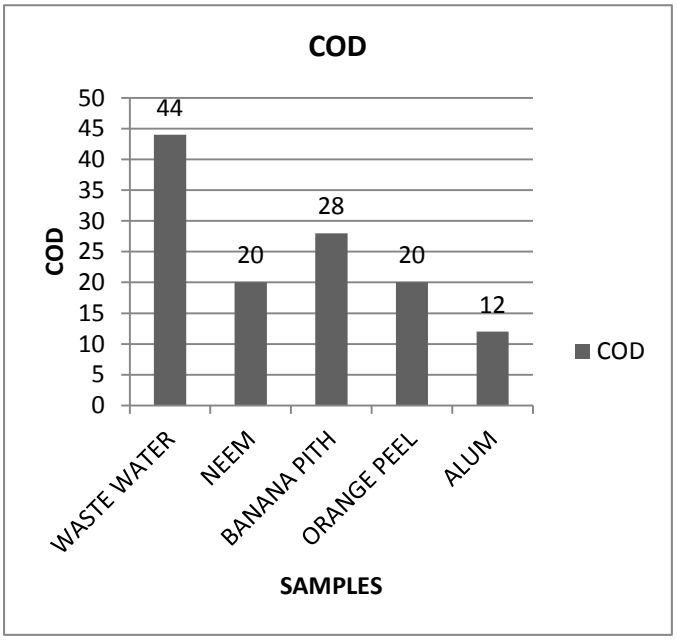

Fig 5.3 comparison of COD graph

5- CONCLUSION

Natural coagulants are obtained from several natural sources, when functional as coagulants primary or auxiliary coagulation/flocculation present as feasible and economical alternatives. There are two types of coagulants are found natural and synthetic. Function of coagulants in wastewater treatment is to remove various parameters. Coagulants are present in two form, first is plant based coagulants (PBC) and second is non-plant based coagulants. The preparation of natural coagulants is consisting over three steps for the substitution of the dosage of the coagulant in treating wastewater. The treatment through bio coagulants signifies to a vital development in viable environment for better worth of eco-system particularly for less urbanized area. An attempt is using eco-friendly coagulant as a natural coagulant for the process of coagulation to treat wastewater. New coagulant processing technique such as composite polymerization and impregnation method can be incorporated in producing coagulants with enhanced capability. This review highlighted that many potential advantages in using natural coagulants from various sources of plants, animal or biomass.

6- REFERENCES

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