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PHYSICO CHEMICAL ANALYSIS AROUND SOYA SOLVENT EXTRACTION PLANT OF CHHINDWARA (M.P.) INDIA

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ABSTRACT

Glycine Max .is the botanical name of soyabean M.P.has emerged as the soya state in India. The composition of Soyabean are soluble carbohydrates (Sucrose, stachyose, raffinose, others) 15%, protein 38%, oil (0.5% lecithin) 18%, moisture 14% and insoluble carbohydrates (dietary fibers) 15%. In this paper we analyse the physico-chemical parameters around the soya industry of Chhindwara. It was observed that the concentration of TDS, EC, Hardness, Chloride and Phosphate, BOD, COD, were higher in the groundwater samples.

Keywords:- DO, BOD, COD, ETP

Introduction

Soybean is world's one of the most useful and cheapest source of protein. The botanical name of soybean is Glycine Max. M.P. has emerged as the Soya state in India. There are a number of Soya solvent extraction plants in the MP. The composition of Soyabean are soluble carbohydrates (Sucrose, stachyose , raffinose, others) 15%, protein 38%, oil(0.5% lecithin) 18%, moisture 14% and insoluble carbohydrates (dietary fibres) 15% . In this paper we analyse the physico-chemical parameters around the Soya industry of Chhindwara.. It was observed that the concentration of TDS, EC, Hardness, Chloride and Phosphate, BOD, COD, were higher in the groundwater samples. In this analysis samples were collected from the nearby area of soya industry.

Materials and Methods:-

Oil Extraction Process:-

Soybean is mainly used for Soya oil and vanaspati as cooking oil. The steps used for oil Extraction are cleaning, destining cracking, cooping. Seeds are heated through jacked steam and open steam to soften the seeds, and then they are flecked between two rollers to flacks. After they are dried expander using hot air. The dried flacks are sent to extractor and Hexane is sprayed on
material to extract oil. The hexane condensed out and recycled back to process. The crude oil extraction is heated up to 50°C to 60 °C and water and phosphoric acid is added, to remove the phosphate and gum from the oil. Caustic soda is used to neutralize it. The bleaching agent is used to desire colour. Lastly oil is then deodorised by heating at

220°C. In the above oil extraction process major chemicals are used they are hexane, phosphoric acid, bleaching agent and caustic solution. The Effluent of the process is discharged in ETP for treatment and the treated effluent finally discharged outside that affects on the ground water quality

To study the effect of pollution on ground water around the soya solvent extraction plant at Chhindwara was selected and samples were taken from nearby area of this industry throughout the year 2014. APHA (1995),Trivedy and Goel (1986) have been used for the analysis of ground water for pH ,Electric conductance TDS, Total Alkalinity, Total Hardness, Calcium and Magnesium Hardness, Chloride, Fluoride, Nitrate, Sulphate, DO, BOD and COD. Data shown (Table 1 & fig.-1) in highest value and lowest value.

TABLE – I

VALUES OF PHYICO-CHEMICAL PARAMETERS SOYA SOLVENT EXTRACTION PLANT AT OF CHHINDWARA (MP)

S.N	**Parameter**	**Units**	**Permissible Limits**	**Highest value**	**Lowest value**
1	pH		6.5-9.2	7.8	5.8
2.	EC	Mhos/ c.m.	300	4750	1550
3.	T.D.S.	mg/lit	500	2810	1020
4.	Total Alkalinity	mg/lit	600	690	140
5.	Total Hardness	mg/lit	600	2310	80
6.	Ca Hardness	mg/lit	200	1230	55
7.	Mg Hardness	mg/lit	150	1080	28
8.	Chloride	mg/lit	1000	2122	90
9.	Fluoride	mg/lit	1.5	1.8	0.2
10.	Phosphate	mg/lit	0.1	1.86	0.01
11.	Nitrate	mg/lit	45	87	23
12.	Sulphate	mg/lit	400	594	12.42
13	DO	mg/lit	6	8.9	2.3
14.	BOD	mg/lit	6	189	6
15.	COD	mg/lit	10	600	17

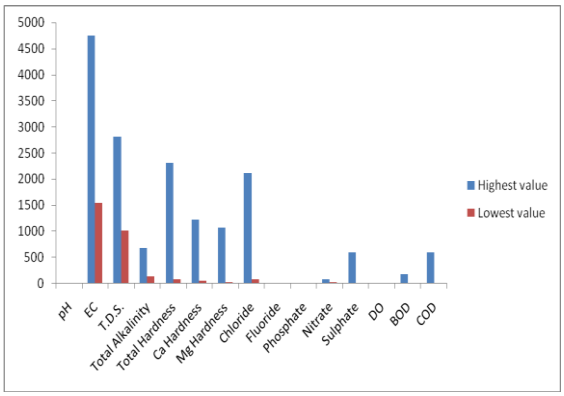

Fig. -1 Highest and Lowest Values of different Parameters

Result and discussion :-

In the analysis of ground water around the Soya industry it was observed that the highest pH value was 7.8 and lowest value was 5.8. The pH does not have any effects on health but it alters the taste quality of water. The value of Ec was above the permissible limits, which indicate the contamination of water through industrial effluent. Conductivity is the measure of substance to conduct e- current. The highest value of Ec was 4750 Mhos/c.m.. The highest value of TDS was observed2810 mg/l. High TDS value indicate the excess addition of phosphoric acid during oil extraction process of plant.

Hardness of water samples also above the permissible limits due to carbonate, bicarbonate, sulphate and nitrate of calcium and magnesium. During the year it was observed that the value of COD and BOD were higher. These are not pollutant but useful indicators of contamination of water through industrial waste. During the year it was observed that the phosphate is beyond the limits. The highest value of fluoride 1.8 mg/l was observed in summer seasons. High value of fluoride (1<) responsible for Dental fluorosis.

Reasons for high quantity of these parameters due to the accumulation of minerals, salts from the industrial waste to the soil and leaching to the ground water.

Conclusion:-

Different Physico chemical parameters measured during the study have higher values. The present study indicates that these parameters affectthe water quality around the Soya plant also affect the ecosystem. It was observed that 60% to 70% of pollution load of water is from effluent. So the effluent coming out from the localized create water pollution that is dangerous to health.

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