A Study of the Ground Water Quality and Discharge of Untreated Textiles in the Dyeing Effluents in and around Chellandipalayam in Karur District

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Abstract

A wide variety of both inorganic and organic pollutants are presented in the effluents from breweries, tanneries, dyeing, textiles, papers and pulp mills, steel industries and mining operations etc. The pollutants are including oils, greases, plastics, plasticizers, metallic wastes, suspended solids, phenols, toxins, acids, salts, dyes, cyanides and DDT etc., Those are not readily susceptible to degradation and thus causes made on serious pollution problems. Sulphuric acid acts an acid waste from the coal mines which is a serious pollutant that increased the hardness of water and made disastrous effect in the living organisms and corrodes concrete Na, Cu, Cr, Hg, Pb etc.,.These are the heavy metal effluents discharged from industries. This attempt has been made to find out in the impact of dyeing effluent on ground water at a particular area and also to know about the quality of dyeing effluents after the treatment of using RO plant. The effect of effluent from Dyeing industry at Chellandipalayam in Karur where discharging through the drain into the water resources. The ground water is highly polluted. During the rainy season the rain water collected in the water resources which are the main sources of ground water to the wells, bore wells located around the district of Karur. In the rainy season, the rain water mixed with Dyeing effluent, sewage into the ground water and reached the wells and bore wells. In turning of the quality of water is easily affected through this way. It makes the water hard with high TDS and unfit for drinking, domestic and agricultural uses. An analysis has been carried on the toxic heavy metals present in the dyeing Industry effluent and the ground water of quality parameters in the water resources in and around the dyeing units at Chellandipalayam. The quality of effluent water used to after the treatment of using RO Plant. A suitable remedial measure for the treatment of polluted ground water using reverse osmosis technology has been proposed.

Keywords: Total Dissolved Solids, dyeing effluent, reverse osmosis, toxic heavy metal,

Introduction - water and life

Without water there is no life. The human body contains about 70% water. All body of mechanism in animals and plants depended on only water as a media. Some of the salts naturally present in water serves as nutrients and are essential for the Junctions and growth of body. About 97% of water availed on the earth's crust which is the saltiest and non-potable and another 2%of water is available on Polar ice. but the contaminated Water is making so many causes on illness of health and spreading the diseases. About 80% of human diseases are spreading only unpurified water.

Water Quality Parameters

Parameter decides the quality of water may be classified as follows: Physical, Chemical, Bacteriological, Biological

Substances Dissolved in Water

About 2,000 chemical contaminants have been so far found in water resource. This Water may naturally contain about 15 to 20 parameters only. Total Dissolved Solids (TDS) adds the sum of all dissolved chemicals presented in the water resource.

Total dissolved Solids (TDS)

About 97-99% of TDS of natural water is contributed only by the six major ions i.e. Calcium, Magnesium, Sodium, Bicarbonate, Chloride and Sulfate. The balance of TDS is contributed by a number of contaminants like Iron, Manganese, Potassium, Ammonia, Nitrite, Nitrate, Fluoride, Phosphate, Trace metals and organic substances. In addition the permissible limit of TDS 1OO mg//1. it may be relaxed up to 2000mg/l with the absence of better alternative sources are included here.

Total Dissolved Solids in Some Waters

Rain water-1-50 mg/l

Surface water in hills-10-100mg/l

Surface water in plains-100-1000mg/l

Groundwater-500-5000mg/l

Groundwaterpollutedbytannery-10000-2000mg/l

Sea water-35000mg/l

Bottle (mineral) water -100-300mg/l

Permissible limit-500mg/l

Maximum allowable limit-2000mg/l

Water Quality in Water Soures

Ground water-high TDS, low turbidity

Surface water-low TDS, high turbidity

Heavy metal Pollution`

Motivation of controlling heavy metal concentrations in gas streams is diverse. Some of them are dangerous to health or the environment (e.g. mercury, cadmium, lead, chromium),[3] some may cause the corrosion (e.g. zinc, lead), some are harmful in other ways (e.g. arsenic may pollute catalysts). European community has been provided the thirteen elements of the highest concerns are arsenic, cadmium, cobalt, chromium, copper, mercury, manganese, nickel, lead, tin, and thallium, the emissions are regulated in waste incinerators. Some of these elements are actually necessary for human within the minute amounts (cobalt, copper, chromium, manganese, nickel). While others are carcinogenic or toxic, affecting, to

among others. The central nervous system may be added the (manganese, mercury, lead, arsenic), the kidneys or liver (mercury, lead, cadmium, copper) or skin, bones, or teeth (nickel, cadmium, copper, chromium).

Heavy metal pollution could be provided in many sources but most commonly arises from the purification of metals, e.g., the smelting of copper and the preparation of nuclear fuels. An electroplating is one of the primary sources of chromium and cadmium. Through precipitation of their compounds or by ion exchanged into the soils and mud's, heavy metal pollutants can be localized and lay dormant. Unlike organic pollutants, heavy metals do not decay and thus pose a different kind of challenging for remediation. Currently, plants or microorganisms are tentatively used to remove some heavy metals such as mercury. A plant which exhibits the hyper accumulation can be used to remove the heavy metals from soils by concentrating them in their bio matter. Some treatment of mining tailings has been occurred where the vegetation is then incinerated to recover the heavy metals.

One of the largest problems associated with the persistence of heavy metals are the potential for bioaccumulation and biomagnifications causing heavier exposure for some organisms than the environment alone. Coastal fish (such as the smooth toadfish) and seabirds (such as the Atlantic Puffin) are often monitored by the presence of such contaminants.

Ground water pollution

Ground water pollution may be defined as the artificially induced degradation of natural ground water quality. Pollution can impaired the use of water and can create some hazards to public health through the toxicity or the spreading of diseases. Most pollution originates from the disposal of waste water by following the use of water of wide variety of purposes.

Thus a large number of source and causes can be the modify groundwater quality, ranging from septic tanks to irrigated agriculture. In contrast with the surface water pollution, sub surface water pollution are difficult to detect, and even more difficult to control of them. It may persist for decades with the growing recognition of the importance of under ground water resources and their efforts are increasing to prevent, reduce and eliminate groundwater pollution.

Factors affecting groundwater pollution:

The extent of ground water pollution depends on the following factors such as Rainfall pattern, Depth of water table, Distance from the source of contamination and Soil properties such as texture, structure and filtration rate.

MATERIALS AND METHODS

Sampling methods

Eight water samples of different sites were collected from the different areas of karur in chelladipalayam region. The water samples were extensively used for drinking and other domestic

purposes. The samples were collected in high grade plastic bottles of one liter capacity after rinsing with Distilled water. Their techniques and methods were followed by the collection, preservation, analysis and interpretation.

Analysis Methods

The physicochemical characteristics of the ground water samples were determined by standard methods .The pH, Electrical conductivity, Nitrate were measured by using portable meters. The concentrations on Magnesium, Calcium hardness, total hardness were estimated by the volumetric methods and their results are compared with Water standards.

Location of sampling stations

The samples were collected from villages of different regions in around Chellandipalayam.

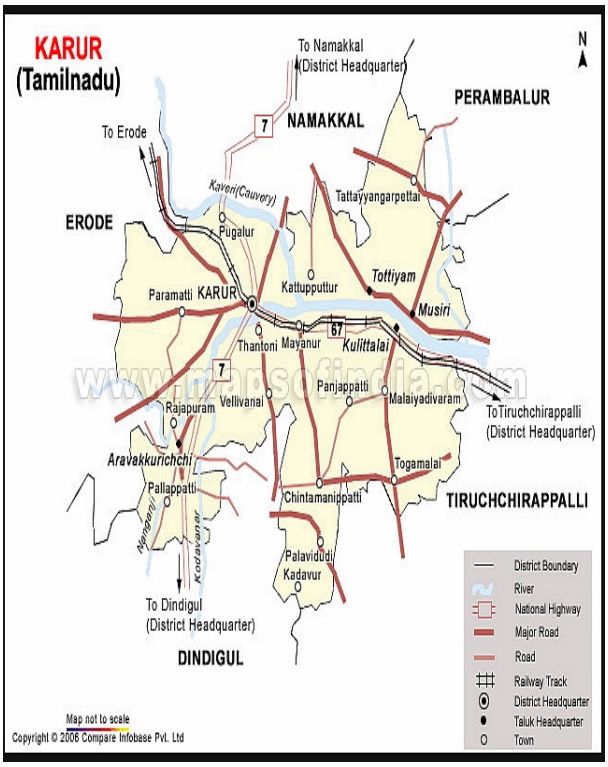

Figure 1: Study Area

Result and Discussion

This investigation has been discussed with dyeing industry effluent of various groundwater samples collected from surrounding areas of dyeing industry in and around Chellandipalayam at Karur district. The physico-chemical parameters such as colour, turbidity, TDS, alkalinity, electrical conductivity, total hardness, calcium, magnesium, chloride, nitrate, COD, iron, copper and chromium, were determined by using the standard procedures. At the result of this analysis has been compared with the water quality standards of WHO. The results of the various physic-chemical analyses of the textiles

dyeing industries effluent, the ground water and the heavy metals were undertaken. The Water sample has been discussed after the treatment of using RO plant following here.

An electrical conductivity of the effluent I & II are 25644 Mg/l and 52140 Mg/l both the highest than the permissible limit. These are influenced for all the stations of sample water. Sample water III has the highest electrical conductivity which compared to that of all the other samples. This is clearly shows the station III very nearer to the industrial effluent locations. An extent of total dissolved solid is presented in the effluent which is availed in the eight times and greater than all the other stations. From the sample water I and VII contained total dissolved solid which is above the prescribed limit, it showed that discharging amount of chemical from industrial wastage which is totally affected the surrounding areas. The total hardness of the sample II is the highest value when we compared with effluent I and all the other samples. But the hardness of the other water sample is in the range of 250-680 Mg/L. This indicates the more distance of the each samples influenced by the acceptable limit.

This analysis has been carried out the calcium how much important in the sample I and II are presented in the range of 2240,5520 Mg/L. and then, other samples contained in the range of 176-128 Mg/L. This would increase the hardness of the water sources. An amount of chloride ion is presented in the effluent I and II are 5000, 11250 Mg/L and then their sample range exists between the range of 1650-530 Mg/L. it is affected the softness of the water. In Chemical oxygen has demanded on the effluent I and II are in the value of 5188 and 6744 Mg/L .It is above the permissible limit and it's totally unfit for all the application purposes and then it causes of the harmful effect such as kidney stone formation and related their diseases. The amount of iron in the samples I and ii and the sample iii are 2.98, 3.34 and 1.21 Mg/l .This is the above permissible limit on other samples containing the iron of the maximum desirable limit. if it is in consumed excessive quantity of the iron stored in liver ,kidney and heart diseases . It makes the of causes failure on these organs.

An extent of chromium in the dyeing effluent I and II are in the value of 0.057 and 0.665 Mg/l the desirable limit 0.005. Hence, the effluent II has been contained the highest quantity of heavy metal and its toxic nature of the effluent 0.005 Mg/l amount of chromium requires for the glucose tolerance factor, insulin biological metabolism and above of those range. It becomes the toxicity through the oxidation of glucose. The amount of copper in the effluent I and II are 0.0008 and 0.00024 Mg/l presented in the desirable limit it does not produce any toxicity but it increased the long period causes with the adverse effect such as Wilson diseases on neurological damage and liver diseases also.

COMPARISON TABLE

Result of Ground Water Samples in the Chellandipalayam of Karur.

physical and chemical parameters.

S.No	Lab. Sample No	Turbitity	Elec.conductivity	TDS mg/1 500	PH	Alkalinity	Total Hardness	Calcium	Magnesium	Iron	Nitrite	Nitrate	Chloride	Fluoride	sulphate	Phospate	Tidys	P/NP	Reason
0	.(1)	.(2)	.(3)	.(4)	.(5)	.(6)	.(7)	.(8)	.(9)	.(10)	.(11)	.(12)	.(13)	.(14)	.(15)	.(16)	.(17)		
1	S1 18333	5	4330	3031	7.5	336	480	128	38	0.75	0.04	25	1160	1	149	0.09	0.32	NP	TDS,Cl
2	S2 18334	6	5328	3729	7.7	280	680	144	58	1.21	0.06	29	1650	1	165	0.14	0.36	P	TDS,TH,Fe,Cl
3	S3 18335	3	2463	1724	7.9	296	250	64	22	0.33	0.02	7	530	0.6	53	0.02	0.2	NP	Nil
4	S4 18336	4	3910	2737	7.6	328	540	160	34	0.55	0.04	8	960	1	119	0.03	0.28	NP	TDS
5	S5 18337	3	3206	2244	7.7	264	660	152	67	0.36	0.03	10	850	0.8	91	0.04	0.28	NP	TDS,TH
6	S6 18338	4	3284	2299	7.4	260	580	176	34	0.45	0.05	20	890	0.6	68	0.05	0.28	NP	TDS
7	S7 18339	4	3812	2668	7.9	280	640	160	48	0.74	0.07	23	980	0.8	128	0.08	0.32	NP	TDS,TH
8	S8 18340	5	4076	2853	7.6	316	560	160	38	0.8	0.09	25	1060	0.4	165	0.1	0.36	NP	TDS,Cl

COMPARISON TABLE

physical and chemical parameters analysis in untreated textiles dyeing effluent.

S.No	Lab.Sample No	Turbitity	Elec.conductivity	TDS mg/1 500	PH	Alkalinity	TH	Calcium 75	Magnesium	Iron	Nitrite	Nitrate 50	Chloride 250	Fluoride	sulphate	Phospate	Tidys	P/NP	Reason
0	.(1)	.(2)	.(3)	.(4)	.(5)	.(6)	.(7)	.(8)	.(9)	.(10)	.(11)	.(12)	.(13)	.(14)	.(15)	.(16)	.(17)		
1	S1 18341	12	25644	17951	11.6	2200	12000	2240	1536	2.98	1.87	126	5000	0.4	2301	0.96	0.4	NP	TDS,PH,Alk, TH,Ca,Mg, Fe,NO2,NO3, Cl,SO4,
2	S2 18342	16	52140	36498	14	4000	25100	5520	2712	3.34	2.15	145	11250	0.8	3802	1.46	0.5	NP	TDS,PH,Alk, TH,Ca,Mg, Fe,NO2,NO3,

COMPARISON TABLE

Heavy metal analysis for untreated textiles dyeing effluent.

S.NO	Parameters	Lab.Sample NO 34820	Lab.Sample NO 34821	Desirable mg/L	Maximum mg/L
1	COD mg/L	6744	5188	150	No relaxation
2	Copper as Cu mg/L	0.024	0.042	0.05	1.5
3	Chromium as Cr mg/L	0.665	0.057	0.05	No relaxation

Conclusion

We are concluding that all the water samples I to VIII have commonly chemical parameters, such as hardness, total dissolved solids, and electrical conductivity, calcium, sulphate, and chloride alarmingly above the prescribed limit. Even though some parameters are copper and fluoride those are all in the acceptable limit .If it makes some of changes on beyond this limit, it will become a harmful thing. Parameters of chromium and iron are presented in the considerable amount. Definitely, it causes made on the metal toxicity of human beings. we compared for all the eight samples with the effluent samples 3 has mildly affected every stations due to the long distance .and then ,it almost of all other station water samples are influenced in the large amount due to the improper management of waste water over exploitation of water sources and rapid growth of industrialization in the urban areas. An attempt has been discussed to study about the impact of dyeing effluent containing the inorganic, heavy metals and organic pollutants in Chellandipalayam area. The effluents are including oils, greases, metallic wastes, suspended solids, phenols, toxins, acids, salts, dyes, cyanides and DDT. Generally, it increases the TDS, hardness of water, and heavy metal resented in the effluents from dyeing units are percolated in and around the Chellandipalayam area in Karur District.

Maximum amounts of dyes are used in the textile processing. Due to the incomplete absorption of dyes and waste water generated through the washing operations. The effluent volume is high and the dyestuffs are highly structured polymers .these is very difficult to decompose biologically. The impact of effluents from Dyeing industry has highly affected the dangerous level in Karur district at Chellandipalayam. During the rainy season the rain water were collected in the pond which is a main source of ground water to the wells, bore wells located in and around the pond and highly polluted due to the indiscriminately discharge of untreated dying effluent around the Chellandipalayam in Karur District. It makes the water hard with high TDS and unfit for drinking domestic and agriculture uses. The

pollution control board insisted for the treatment of the dyeing effluent using RO plant. During rainy season the water flows along with the effluents. The people used to take bath and wash their clothes in the pond water. The pond water percolates in the ground and contaminates the ground water. The results of the various physico - chemical analysis of the dyeing effluent from dying unit in Karur where the treatment of water using the RO plant and reveals that the dying effluent contains very high Total Dissolved Solids and ground water also contains high total dissolved solids which is above the standard level.

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