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STUDIES ON PHYSICO- CHEMICAL PROPERTIES OF INDUSTRIALLY POLLUTED SOIL OF AURANGABAD CITY WITH SPECIAL REFERENCE TO ELECTRICAL CONDUCTIVITY.

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Abstract

The city of Aurangabad has witnessed a sea change during last two decades because of rapid industrialization and small manufacturing unit. The four industrial zones (MIDCchikalthana,,waluj, shendra,railway station) harbor a variety of industriesrangingfrompharmaceuticals,breweries,distilleries, to chemical factories.

The waste generated from industries are discharged in some water bodies and also towards nearby land, Thus causing the problems of both water and soil pollution. This not only affects the soil ecosystem but also the composition of soil making it unfit for agricultural purpose. The present study focuses on the various physical and chemical properties of polluted soil near the vicinity of some industries and polluted water discharged from industries. The authors have closely monitored the different parameters like pH,electricalconductivity,organic carbon.nitrogen,phosphorus,potassium,sulphur,zinc,iron,manganese, and copper(for soil) and ph,conductivity,,total dissolved solids(TDS),total suspended solids(TSS),Chemical oxygen demand, (COD),chlorides and sulphates for (water samples).

Two most significant changes in parameter i.e. Electrical conductivity for (soil and water) COD for (water) wereworrysome,. Also the pH of some samples showed alkaline range indicating the soil being polluted which increased its salinity making the soil infertile and unfit for any vegetation.

From the findings one can conclude that immediate remedial measures should be taken in order to mitigate or decrease the concentration of Salts, Electricalconductivity, COD so as to restore the fertility of soil and treatment of water before being discharged in the soil. This would make the soil to regain its fertility and will also promote the microbial population to survive creating an ecological balance.

Key words: polluted soil,water,electricalconductivity,soilpollution,COD..

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Introduction:

Rapid and industrialization and urbanization has led to the development of many cities providing not only job opportunities but also the growth of the city overall.it is needless to say to that with so many industries, manufacturing, units, factories and small workshopsharboring have not only added to boost the economy of many cities but also has given better standard of living for skilled professional. But the way industries have grown there has always been a shortage or deficiency in management of different chemical,pollutants,effluent,coming out of such industries, further development of different industrial zones have elevated this problem because it is not only one or two industries rather many of them operating at the same time and discharging pollutant of vast array in the surroundings concomitantly.the different types of waste that gets discharged are, chemical, effluent water, dyes, toxic compounds, heavy metal ion, and organic waste.

Some wastes and their sources:

Products	Hazardous wastes
Medicines	Organic solvents &residues,heavy metals(mercury &zinc)
Metals	Heavy metals, fluorides,cyanides,acids,alkalinecleaners,solvents,pigmentsetc
Paints	Heavy metals,pigments,organic residues
Leather	Heavy metals,organic solvents
Oil,petroleum products	Oils,phenols,organic compounds,
Pesticides	Organic chlorine compounds,organic phosphate compounds
Plastics	Organic chlorine compounds
Textiles	Heavy metals,dyes, Organic chlorine compounds

The above mentioned pollutants not only cause soil pollution but the discharged water also is a potent source of contamination of soil and other ecosystem. The hazards of soil pollution has many impacts, from increasing salinity of soil, to infertility of soil, and reduced vegetation, stunted growth of plants, deposition of metals in plant body.

Apart from the above mentioned problems, the polluted water discharged from industries further hampers the quality of soil by further addition of xenobiotic compounds, heavy metals, and salts.

Thus it is the dire need of hour to check such areas of pollution and to find a remedy to mitigate the soil and water pollution so that the fertility of soil is restored and water is being treated before discharging them into soil,. Forunderstanding the effects of pollutants it is necessary to first monitor the soiland water samples from polluted areas to understand the types of chemicals, metals, present in it. Thus it becomes absolutely necessary to study the physico chemical

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properties of soil and water of such areas so that a holistic approach can be adopted to degrade the pollutants.

Further it provides with an idea of using microbes, botanicals, fungi that can easily degrade the pollutants with minimum cost, it also provides a detail information about the micro biota of such soil so as to use the same for degradation of soil pollutants and restoring its fertility.

A detail study of physiochemical properties of soil and water from various industrial zones of Aurangabad city was carried out so as to understand the pollutants and ways one can afopt to degrade them.

Materials and methods:

Area of study:

The study was carried out from four different soil samples and two discharged water sample collected from the MIDC zones of Aurangabad city.ie MIDC waluj,shendra,chiklathana and railway station)

Requirement:
Plastic bottles, plastic bags:
Soil sampling preparation and analysis:
Fivedifferent soil sample were collected from industrial zone, along with two samples of discharged water. Soil sample were collected from top layer 0-15cm and sub layer 15-30cm.the samples were dried for 8 days were ground using agtamortarand sieved with 0.5 mm mesh size sieve to remove stones, plantroots, to have soil of uniform size, and then packed in polythene bags for analysis.

Water sample were collected in bottles and stored in plastic bottles.

Physico chemical study:

The present study provides a detail description of the physico chemical criteria of soil and water sample.For soil samples 15 parameters were analsyedie (p^H,electricalconductivity, organiccarbon, availablenitrogen, available phosphorus, availablezinc, availablepotassium, availablesulphur, available cadmium available zinc, available iron ,manganese and copper . Along with fluoride arsenic,lead and cadmium.

For water samples seven parameters are studied vizp^H,electricalconductivity,Total Dissolved Solids.,Total Suspende Solids, chloride, Sulphate and Chemical oxygen Demand.

Results and discussions:

For soil samples

Sr no	parameter		Sample A	Sample B	Sample C	Sample D	Sample E	units
1	p^H		8.39	8.15	7.29	7.86	7.95	-----
2	Electrical conductivity		**5.20**	**5.95**	**8.33**	2.25	**9.75**	ms/cm

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	(EC)							
3	Organic carbon (c)		1.05	0.39	2.49	2.30	2.46	%
4	Available nitrogen (N)		225.79	263.42	752.64	551.94	301.06	Kg/Ha
5	Availablephosphorus (P)		7.26	3.87	63.38	96.77	58.54	Kg/Ha
6	Available potassium (K)		14.00	148.40	524.05	1302.78	407.12	Kg/Ha
7	Availablesulphur (S)		548.81	304.95	532.62	114.79	119.76	ppm
8	Available zinc (Zn)		4.80	1.44	4.36	5.18	4.90	ppm
9	Availableiron(Fe)		33.36	13.40	32.28	33.50	29.70	ppm
10	Available manganese (Mn)		19.16	3.14	18.50	18.58	19.38	ppm
11	Availablecopper (Cu)		8.26	2.24	2.08	10.64	22.58	ppm
12	Fluoride(F)		3.19	**4.72**	**6.71**	**4.92**	**7.45**	ppm
13	Arsenic(Ar)		Less than 1	Less than 1	3.40	**7.44**	**13.77**	ppb
14	Lead (Pb)		Less than 1	Less than 1	Less than 1	Less than 1	Less than 1	ppb
15	Cadmium(Cd)		Less than 1	Less than 1	Less than 1	Less than 1	Less than 1	ppb

For water sample:

Sr no	parameter	Sample A	Sample B	Units
1	p^H	3.48	6.41	
2	Electrical conductivity	**34800**	3750	µmhos/cm
3	Total dissolved solids (TDS)	52	38	Mg/L
4	Total suspended solids (TSS)	**24980**	2690	Mg/L
5	Chlorides (Cl)	8717	830	Mg/L
6	Sulphate (S)	1383	62	Mg/L
7	Chemical oxygedemand (COD)	**17840**	1400	Mg/L

Conclusion:

From the above table presented it clearly showsthat,Thep^H of soil sample A,B,E is of alkaline range and further may increase,alkalinity and ph are the factors determining the amenability of soil and water for biological treatment.

The conductivity of soil depends upon the concentration of ions Electrical conductivity is found to be very high for the sample A,B,C and E indicating presence of many ions, further the presence of fluoride in sample A,B,C,D,E and presence of cadmium in sample C,D and E indicates contamination by heavy metals.Similarlyfor water sample p^H of sample a is acidic with

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very high electrical conductivity,TheTSS and COD values are also very high owing to the presenceof organic matter.

Thus from the above studies we need to adopt an approach that is feasible and economical for decreasing electrical conductivity and organic matter from the pollutants by using microbes and botanicals. This will ensure a safe disposal of water without causing any water pollution and will also make the soil fit for agriculture /vegetation purpose.

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