



EVALUATION OF PHYSICOCHEMICAL PARAMETER OF MUNICIPAL SOLID WASTE LEACHATE AT JABALPUR

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ABSTRACT: Leachate from active municipal solid waste landfills can be a major source of contamination to groundwater and surface water. Therefore, the present investigation was carried out to assess the quality of municipal solid waste leachate samples. Ten leachate samples were collected from different locations have significant value of COD and BOD 1213 mg/L and 542 mg/L in sample respectively.

Keywords: Biodegradable, Groundwater, Landfills, Leachate, Pollution.

INTRODUCTION

One of the major pollution problem caused by the municipal solid waste (MSW) landfill is leachate, which is generated as a consequence of precipitation, surface runoff and infiltration or intrusion of ground water percolating through a landfill. Generally leachate contain large amounts of organic matter (biodegradable but also refractory to biodegradation), which are great threat to the surroundings soil, groundwater even surface water [1, 2, 3, 4, 5, 6, 7, 8 and 9].

The quantity of leachate generated from landfills depends mainly on climatic factors in its vicinity that is the above all on the water balance in the layer covering wastes. The volume of leachate is also affected by initial moisture content of the waste, solid waste composition, biochemical and physical transformation taking place in them and causing changes in their humidity and by the inflow of water from outside a landfill [10, 11]. Besides contaminating surface water another devastating effect of dumping site is on groundwater quality by the formation of leachate [12, 13]. Leachate by seepages and infiltration not only deteriorates soil quantity but also renders the associated aquifer unreliable and until for drinking purposes [14]. Therefore the present investigation deals with physicochemical analysis of municipal solid waste leachate in Jabalpur city.

MATERIALS AND METHODS

Survey and Sample Collection

The survey was conducted during rainy season of year 2011. The dumping site is located at Nagar Nigam Jabalpur region including Panagar, Sihora, Chhawani, Shahpura, Bhedaghat, Barela, Katangi, Patan, Manjholi and Nagar Nigam Jabalpur.

All leachate samples were collected from MSW dumping sites. Samples were stored at 4°C for until used for analysis [1].

Physicochemical Analysis of Leachate

All the leachate samples were analyzed for following physical as well as chemical parameters included pH, Electrical Conductivity (EC), Total Dissolved Solid (TDS), Total Suspended Solid (TSS), Total Solids (TS), Total Alkalinity (TA), Chloride, Total Hardness (TH), Ca hardness, Mg hardness, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Sulfate, Total organic compound (TOC), Oil & grease carried out in accordance to standard analytical methods [15, 16].

RESULTS AND DISCUSSION

Leachate was characterized for both physical and chemical parameters (pH, COD, BOD, Oil & grease, TDS, TSS, TS, TOC, EC, TA, Ca, Mg, Na, K, chloride, sulfate).

Results are shown in table 1. Test results showed that leachate is highly contaminated with different inorganic. While migrating through the waste, the liquid dissolved salts picks up organic constituents. The organic strength of landfill leachate can be greater than 20 to 100 times the strength of raw sewage. Leachate containing hundreds of different chemicals the characteristics of municipal leachate vary greatly within an individual landfill over space and time. Also leachate characteristics vary considerably from one landfill to another.

Table 1: Assessment of the leachate samples from MSW dumping sites at Jabalpur

S.N.	Parameters	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
1.	pH	6.2	6.6	6.3	7.1	7.0	6.9	6.7	6.6	6.2	7.1
2.	COD mg/L	1213	1129	761	961	1180	1104	1124	1023	831	673
3.	BOD mg/L	542	531	128	289	401	398	413	301	237	119
4.	TDS mg/L	4310	5211	410	1411	4210	3812	4516	5032	3731	2361
5.	TSS mg/L	214	189	132	89	141	103	132	116	132	86
6.	TS mg/L	4524	4500	542	1500	4351	3915	4648	5148	4863	2447
7.	Oil & grease mg/L	1	0.9	BDL	0.7	2	BDL	1.3	0.9	0.2	0.8
8.	TOC mg/L	39	31	16	26	86	81	64	43	36	32
9.	EC ($\mu\text{s}/\text{cm}$)	6432	6871	5410	1611	7211	8124	5314	4612	4411	4013
10.	TA mg/L	30	42	38	30	34	14	18	20	29	38
11.	Ca ⁺⁺ mg/L	186	198	161	172	192	201	214	218	164	191
12.	Mg ⁺⁺ mg/L	68	74	81	79	69	71	63	49	88	93
13.	Na ⁺ mg/L	214	141	161	139	113	118	121	141	132	104
14.	K ⁺ mg/L	210	131	104	114	161	173	104	161	130	129
15.	Cl ⁻ mg/L	201	210	161	152	160	143	158	143	123	120
16.	SO ₄ ⁻ mg/L	32	40	49	63	54	49	43	39	61	59

*L- Leachate, *BDL- Below Detectable limit

Many factors influence the leachate composition including the types of wastes, moisture content, the particle size, and the degree of compaction, the hydrology of the site, the climate and age of the fill [17, 18]. Similarly Jedrczak and Haziak [10] Karim et al. [18], Thomanetz [19] present the chemical composition of leachates from municipal solid waste landfills. The data obtained by various authors compiled by Kulikowska [17].

CONCLUSION

Therefore, from the present investigation we can conclude that MSW leachate containing higher amount of inorganic as well as organic component which may cause contamination of groundwater as well as surface water and also contaminates the agricultural soil near MSW region.

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