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CONCERNS OF ORGANIC MATERIAL DISPOSAL IN CHHATTISGARH

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ABSTRACT

*We have many types of waste materials which needs proper disposal. A*wareness towards environment & hygiene is most essential in the run for development in A mad way. The manufacturing of EEE items involves many organic materials also. These manmade components are almost such which can survive in its own way for centuries. In case we opt for forceful destruction of these by burning of by dumping these they pose special problems. The unplanned and unscientific crude disposal attempts give rise to irreparable damage to environment and living being affected by it. Situation of such disposal in developing sates cities show similar results as can be witnessed in any part of India which is similar to worst affected areas worldwide specially in the third world nations. The current study takes stock of preposition of degradation goes demographic preposition, industrialization extent, non strictness and absence of regulatory & monitoring enforcement mechanisms and the situation arrived at are alarming. Worst affect is from continued use of banned substances in product manufacturing. This must be stopped and new ways for environment friendly constituents, permitted components and safe technology for safe products must be exercised. Available and emerging options of buy back, extended producers responsibility must be made mandatory and extensively exercised keeping in mind the proper scientic disposal of such deadly items. The manufacturers must go for disposal in safe, highly technical manner in controlled, sustained and environment friendly manner.

Keywords- EEE*, Buy back, Hazardous, e waste, Manmade/Organic, Regulations Toxicity, Disposal, EPR.*

1. INTRODUCTION

Mad rush for industrialization and automation has lead to many products which require elemental and man made substances. The developed man made substances are derived products which have tailored properties. These constituents are known as organic materials. These days in all sphere of life they are present. Regardless of ruggedness, these also go for wear and tear and lose their desired properties and turn to waste or in a state they cannot be used. The synthetic materials are manmade and often consist of deadly toxic and hazardous substances which needs careful specialized disposal in presence of highly expertise environment through experts.
Sector wise development of EEE industry can be listed as

Data processing, Telecom & Entertainment, Medical Instrument industry, Audio Video, Automotive & Automobile, Aerospace & Defense, Home Appliances etc[2].

2. CONTITUENTS OF E-WASTE

We have different distinct types of constituents in the E wastes. Most of the constituents are hazardous and non hazardous metals and organic materials.
As constituents Hazardous Metals, Materials & Substances popularly known as organic or manmade materials in E-Wastes can be put as follows

The **metals** present in e waste can be classified as hazardous and non hazardous. The hazardous are of main concern for health and other reasons where as the availability and depletion or extinction of metals which are non hazardous can be put in consideration. Metals abundantly found in e waste having harmful effects by any means are as listed herein as

Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	
Cadmium	Chromium	Cobalt	Copper	Gallium	Germanium	
Indium	Lead	Lithium	Mercury	Molybdenum	Nickel	
Selenium	Silver	Sulphur	Tin	Vanadium	Yttrium	Zinc etc.

In case of organic or manmade hazardous materials a variety of such **substances** can be broadly put in three categories or segments, namely **Phthalates, Chlorinated compounds** and **Flame retardants [9,10.15,25]**

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3. CURRENT STUDY

The present study aims at lab examination of texture of soil, environment near the most worst affected areas by e waste in the cities of Chhattisgarh. WE went for proper sampling and there after working on these for arriving at the alarmness of situation.

4. SELECTION OF SAMPLES & SAMPLING, DATA & ANALYSIS

Chhattisgarh state has one of the oldest industrial towns of Indian Republic and has a diversified rich cultural heritage and varied strata of populations which is a good mix of disproportionate economical background. The have ones and have not ones are plenty with almost all types of consumers. The demography is varied and has various industrial scenarios having diverse urban and rural industrialization in clearly marked and known areas. As usual industrial sections are located in and to limited areas having traditional and upcoming products to the limits of the most recent IT sector. The connectivity of state's major urban areas from leading industrial centers is added advantage at one end & disadvantage at other. Cities are well connected to national and international centers of activities. Major traditional cities have inherent large slums areas with good mixed culture having wide known and acknowledged range of economical strata. The present study is for the cities of Bilaspur, Bhilai, Ramghar, Ambikapur, Jashpur, Jagdalpur and Raipur.

With the dynamic leadership of the present CM though we are witnessing the overall development but still it is a well known fact that very less organised or formal recycling and disposal centers and facilities are available in nation and this new state of Chhattisgarh. In lack of formal collection facilities for e-waste we are left with limited destinations better known as slum or waste gatherers / radddiwala, local workshops, bye back options, keeping in house at dumping place or handing over to scrap dealers for further transmigration to nearby metros as available options.

Once the cities has been selected the visual survey of the worst affected areas is done and sampling spots are located and identified, now identification of locations and diverse strata needs to be identified for proper study and determination of level/ extent of degradation due to these manmade toxic constituents making the environment toxic and polluted. The samples are to be taken for exploration of extent of contamination by contaminants of surrounding, soils, texture, sediments to get most accurate and possibly reliable evaluation of content of contaminations by manmade substances. To best of knowledge and belief of the locals and stake holders of the affected areas, workforce is engaged in for collection of samples. Equal amount of in equal quantity in ten numbers were icked. These then mixed and once again samples from this mix is obtained and preserved in the thoroughly cleaned and vaporized botels. Samples are such obtained which represent maximum contaminations available in surrounding in order to get worst possible affected data is obtained for analysis and consideration. The sealed samples are forwarded to the labs and results were obtained after through examination. Data on analysis thus available will enable to get true picture of region for proper representation. Contamination, presence of contaminants, visual and analytical analysis and its hazardous effects can ascertain level of toxicity / harardness and affect / impact on human and living beings living in surrounding.

Table 3. Details of Samples

Sample No	Type	Location
Bilaspur (BIL)	Recycling/Repairing/Burning / dismantling Place	Slum / scrap dumping / waste treatment and lonely river site
Bhilai (BHI)	Recycling/Repairing/Burning / dismantling Place	Slum / scrap dumping / waste treatment and lonely river site
Ramghar (RAM)	Recycling/Repairing/Burning / dismantling Place	Slum / scrap dumping / waste treatment and lonely river site
Jashpur (JAS)	Recycling/Repairing/Burning / dismantling Place	Slum / scrap dumping / waste treatment and lonely river site
Ambikapur (AMB)	Recycling/Repairing/Burning / dismantling Place	Slum / scrap dumping / waste treatment and lonely river site
Jagdalpur (JAG)	Recycling/Repairing/Burning / dismantling Place	Slum / scrap dumping / waste treatment and lonely river site
Raipur (RAI)	Recycling/Repairing/Burning / dismantling Place	Slum / scrap dumping / waste treatment and lonely river site

Results thus obtained have been tabulated in the tables listed below. Careful observation and obtained results of critical examination revealed that contamination is present in almost all samples but varies in nature from place to place. The concentration arrives from level of traces to alarming level in toxicity and harardness point of view. Some of deadly constituents are of such level that they pose threat to health, hygiene to individual beings and are reasonably responsible for degradation to environment and cause pollution of all levels. Toxicity level, degradation, and hazardous contents warrants emergent need to develop appropriate technology capable of reducing use of deadly materials and paves ways for use of environment friendly materials for maintaining environment within safe levels for living beings. Producers / Manufacturers & Promoters, Agencies regulating safety measures and agencies responsible for safeguarding human and living beings should aim and look at it.

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Details of observations obtained from the samples collected from the various spots and positions have been produced below. Here it is important to note that the numbers represent number of compounds identified in the e-waste samples from the locations / samples. These include the level of traces even case of obtained in samples.

Table 4. Details of constituents obtained.

ORGANIC COMPOUNDS	BIL	BHI	RAM	AMB	JAS	JAG	RAI
NO. OF ORGANIC COMPOUNDS ISOLATED	162	141	132	131	77	92	123
NO. RELIABLY IDENTIFIED	88	53	66	49	24	35	57

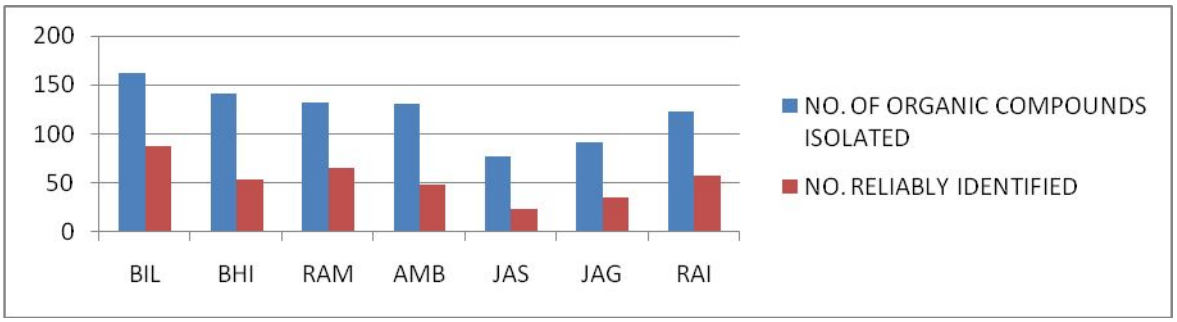

Figure 1. Organic compounds at sites

Figure 1 shows the graphical of identified organic compounds in all the seven selected cities sites. The contamination is highest at Bilaspur and lowest at Jaspur. The other cities are in between.

Table 5. Constituents of Chlorinated & Brominated substances

CHLORINATED AND BROMINATED SUBSTANCES	BIL	BHI	RAM	AMB	JAS	JAG	RAI
CHLORINATED BENZENES:							
DI-PENTA CHLORINATED	2	6	2	8		4	8
HEXA CHLORINATED	1	1	1	1	1	1	1
POLYCHLORINATED BIPHENYLS (PCBS)				7			7
CHLORINATED ALKYL BENZENES	2			2	2		2
CHLORINATED ALKANES			1	1			2

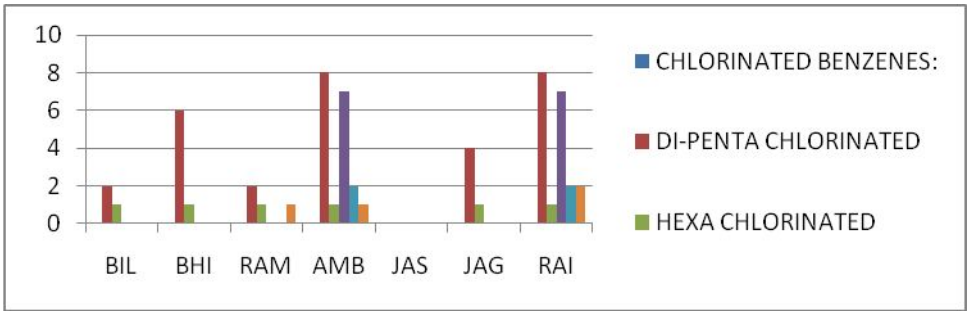

Figure 2 Presence of organic materials at sites

Table 6. Constituents of PBDEs.

POLYBROMINATED-DIPHENYL ETHERS PBDE	BIL	BHI	RAM	AMB	JAS	JAG	RAI
TRI-HEPTA BROMINATED	7	6	9		3	9	7
OCTA BROMINATED	1			1		1	

Table 7. Constituents of Triphenyl Phosphate (TPP) & Phthalate Esters

TRIPHENYL PHOSPHATE (TPP) & PHTHALATE ESTERS	**BIL**	**BHI**	**RAM**	**AMB**	**JAS**	**JAG**	**RAI**
TRIPHENYL PHOSPHATE (TPP)	**1**			**1**			**1**
DEHP	**1**		**1**		**1**	**1**	**1**
DBP, DIBP, DINP	**3**						

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Table 8. Constituents of Hydrocarbons & others.

HYDROCARBONS & OTHERS	BIL	BHI	RAM	AMB	JAS	JAG	RAI
PAHS AND DERIVATES	5	3	9	2	4	6	4
BIPHENYL AND DERIVATIVES	2	3	7	1	1	4	1
ALKYL BENZENES	3	11	14	6	3	6	9
ALKANES AND ALKENES	15	12	18	10	5	11	12
STEROIDS & HOPANOIDS	2	3	2	4	1	7	1

Table 9. Constituents of Nitrogen compounds.

NITROGEN COMPOUNDS:	BIL	BHI	RAM	AMB	JAS	JAG	RAI
ALKYL & ALKYL BENZENE NITRILES	1	1	3		2		1
NITRO DERIVATIVES	3			3		3	

Table 10. Constituents of Oygenated benzene derivatives

OYGENATED BENZENE DERIVATIVES	BIL	BHI	RAM	AMB	JAS	JAG	RAI
PHENYL KETONES	1	2	1	4	1	2	1
PHENOL & DERIVATIVES	1	1	1			4	1
BENZOIC ACID ESTER				1	1	1	

Almost all samples collected reflects presence of multiple synthetic/ organic substances which have been listed in above tables listed against different heading wise tables for segments/ classes of constituents for ease of discussion. Table 5 shows the presence of no of organic compounds isolated and no of reliably identified ones among all the samples. Chlorinated benzenes presence was noticeable in all the samples in some form or the other. In case of PCBs it is present in samples 1, 3, 5 and 6. Case of PBDEs can be identified in samples of in all the samples in some form or other, even in form of traces only. The presence of TPP in sample 1, 4 & 7 : DBP, DiBP and DNP in sample 1 , while DEHP presence was evident in all except sample 2. Presence of hydrocarbons family which includes PAHs with derivatives derivates, biphenyl with its derivatives derivatives, alkyl benzenes, alkenes and alkenes and steroids & hopanoids is evident in all the samples collected i.e. obtained and tested. In case of nitrogen compounds constituents alkyl & alkyl benzene nitrides are available in all samples except sample 6 leaving nitro derivatives presence in 1,4 and 6 samples.4 only. Phenyl ketones were present in all samples compared to benzoic acid ester presence in samples 4, 5 &6 and phenol & derivatives availablility1, 3, 6 and 7 samples only.

Polychlorinated dibenzo-p-dioxins and furans (PCDD/Fs 2,3,7,8 substituted congeners) examination for sample 1 and 5 was particularly taken as these cities have age old traditions and civilization for quantitative analysis to estimate range of PCDD/Fs toxicity in terms of toxicity equivalents (TEQs). The TEQs gives concentration equivalents for toxic congener 2,3,7,8- tetrachlorodibenzo-p-dioxin popularly known as TCDD. Mass equivalents as per known conventions are obtained to get account of toxicity & harardness of individual congeners. Total TEQs for mentioned two samples obtained can be tabulated as hereunder: Analytical results of quantification of 2,3,7,8-substituted PCDD/Fs available in samples BIL and JAS

Table 11. Analytical results of samples 1 and 5

Congener	conc pg/g_s1	TEQ pg/g_s1	Log TEQ_s1	conc pg/g_s5	TEQ pg/g_s5	Log TEQ_s5
2378-TCDF	15.4	1.5	0.1760913	221	22.1	1.3443923
12378-PCDF	113.9	5.67	0.7535831	226.6	11.3	1.0530784
23478-PCDF	21.4	10.5	1.0211893	771.5	385.7	2.5862496
123478-HxCDF	49.9	5	0.69897	673.9	67.4	1.8286599
123678-HxCDF	27.4	2.7	0.4313638	443	44.3	1.6464037
234678-HxCDF	63.34	6.3	0.7993405	563.8	56.4	1.7512791
123789-	18.6	1.9	0.2787536	185.8	18.6	1.2695129

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HxCDF						
1234678-HpCDF	296.1	2.9	0.462398	794.9	7.9	0.8976271
1234689-HpCDF	112.1	1.1	0.0413927	114	1.1	0.0413927
OCDF	971	1	0	1695.7	10.7	1.0293838
2378-TCDD	3.15	3	0.4771213	34.8	34.8	1.5415792
12378-PCDD	3.44	1.7	0.2304489	172.2	86.1	1.9350032
123478-HxCDD	16.6	1.6	0.20412	164.6	16.5	1.2174839
123678-HxCDD	24.4	2.5	0.39794	376.1	37.6	1.5751878
123789-HxCDD	15.9	1.6	0.20412	174.2	17.4	1.2405492
1234678-HpCDD	167.5	1.7	0.2304489	2524.1	25.2	1.4014005
OCDD	2461.7	2.5	0.39794	5968.3	6	0.7781513
		53.17			849.1	

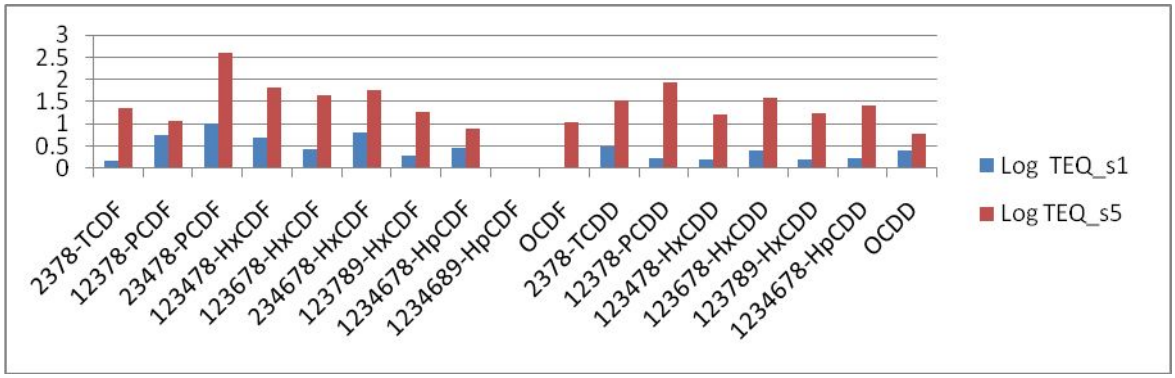

Figure 9. Showing the details of different quantitatively obtained constituents in log scale for sample 1 and 5

It can be concluded that level of PCDD/Fs in sample 1 was 53.17 pg/g TEQ which is lower than reported from sites in China and Africa but adheres in range of what is available in other areas of India. In India normal range of combustion residues for e waste combustion regions range between 80 to 180 pg/g TEQ and can go upto 675 pg/g in selective cases. The PCDD/Fs level of sample 1 site is of moderate in nature perhaps for the reason that these gets transported to other locations as per connectivity to metros. The normal ranges obtained / reported are below 1 pg/g TEQ and rarely above 10 pg/g TEQ.[11]

Sample from site 5 is however indicator of very high level of contamination particularly at order of 849.1 pg/g TEQ. The total count is somewhat below 1000 pg/g TEQ which is seen to be threshold level for serious contamination[11]. The individual PCDD/Fs compounds profiles are almost similar in two samples. The similarities can be indicator of similarities of volumes and prepositions left after open burning of e-wastes from primary sources. Figure 9 shows the graphical representation of data obtained among the comparative representation of samples collected from 1 and 5 sample/sites.

5. CONCLUSION

The Electronic industry which has registered rapid industrialization growth particularly after second world war has given reasons to cheer but at same time has put lines on our foreheads also. The unprecedented growth has lead to many metals and manmade substances inclusion in manufacturing of EEE products. Since all equipments or sevices have a life span and after that they lose their credential and turn to waste which in this case is termed a E waste has many manmade and depleted virgin materials capable of reuse and some which cannot be further used. The usable ones needs technology for reuse but the non usable materials also need technology for proper disposal as they when left uncared to the unskilled persons for disposal are left in open air or burnt in air leading to multiple stages of environmental degradation. The manmade organic materials have long lasting effects and are becoming prime concern. A national survey is need of hour to ascertain toxic and hazardous degradation evaluation. In this step a survey of leading cities of Bihar was done. The situation is n more different from remaining cities in India and in particular cases it can be seen that for degradation we even match to the world worst affected areas also.

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Addressing these need multiple efforts rising from careful designing of product , use of proper collection mechanism , development of proper disposal system, segregation of useful materials to reduce e waste volumes and stopping illegal trans migration of e goods for having an accountable inventory for addressing these. Global enactment to address these and in state regulating mechanism development and stringent enforcement and implementation mechanism can address to some extent. Educating masses through curricula can be an effective means to teach citizens about the harmful effects for proper situation handling also.

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30. *Silicon Valley Toxics Coalition, op. cit. see also National Safety Council*
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