Chapter-IV
Results and Discussion
WASTE GENERATION

In the earlier times, the population was small, needs were few and resources were abundant, the generation was west such that it got naturally recycled being mostly biodegradable. However, after the industrial revolution, particularly during the recent decades, the resources have been recklessly used and there has been generation of very diverse types of wastes which are both nondegradable and hazardous.

Kupchik and Gerald, (1976) investigated that the direct and indirect associations among the incidence of air pollution related disease the emissions of air pollution and their relation to solid waste generation.

Rudzitis, Gundars, (1982) studied to determine the factors which influence residential solid waste generation rates in city Chicago, Illinois, USA. In this income way the most significant variable confirming the hypothesis that solid waste generation rate increases with rising incomes. The study also suggests that there is a basic Year around volume of wastes, relatively insensitive to income and an excess volume, which follows a seasonal pattern. Another survey in 1981 put the figure at 432 gms per head per day (Nath, 1984) rate in per capita generation as 1% for
pre 1980 & 1 33% for post 1990  A primary survey in 1971 estimated that
the urban population generated 374gms of solid waste per person per day
(Bhinde & Sundaresan, 1984)

Aclebhibu and Afolabi, (1984) discussed that solid waste has been
identified as most important source of environmental deterioration in
Nigerian cities Leaf waste constitutes about – 1/3 of the total waste
generated there are significant relationship between some
socioeconomic variables and the types of waste generated Nath, (1984),
studied on estimates and taking the annual growth

Patil et al, (1985) studied on average calorific value of the refuse
were around 1700k cal per kg in Pune city Density of refuse was variable
from 250-465 kg per m³ Sridhar and Bammkeke,(1986) studied on the
heavy metals contents solid wastes produced in residential areas, market
and a cafeteria in Ibadan, Nigeria is measured  The solid wasted produced
in low-density areas with higher per capita income showed higher levels
of heavy metals  The cafeteria waste showed lows levels of some of these
heavy metals
Roy, (1988) studied that huge tonnes of municipal solid waste generated from the cities has emerged as a new environmental problem in the developing countries.

Sinha and Rawat, (1991) discussed that waste is an inevitable by-product of human activities. Nearly 700-900 tonnes per day of municipal solid waste is generated in Jaipur.

Varadarajan and Viraraghavan, (1992) studied a major problem of solid wasted because of the increase in quantity of waste materials. Other types of solid waste like hazardous waste can also become a part of municipal solid waste. Yhdedo, (1992) discussed on generation of solid wasted of Kariako marker in Dar es Salaam, Tanzania. Two main problems identified poor market design and lack of well-organized solid waste generation storage system.

Bernt, (1992) discussed that recyclable and compostable material should be separated and remaining amount of wasted be treated by incineration process. Charles, (1992) reported an the monthly quantity as of residential, commercial, industrial and other wastes generated between 1985-1989 in Brown country, Wiscon in U.S.A. are analysed. For each month and each waste type the quantity of waste generated is composed
**Fig. 39.** Plot of pH versus $k$ s$^{-1}$ at 30 °C for [SB] = B$_4$

**Fig. 40.** Plot of pH versus $k$ s$^{-1}$ at 30 °C for [SB] = B$_5$
waste generation in Japan. Waste amount were normalized and moving averages (MA's) were calculated by tarring specific daily charge.

Khan, (1994) discussed to identify the problems of municipal solid roasted generation in India in the contest of population growth in urban areas. Hockett et al. (1995) studied to identify and measure the variables, which influence per capita municipal solid waste generation in the Southeastern United States. An additional goal of this study is to examine the influence of the components of retail sales, including sales of restaurant, merchandise, food stores and clothing stores on per capita municipal solid waste has been suggested that retail sales and the waste disposal fees are significant determinants of waste generation that in

Yang, (1995) discussed the quantity of urban waste generated in Taiwan few years i.e. 8-10% per year. Yhdego, (1995) discussed on urban solid waste in Tanzania and Dares Salaam city is a serious environmental problem concurrent with recent socioeconomic development coupled with liberalization of the economy and rapid population growth, the quantum of solid waste generated has increased at a rapid rate. Wang, Jue et al. (1995) discussed on the management of solid waste exchange which means waste recycling and recovery and a
trend of exchange between waste generators and potential waste users. Agrawal, (1995) studied that the rapid with of industrialisation, the generation waste is also rising at alarming rate. EPTRI,(1995) discussed that solid waste generated in year 1995 is about 456 gms/person/day. Jockche, (1995) studied that the per capita biodegradable waste collected from “bio” bins varying from 40 to 170 kg per year in Germany. The large amount of waste is generated.

Kaseva and Gupta, (1996) investigated that solid waste generation in city of Dar es salaam between the years 1993 and 1995 in about 2000 tonnes per day. Yadav and RamBilas, (1996) estimated that the wasted generated by the city, Ghaziabad is about 0.59 kg per capita in 1992-93. The highlights the problem of municipal solid waste generation in the city due to rapid growth of population, various constituents in the solid wastes. Pasrija et al., (1997) discussed that solid waste generation in city, Chandigarh is about 0.38 kg to 0.48 kg/capita/day.

Wei, Jin-Bao, (1997) reported that the total amount of solid waste generation variations over the last ten years in the city Wuhon. The total amount of municipal solid waste increases from 1.19 million tonnes in 1985 to 1.50 million tonnes 1993 and is estimated to reaches million
tonnes in 2000. The results show a rapid increase in the amount of municipal solid wastes related to the increased population of China and changed living standards. Kornhauser et al., (1997) reported that everyday over one million tonnes of waste generated worldwide in which 90% of it is generated from industrialised countries. Chang and Lin, (1997) reported that successful operation of solid waste management system frequently depends on accurate predictions of solid waste generation. Conventional prediction models are usually estimates factors in a per capita basis.

Choe & Fraser, (1998) studied that in recent years reducing the amount of waste generated by households has becomes an important policy issue in industrialized economics. It is no longer acceptable to discarded waste without environmental and natural resources issues.

Anon (1997) discussed on registration emphasis the need to reduce the amount of household wastes generation in Japanese names. Qdais et al., (1997) discussed that the average generation rate in kg per capital per day of residential solid waste in Abu Dhabi city. This survey covered 40 houses with different socio economic levels and totaled 840 samples. The study showed an average generation rate of 1.67 kg per capita per day. Linear regression analysis revealed that this rate was dependent on the
income level with an increase of about 35% for the high-income residents over the average rate. The generation of municipal solid waste in the major cities of Japan, Korea, Malaysia and Taiwan has also increased rapidly with estimated per capita generation rates today (above 1 kg/capita/day) as great as or greater than that an average throughout the European Community (Arango & Bertuzzi 1994, Nasir et al. 1995, Kamarah 1997, Muttamara 1997 and Yasuda 1997).

Sheketdar, (1999) discussed that the municipal solid waste generation rate is around 0.8 kg/person/day, a total that is expected to increase by 27/year in Bosnia and Herzegovina city.

The overall generation rates of solid waste for the entire community, generation rates of residential as well as industrial, commercial, institutional establishments and public places and generation rates of individual solid waste components are required in the design of solid waste management system. The quantities and overall generation rates of municipal solid wastes in a study of 14 communities in USA, the average residential solid waste generation for rural area is 0.97 kg/capita/day, for suburban, excluding Haddonfield, NJ, it is 1.67 kg/capita/day. The average for Seattle, WA & Babylon, NY, which are
large cities is 1 50kg/capita/day the only small city in this study is Cherry Hill, NJ with a solid waste generation of 1 80kg/capita/day Without going into so much statistical analysis, this study seems to indicate that there is not much difference in waste production among suburbs and cities which average 1 60kg/capita/day, excluding Haddonfield, NJ However, the rural areas show much lower production rate, by comparism (Arcadio et al , 1997)

Porcel et al , (1997) studied that the special and seasonal uanability in municipal solid waste generation Corodoba Agunwamda et al , (1998) on generation rate of solid waste Which is about 0.53 kg per capita per day

Chang et al , (1998) studied that the issues are intimately related to solid Waste generation Doroie et al , (1998) reported that an institutional solid waste Environmental Management system (SM-EMS) were developed for each material and than used to measure the amount of waste being generated The total units generated with increasing 29% of waste in 1996 Chang and Chang, (1998) studied on an evolution of the wastes inflow with different rate of generation Albert Andrade (1998) Lima’s Mayor reported that municipal solid waste generated is about 3,950
tonnes per day in Lima city Paris Haq et al, (1998) studied on hazardous waste generation in Punjab and Jammu province located in the northern part of India has been conducted with a view of identifying the hazardous waste gene raters and quantity was hazardous waste in different areas of these provinces

European Union’s Statistical Agency, (1999) recently concluded that the amount of hazardous waste generated overall in the European Union showed significant increases between 1990 and 1997. Although some nations, such as Germany, the Netherlands and the UK were reducing the amount of hazardous waste generated, others including Austria, Belgium, Denmark, Finland, Luxembourg and Spain are reported to have shown increasing tendencies. On a per capita basis the largest generation of hazardous waste within the EU are Luxembourg and Belgium with figures of 341 & 276 kg/person in 1997-up from 304kg in 1990 & 197 kg/ person in 1994 respectively. Spain’s generation of hazardous waste double from 43kg to 84 kg/person over the period 1990-95. Mamta Gandhi, (1999) studied to assess the quantity of household waste generated from 100 families of urban areas of Hisar districts of Haryana. Untreated kitchen waste resulting in permanent stinking mass,
consequently a medium for spreading communicable diseases. On an average generation of kitchen waste by each family loose 1015gm/day.

Pramod Kumar and Singh, (1999) discussed that the average quantity of solid waste generated is 200gm/capital/day in Ghazipur city. Stentiford, (1999) studied that Ho Chi Minh City is largest City in Vietnam covering 2000 km². Some five million people live in the city, which generated around 3500 tonnes/day of municipal solid waste.

Journal Biocycle, (1999) according to the 11th annual survey of municipal solid waste generation & management case study of the monthly Journal Biocycle, (1999) the amount of municipal solid waste generated in the USA. In 1999 was 340 million tonnes compared to 308 million tonnes in 1998. Increase in annual municipal solid waste generation were reported by 27 states, led by Texas with an increase of 10.8 million tonnes and California with an increase of 10 million tonnes. A fall in waste generation was reported by 20 states, with Georgia (3.5 million tonnes), Kansas (1.7 million tonnes) showing the most significant falls. More municipal solid waste was generated in the south (nearly 87 million tonnes) in 1998 than in the other six regions of the USA (West, Rocky Mountain, Midwest, Great Lakes, New England & Mid Atlantic).
The west showed the biggest increase, from 56 million tonnes in 1997 to 65 million tonnes in 1998. The Great Lakes generated almost 56 million tonnes in 1998 and the Midwest 50.8 million tonnes. These figures represent increases of 5.4 million tonnes and 8.2 million tonnes respectively. Municipal solid waste generation in the Mid-Atlantic States remained at about 50.8 million tonnes/year. The Rocky Mountains region increased slightly to 16.3 million tonnes in 1998 and the New England states were unchanged at 12.7 million tonnes.

Merseyside Waste Disposal Authority (MWDA), (1999) discussed that Merseyside generates 670,000 tonnes of solid waste. Journal Surveyor, (1999) discussed that the country currently generates about 2,500,000 tonnes of household waste annually, but this could rise to around 3,200,000 tonnes by 2001.

Huren et al., (1999) discussed that the municipal solid waste generation in the US has increased steadily over the years from 1960 to 1995, total municipal solid waste generation in the US increased from 88.1 million tonnes to 208.0 million tonnes. Per capita generation increased from 1.21 kg to 1.96 kg per person per day. Although the per capita generation seems to have stabilized since the late 1990s, total waste
generation is still increasing is estimated that waste generation by the year 2000 will reach 221.7 million tonnes. As the fourth most populated state in the US, Florida generated 18.2 million tonnes of municipal solid waste. The per capita municipal solid waste generation rate in Florida was 3.14 kg, 60% higher than the US average. As a result of the growth of waste generation, the estimated number of Florida’s municipal solid waste workers increased 14% from 1993 to 1996. The generation of municipal solid wastes in Athens, Greece was daily quantity of 1000 tonnes per day. Reported by Tsilivantis, (1999)

Wang & Nie, (2000) investigated that municipal solid waste generation in China has increased rapidly in the past 20 years from 31.3 million tonnes in 1980 to 113.0 million tonnes in 1998. The annual rate of increase is 3-10%. The average generation per capita is 10 kg/day (0.38 tonnes/year).

Singapore is a small island city state with a large population, warm climate and high humidity. Over the past two or three decades, rapid industrialization and economic development has caused a tremendous increase in solid waste generation. The yearly solid waste increased from 0.74 million tonnes in 1972 to 2.30 million tonnes in 2000, reported by

The proper estimation of solid waste generation, the goal programming modeling analysis not only focuses on the evaluation of how the waste inflows with different rate of generation (Change & Chang, 2001).

In the city of Morelia, Michoacan, Mexico, the seasonal patterns of solid waste generation from residential & non-residential areas shows that the recorded amount of municipal solid waste deposited in the municipal dumping ground is less than the estimated amount of solid waste generated (Buerroastro et al., 2001).

The socioeconomic variables in Morelia, Mexico, and generation rates were estimated. The generation of residential solid waste and non-residential solid waste was forecasted by means of a multiple linear regression Analysis discussed by Buenrostro et al., (2001).

El-Fadel et al., (2001), investigated in Lebanon industrial sector, the solid waste and hazardous waste generation is estimated at 376 730 tonnes/years and 3000-15000 tonnes/year, respectively.
Marias et al., (2001) discussed that the council for Scientific and Industrial Research [CSIR] estimated in 1991 that 780 000 tonnes/year waste generated in South Africa. Some remarkable work reported are carried out by the below listed workers on present status municipal solid waste generation.

In the Guadalajara Metropolitan Zone, Mexico, Household Solid waste generated during seven days by a sample of 300 households chosen, the average per capita daily HSW generation rate was 5.08 gms. The average daily generation rate MSW was 3119.2 metric tonnes. HSW represented 55.9% of MSW & the main difference between HSW & MSW was a lower proportion of organic waste material (53% vs 16.5%, respectively) discussed by Bernache-Perez et al., (2002).

Koufodimos and Samaras, (2002) investigate that the generation of solid waste in the municipality of Pilea in Northern Greece. In this paper describe results of sampling methods for four time during one year in selected areas of the city & the quantitative analysis of the collected samples.

The study presents a model that was developed and applied to serve as a solid waste decision support system for solid waste generation rate.
taking into account both socioeconomic and environmental considerations (Najm et al, 2002)

Some remarkable work reported are carried out by the below listed workers on present generation of municipal solid waste


The two hospitals located in the same sector of a class B city, on an average 1424 71 and 224 6 kgs of five types of wastes as per the moisture content were found daily for seven days in these two hospitals of 1000 general beds and 600 long stay beds for chest tuberculosis and other Cardiothoracic diseases respectively The wastes of first hospital have higher combustibility due to its sprawling nature and activities for general
patients than that of second hospital treating special cases (Ray et al., 1979)

Li and Jenq, (1993) daily waste generation rate at National Taiwan University Hospital (NTUH) was 4,600-kg/ day, which consisted of 4100-kg/ day non-infectious waste, 340kg/ day infectious waste, 70-kg/day kitchen waste, 50-kg/day pathological waste and 40 kg/day plastic syringes The NTUH waste consisted of 99.02% combustible waste and 0.97% noncombustible waste by mass The combustible paper (16.17%), textiles (9.77%), cardboard, wood and leaves (1.12%), food waste (21.51%) and plastic (50.45%) The noncombustible waste included 0.40% metal and 0.57% glass

Basu, (1995) the quantum of hospital waste generated is 0.775-kg/patient/ day Hasselrus, (1995) reported that 4 million tonnes of medical waste is generated in United States in which 25% of waste is infectious The wastes from hospital include routine, clinical, cytotoxic, infectious, pathological, pharmaceutical and radiological wastes (Sami and Dadhwal, 1995) Audit Commission, (1995) discussed on source and transfer the medical waste
Mato and Kassenga, (1997) discussed on collection and storage of medical waste in Tanzania was growing environmental problems. The medical facilities are characterised by and inappropriate refuse storage facilities, lack of refuse collection services.

The waste generated in preparation for surgery was separated and weighted. Of 530 lbs of operating room waste, 40 lbs were non-infectious, largely plastic and paper, the results of this study suggests A segment of waste can be removed from the contaminated stream, potentially reducing hospital costs and improving our environment (Francis et al., 1998) investigated that 300,000 tonnes of clinical wastes generated annually by hospitals, health centres and veterinary practices in UK.

Jugal et al., (1999) discussed on handling and collection of hospital waste could lead to spread of infection in health care workers. Hospitals pays many times more to dispose of medical waste than it does for general waste where as proper segregation and handling of waste could reduce the waste. Prasad and Trivedi, (1999) aimed at characterisation of the solid waste generated from Indira Gandhi Institute of Medical Sciences, Patna. The quantitative and qualitative aspects of solid waste generated in 300 bed special hospitals were investigated.
Patil and Shekdar, (2001) reported the waste generation rate ranges between 0.5 and 2.0 kg/ bed/ day. It is estimated that annually about 0.33 million tonnes of waste generated in India. The solid waste from hospitals consists of bandages, lines and other infectious waste (30-35%), plastic (7-10%), disposable syringes (0.3-0.5%), glass (3-5%) and other general waste including food (40-45%). In general wastes are collected in mixed form and transported.

In the present investigation, data of municipal solid waste generation in year 2000-01, and year 2001-02 in rainy season in year 2000-2001. The municipal solid waste in month June, the maximum generated waste is about 230 tonnes and minimum waste generated is about 210 tonnes. The average waste generated is about 244.15 tonnes. In month July, the maximum waste generated is about 285, tonnes minimum waste is about 210 tonnes and average waste generated is about 253.65 tonnes. In month August the maximum minimum and average waste generated are about 264 tonnes, 210 tonnes and 233.68 tonnes respectively. In September the maximum waste generated is about 275 tonnes, minimum waste generated is about 205 tonnes and average waste generated is about 232.36 tonnes. In summer season in year 2000-2001, in
month February the maximum, minimum and average waste generated is about 293 tonnes, 245 tonnes and 268.21 tonnes respectively. In month March, the maximum, minimum and average waste generated is about 290 tonnes, 244 tonnes and 270.70 tonnes respectively. In month April, the maximum, minimum and average waste generated is about 292 tonnes, 256 tonnes and 273.43 tonnes respectively. In month May the most generated maximum, minimum and average is about 287 tonnes, 245 tonnes and 269.35 tonnes respectively.

In winter season in year 2000-01 the maximum, minimum & average waste generated in month October is about 280 tonnes, 203 tonnes and 242.35 tonnes respectively. The maximum minimum and average waste generated in month November is about 290 tonnes, 245 tonnes and 268.67 tonnes respectively. In month December the maximum, minimum & average waste generated is about 287 tonnes, 238 tonnes, and 269.09 tonnes respectively. In month January the maximum, minimum and average waste generated is about 295 tonnes, 220 tonnes and 264.61 tonnes respectively.

In year 2000-01 the municipal solid waste generated monthly in month June 7325, tonnes, July – 7863 tonnes, August-7244 tonnes
September-6917 tonnes, October-7513 tonnes, November 8060 tonnes, December -8342 tonnes, January-8203 tonnes, February-7510 tonnes, March-8392 tonnes, April 8203 tonnes and May 8350 tonnes

In year 2001-2002 in rainy season, in month June, the maximum, minimum & average waste, generated is about 286 tonnes, 215 tonnes and 250.56 tonnes respectively. In month July the waste generated the maximum, minimum and average is about 274 tonnes, 204 tonnes and 240.87 tonnes respectively. In month August, the maximum, minimum & average waste generated is about 269 tonnes, 208 tonnes, & 237.22 tonnes respectively. In month September the maximum minimum and average waste generated is about 268 tonnes, 210 tonnes, and 236.87 tonnes respectively.

In winter season, year 2001-2002 in month October, the waste generated maximum minimum and average is about 270 tonnes, 210 tonnes, & 243.94 tonnes respectively. In month November the maximum, minimum & average waste generated is about 287 tonnes 242 tonnes, & 265.73 tonnes respectively. In month December, the maximum, minimum & average waste generated is about 290 tonnes, 241 tonnes, & 269.52 tonnes respectively. In month January, the maximum, minimum &
average waste generated as about 297 tonnes, 245 tonnes and 273.97 tonnes respectively.

In year 2001-2002 in summer season, the waste generated maximum, minimum & average is about 292 tonnes, 250 tonnes & 270.57 tonnes respectively. In month February, the waste generated maximum, minimum & average is about 288 tonnes, 244 tonnes & 268.52 tonnes respectively. The waste generated maximum, minimum and average is about 292 tonnes, 240 tonnes & 269.50 tonnes respectively in month April. The maximum, minimum & average waste generated in month May is about 298 tonnes, 243 tonnes & 270.35 tonnes respectively.

In year 2001-02 the municipal solid waste generated monthly, in months June 75.17 tonnes, July-7467 tonnes, August 7354 tonnes, September 7106 tonnes, October 7562 tonnes, November- 7972 tonnes, December- 8355 tonnes, January 8493 tonnes, February-7576 tonnes, March- 8374 tonnes, April- 8085 tonnes and May 8381 tonnes.
In the present investigation medical waste categories into following categories

1. Pathological wastes, includes, tissues, organs and body parts that are removed during surgery

2. Human blood and products of blood components

3. Sharps including hypodermic needles, syringes, Pasteur pipettes and Scalpel blades

4. Waste from surgery that was in contact with infectious agents including soiled during sponges, drapers, and lavageous surgical gloves

5. Biological contamination and discarded materials contaminated with blood excretion, exudates or secretion from human beings or animals that are isolated to protect other from communicable diseases

Medical wastes generated from Aurangabad medical college and hospital is about 250 to 300 Kg / day There are 1054 beds in 31 wards

The average medical waste generated is about 0.284 Kg/bed/day

Medical wastes generated from M G M hospital is about 150 to 220 Kg / day There are 740 beds in 18 wards The average medical waste generated is about 0.297 Kg/bed/day
Medical wastes generated from Hedgewar hospital is about 150 to 175 Kg / day. In this hospital, 530 beds in 10 wards. The average medical waste generated is about 0330 Kg/bed/day.

Medical wastes generated from Dhoot hospital is about 100 to 150 Kg / day. In this hospital, 440 beds in 08 wards. The average medical waste generated is about 0 340 Kg/bed/day.

From 20 small hospitals having capacity of 20 beds generates about 130-140 Kg of medical waste / day. The medical waste generates is about 0 350 Kg/ bed /day.

In all these hospitals also generates solid waste from kitchen, canteen, laundry unit, administrative block and floor sweeping. From these hospitals nearly about 20-22% of waste is infectious waste and 78-80% of waste is non-infectious medical waste.
COMPOSITION

The composition of waste determined how critical the frequency of collection is. Where organic matter constitutes a high percentage of waste and climate is warm, decomposition of waste is likely to take place more quickly than compared to areas with different waste composition and cold climate. Uncollected waste, in warm areas, would only increase bad odours and risks to health in the surrounding areas.

Composition of municipal solid waste having ferrous metal, aluminum, glass, paper etc. studied by Blum, (1976) Gheresus, (1978) found that the composition of municipal solid waste contains ferrous & nonferrous metals, paper, glass, woodchips, rubber, grit and rejected municipal solid waste (refuse). Adedibu and Afolabi, (1984) discussed that the solid waste has been identified as most important source of environmental deterioration in Nigerian cities. There are significant relationship between some socioeconomic variables and the types of wastes. Income and education are positively associated with production of paper and metal waste. Modern building is negatively associated with the production of leaf waste.

Patil et al., (1985) studied that the physical & chemical characteristics of the refuse at Pune city. It contains relatively high organic matter and high...
paper content. Plastics were found to vary between 0.3 – 1.5% in different localities.

In the State of Florida (USA) the composition of the municipal waste stream was quantified in terms of the amounts of paper, plastic, glass metals, rubber and tires studied by Korzun et al., (1989). Yhdego, (1991) deals with the scavenging of solid wastes in Dar es Salaam, Tanzania. Moreover, the socioeconomic health and organizational problems facing the scavengers are discussed.

Usha et al., (1991) studied that the percentage composition of solid waste materials viz, dust and materials, pebbles, rugs & fibers, plant material, plastics, papers, and glass found in the famous pink city Jaipur. Categorization and sources of hazardous wastes, typical hazardous waste produced in India studied by Sandwar, (1991) Morselli et al., (1992) discussed the composition of municipal solid waste. Yhdego, (1992) reported that in many developing countries, the market is still the most important source of commerce for traders and provisions for the general public. This study examine the quality solid waste in Karakoo market, Dar es Salaam two hirds of the waste contains the vegetable matter only. Genon et al., (1992) was found interesting to correlate the composition of wastes with the transfer of metals and organic substances to the percolating liquids,
this being derived from both the flow of rain water and the expulsion of
interthal liquid present in the wastes Rhyner Charles, (1992) studied the
monthly quantities of residential, commercial, industrial and other wastes
between 1989-92 in Brown Country, Wiscon USA For each month and each
waste type, the quantity of waste is compared with the monthly average and
the average is computed in percentage.

Knowledge of waste composition is of crucial importance of waste
management for a casting. Composition is usually specified by average
content of glass paper & organic matter (Leroy et al., 1992) Khageshan et
al., (1992) discussed the refuse samples of Gulburg city are from two areas
1 e Astf Gunu and Brahmpur In this study the paper content was found to be
an average between 3% to 8% The plastics and rags contents were found to
range between 0 70% and 3% respectively and metal, glass, rubber, leather
and wooden material were found to be less than 1% The total compostible
matter was found to range between 40% - 43%.

Dayal et al., (1993) discussed the impact of climate conditions and
socioeconomic status on solid waste characteristics at Agra city during
1989-90 Different sub-groups divided the city occupation-wise into
residential commercial and industrial areas following the stratified random
sampling technique four hundred chemical properties of solid wastes
produced in different seasons Arinola and Arinola, (1995) studies that the composition of solid waste produced at various locations in Nigeria differs considerably because the amounts generated and the constituents there of are determined by social customs and living standards. Nigeria was undergone extensive industrial development that has often changed the composition of domestic solid wastes as well as agricultural wastes though most solid waste in Nigeria combines little human and animal material. Jeevan and Shantaram, (1993) discussed that physical characteristic of urban solid wastes in Hyderabad city. The non-compostable matter in more in Autonager and Amberpet wastes and less in Golkunda wastes. Composition of wastes differed from landfill site to sits Golkonda wastes contained more compostable matter.

Heckman and Kluchinski, (1996) discussed that the municipal leaf waste delivered to New Jersey farms was sampled to evaluate its chemical composition and suitability for land application. The chemical composition of municipal leaf waste was found to be quite variable. Bhattachary et al., (1993) studied on solid waste characteristics. Rajendran and Sundarajan, (1996) studied that degradable and non-degradable solid wastes material found in college campus, Madurai. In Ghaziabad city urban solid waste having 60 – 85% decomposable organic matter studied by Yadav and
RamBilas, (1996) Korfmacher and Ktrina, (1997) studied on waste composition in the winter veld, Bophutha tsuwan in including community in South Africa. Wei et al., (1997) the results shows a rapid increase in the amount of solid waste-generation with compositional changes in the city Wuhan in China. He pinjing and Shao liming, (1997) discussed the current situation of municipal solid waste quantity and quality in China and changing the tendency of composition Kaseva and Gupta (1996) studied that the composition (60% organic matter vegetable matter) In this composition paper, metal, plastic glass and textiles are present Ro et al., (1997) reviewed and analyzed results of recent research activities per training to characterization of municipal solid wastes. Pascual et al., (1997) studied on several urban wastes of different nature and level of organic matter stability have been characterized analyzing fertility and phytotoxicity parameters Porcel et al., (1997) reported that the average composition of municipal solid waste shows higher in Cordoba shows higher levels of organic matter than the average in Spain. The Level of glass are lower and similar level for plastic and paper were noted. The high content of organic matter in municipal solid waste together with the adequate characteristics.

The percentage of paper, plastics, rubber, leather and metals in the composition of solid waste of Chandigarh city are very less as compared to
the percentage of other cities. The percentage of glass in the solid waste in Chandigarh city is in the same range as for the other cities. The percentage of ash and earth in the solid waste of Chandigarh is about 35% higher than other cities. The compostable matter in the solid waste of Chandigarh is slightly less than other cities reported by Passija et al., Arcadio et al., (1997) discussed the composition of municipal solid waste contains yard waster –10%, wood-2%, food wasters-17%, paper-33%, cardboard-8%, plastics-5%, textiles-2%, rubber-0 5%, leather-0 5%, misc,organics-2%, glass-5%, tin cons-5%, nonferous-1%, ferrous metals-1% dist, dashes, etc-8% Sundararajan et al., (1997) reported that paper-2 52%, bones-0 75%, straw and wood- 6 27% brick and tiles – 2 17%, glass –2 50%, metals – 4 60% cloths – 6 31%, rubber, plastics – 5 70%, leather –2 107 Ashes and earth –13 08% and garbage and rubbish –54 00% found in the physical composition of municipal solid wastes Eugene and Glyson, (1998) discussed that the composition found in municipal solid waste were combustible- Newsprints, food wastes, other paper, diapers, textiles and garments, wood, yard wastes, sweeping and non combustible Ferrous, nonferrous, aluminum, glass, plastics films, brick etc.

Tsilhyannis, (1999) discussed the composition of municipal solid waste in Athens, Greece (1996) found materials like putrescibles – 51%
paper - 22.3%, plastics - 10%, metals -4%, glass - 3.5%, Textiles/wood/leather/tyres -3.5% inert materials - 20% & other - 3.5%


Environmental protection Agency, Ireland, (1998) findings of a study on household hazardous waste, door to door surveys to assess attitudes and knowledge about household hazardous waste, a waste characterization survey to assess the hazardous proportion of waste for collection. The major components of municipal solid waste in Ho Chi Minh City is vegetable, fruit and animal remains, with dry season waste typically containing 62.2% and typical market waste 82.9%. Bamboo and textile waste constitute about 4.5% while gravel, concrete fines etc. plastics, paper, cardboards, metals Make up significant fraction of dry season waste studied by Stentiford, (1999)

An analysis of municipal solid waste composition in Athens for 1990 identified 48.5% putrescibles, 22% paper, 3.5% glass, 10.5% plastics, 4.2%
metals and 11.3% other studies by Association of Attica & the Association of Greater Thessaloniki, (1999) Mamta Gandhi, (1999) studied that composition of household solid waste having non-vegetarian waste, fruit waste vegetable waste, paper, plastics, metal, cloth, leather and glass. Similarly Kumar and Singh (1999) reported that composition of municipal solid wastes in different residential sector in Ghazipur city were food waste, foliage, paper, plastic leather, Rubber, glass Metals, fine earth & ash, Bones, textiles and stones, etc. Huren An et al, (1999) discussed on composition of municipal solid waste in Florida (1996) were glass-35% Metals-17.1% & Yard waste-18.5%.

Mamta Sexena, (2001) reported that composition of municipal solid waste in 1971-73(40 cities) & 1995 (23 cities) were paper-4.14% & 5.78%, plastics-0.69% & 3.90%, metals -0.50% & 1.90%, glass-0.40% & 2.80%, rags-38.3% & 3.50%, total composable matter 41.24% & 41.82%, Ash and fine earth 49.50% & 40.30% respectively. Solid waste characterization conducted at the Guadalajara Metropolitan Zone, Mexico are reported. In this study household waste consists of putriscible waste (53%), paper 10% & plastic (9%) Bernache et al, (2000) Waste composition studies are rarely carried out in Mainland Chinese cities & even when it does, theme technologies used are not stringent. A yearlong field survey on the physical
components of waste and recyclable in the waste stream has been conducted in Guangzhou to fill the information gap and to provide further experience for waste characterization study in Mainland China. It is found that the ash content in the waste stream has decreased but the proportion of plastic material in the waste stream has increased (Chung and Poon, 2001).

Buenrostro et al., (2001) discussed the adequate management of municipal solid management of municipal solid waste in developing countries is difficult because of the scarcity of studies about their composition. In this paper analyses the composition of urban solid waste in the city of Morelia, Michoacan, Mexico. Low calorific value and high moisture content characterize China’s municipal solid waste investigated by Wang & Nie, (2001). The composition of municipal solid wastes includes newsprints, hard wood mulch, low density polyethylene, iron, animal feed, sand, plastic, metal food wastes and other materials (Thipse et al., 2001).

The high organic and moisture contents of solid waste resulted in an extremely strong leachate investigated by El-Fadel et al., (2002). Mixed municipal solid waste contains rich in organic components but also containing inorganic material such as glass, aluminum and steal as well as non-degradable plastic wastes found by Eastern Power limited, (2002). Komatsu et al., (2002) discussed that the composition of municipal solid
wastes are garbage leftover from hotels, yard wastes and paper which is organic waste in Kyoto City, Japan Chang and Chang, (2001) discussed the physical and chemical composition of municipal solid waste in Taipei Country.


In present work the composition of municipal solid waste in Aurangabad city containing kitchen wastes, miscellaneous wastes Kitchen wastes or household wasted may be vegetable wastes or non-vegetable wastes like bones and eggshells, etc A miscellaneous waste includes plastics, metals, clothes, leathers rubbers, etc Most of the papers are in the
forms of newspapers, notebooks, books, books cardboards, and toffee wrappers, etc

**Composition of Solid Wastes:**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Food wastes, Fruit waste</td>
<td>20 – 30%</td>
</tr>
<tr>
<td>Vegetable wastes &amp; Non vegetable waste</td>
<td></td>
</tr>
<tr>
<td>2  Paper</td>
<td>4 – 10%</td>
</tr>
<tr>
<td>3  Plastic</td>
<td>2 – 4%</td>
</tr>
<tr>
<td>5  Rubber</td>
<td>0.1 – 1%</td>
</tr>
<tr>
<td>6  Metal</td>
<td>1 – 3%</td>
</tr>
<tr>
<td>7  Clothes</td>
<td>3 – 5%</td>
</tr>
<tr>
<td>8  Leather</td>
<td>1 – 2%</td>
</tr>
<tr>
<td>9  Fine earth &amp; ash</td>
<td>50 – 60%</td>
</tr>
<tr>
<td>10 Glass</td>
<td>2 – 3%</td>
</tr>
</tbody>
</table>

In year 2000-2001, in rainy season, the composition of municipal solid waste in month June, kitchen waste food waste, fruit waste, vegetable waste and non vegetable waste – 28%, paper – 60%, plastic – 35%, glass – 21%, rubber – 0.6%, metal – 28%, clothes – 48, leather 12% & fine earth
and ash – 51% In month July compositional percentage is food waste, fruit waste, vegetable and non vegetable waste – 25 8%, paper – 8 5%, plastic – 2 8%, glass – 2 0%, rubber – 0 4%, metal – 2 4%, clothes – 3 4%, leathers – 1 9%, and fine earth and ash – 52 8% in month August percentage of composition is food waste, fruit waste, vegetable and non vegetable wastes – 22 8%, paper – 6/9%, plastic – 3 1%, glass – 2 2%, rubber – 0 7%, metal – 2 0%, clothes – 3 9%%, leather – 1 0% & fine earth and ash – 57 4% In month September waste composition is food waste, fruit waste, vegetable waste and non vegetable waste – 27 5%, paper – 6 0%, plastic – 2 9%, glass – 2 6%, rubber – 0 3%, metal – 2 8% clothes – 4 0, leather – 1 3& fine earth and ash – 52 3%

In Winter season year 2000-2001 the composition of solid waste is food waste, fruit waste, vegetable waste and non vegetable wastes, – 26 0%, paper – 8 0%, plastic – 3 5%, glass – 2 6%, rubber – 0 3%, metal – 1 5% clothes – 3 7 %, leather – 1 0 & fine earth and ash – 53 4% In month November food waste, fruit waste, vegetable waste and non vegetable wastes, – 22 5%, paper – 6 1%, plastic – 2 2%, glass – 2 8%, rubber – 0 8%, metal – 1 4%, clothes – 4 6, leather – 1 6 & fine earth and ash – 58 0% In month December food waste, fruit waste, vegetable waste and non vegetable wastes, – 27 4%, paper – 4 2%, plastic – 2 2%, glass – 2 0%, rubber – 1 0%,
metal – 19%, clothes – 58, leather – 14 and fine earth and ash – 54.1%

In month January food waste, fruit waste, vegetable waste and non vegetable wastes, – 27.4%, paper – 9.2%, plastic – 3.5%, glass – 2.3%, rubber – 1.0%, metal – 2.0%, clothes – 3.2, leather – 1.2 and fine earth and ash – 50.2%

In Summer season in year 2000 – 01 in month February, food waste, fruit waste, vegetable waste and non vegetable wastes, – 29.4%, paper – 5.7%, plastic – 3.9%, glass – 2.4%, rubber – 0.8%, metal – 1.4%, clothes – 3.4%, leather – 1.8 and fine earth and ash – 51.2%

In month March composition of waste food waste, fruit waste, vegetable waste & non vegetable wastes, – 26.2%, paper – 7.2%, plastic – 4.0%, glass – 2.0%, rubber – 0.5%, metal – 2.2%, clothes – 4.0, leather – 1.0% & fine earth & ash – 52.8%

In month April food waste, fruit waste, vegetable waste & non vegetable wastes, – 24.2%, paper – 5.9%, plastic – 3.9%, glass – 2.9%, rubber – 0.8%, metal – 2.6%, clothes – 5.2, leather – 1.1% & fine earth & ash – 53.4%

In month May food waste, fruit waste, vegetable waste & non vegetable wastes, – 23.2%, paper – 5.8%, plastic – 3.4%, glass – 3.0%, rubber – 0.9%, metal – 2.3%, clothes – 4.9, leather – 1.7% & fine earth & ash – 54.5%

In rainy season year 2001 – 02, the composition of municipal solid waste is food wastes, vegetable waste & non vegetable wastes, – 23.4%,
paper - 5.8%, plastic - 2.3%, glass - 2.7%, rubber - 0.6%, metal - 2.8%, clothes - 3.9%, leather - 1.9% & fine earth & ash - 56.6% In month June In month July food waste, fruit waste, vegetable & non-vegetable wastes, - 21.2%, paper - 7.5%, plastic - 2.8%, glass - 2.0%, rubber - 0.5%, metal - 2.4%, clothes - 4.8, leather - 1.0% & fine earth & ash - 57.8% In month August food waste, fruit waste, vegetable waste & non vegetable wastes, - 22.8%, paper - 6.9%, plastic - 2.5%, glass - 2.2%, rubber - 0.6%, metal - 2.0%, clothes - 4.0, leather - 1.2% & fine earth & ash - 57.8% In month September, the composition of waste is food waste, fruit waste, vegetable waste & non vegetable wastes, - 22.9%, paper - 6.0%, plastic - 3.1%, glass - 2.6%, rubber - 0.8%, metal - 2.8%, clothes - 3.4, leather - 1.3% & fine earth & ash - 51.1%

In Winter season in month October, food waste, fruit waste, vegetable waste & non vegetable wastes, - 26.2%, paper - 8.2%, plastic - 3.3%, glass - 2.8%, rubber - 0.6%, metal - 1.4%, clothes - 3.7, leather - 1.0% & fine earth & ash - 52.2% In month November food waste, fruit waste, vegetable waste & non vegetable wastes, - 28.4%, paper - 7.0%, plastic - 3.0%, glass - 2.5%, rubber - 0.8%, metal - 1.5%, clothes - 5.1, leather - 1.6% & fine earth & ash - 50.1% In month December food waste, fruit waste, vegetable waste & non vegetable wastes, - 29.3%, paper - 5.2%, plastic - 3.9%, glass
- 25%, rubber - 10%, metal - 20%, clothes - 32, leather - 1.2% & fine earth & ash - 51.7% In month January food waste, fruit waste, vegetable waste & non vegetable wastes, - 27.2%, paper - 8.3%, plastic - 2.3%, glass - 3.0%, rubber - 1.0%, metal - 1.9%, clothes - 4.0, leather - 1.8% & fine earth & ash - 51.5%

In Summer season the waste composition is food waste, fruit waste, vegetable waste & non vegetable wastes, - 25.7%, paper - 6.4%, plastic - 3.4%, glass - 2.1%, rubber - 0.8%, metal - 2.2%, clothes - 5.0, leather - 1.2% & fine earth & ash - 53.2% Found in month February food waste, fruit waste, vegetable waste & non vegetable wastes, - 28.0%, paper - 8.7%, plastic - 3.0%, glass - 2.4%, rubber - 0.4%, metal - 1.2%, clothes - 5.2, leather - 1.1% & fine earth & ash - 50.0% found in month March

The composition food waste, fruit waste, vegetable waste & non vegetable wastes, - 24.6%, paper - 6.5%, plastic - 4.0%, glass - 2.1%, rubber - 0.8%, metal - 2.3%, clothes - 5.6, leather - 1.7% & fine earth & ash - 52.4% found in month April The composition, food waste, fruit waste, vegetable waste & non vegetable wastes, - 28.6%, paper - 6.9%, plastic - 3.4%, glass - 2.4%, rubber - 0.9%, metal - 2.6%, clothes - 4.8, leather - 1.4% & fine earth & ash - 54.0% found in month May
COLLECTION SYSTEMS AND TRANSPORTATION

Collection of solid waste is done in community bins and it is only in some specific areas of a few metropolitan cities that house to house collection is carried out the community bins are provided at specific locations on the streets, are of concrete or metal, at same places large enough to be of the size of room

In most of the cases the transportation of the waste from the bins to the transfer vehicle is carried out manually, with an average of two to three trips made by a vehicle in day Only in a few cases, front-end loaders are used Manual loading of waste is not only time consuming but also injurious to the health of the workers

The structure can be adopted to the vast array of municipal solid waste handling systems founds around the country. It stimulates a large number of options suitable for each type of municipal system (Clapham, 1986).

In the early 1980's in Indonesian cities, waste pickers were estimated to reduce the quantities of MSW by one third (Vensnel, 1982) as reported in Furse by 1989. In 1988, 25,000 waste pickers recovered materials at Monila’s Smokey Mountain dump, with perhaps 6000 more depending on these wastes for their basic needs (Gobriel 1988, as reported in Fure by, 1989).

Gotoh, (1989) indicates the few waste “scavengers” are found in China. Fure by (1990) considers this view to be “uninformed”. Fure by indicated that the formal system of waste recovery organized by the Ministry of Commerce allows individuals to collect recoverable materials from households and shops and sell them to materials recovery companies. Yang, (1989) indicates that waste pickers in Beijing recover and sell paper, textiles, glass and metals extracted from domestic waste.

This paper deals with the scavenging of solid wastes in Dar es Salaam, Tanzania. It presents the collection of solid wastes and the results of the scavenged wastes. Moreover, the socioeconomic health and
organizational problems facing the scavengers are discussed by Yhdego, (1991)

The world famous city, Jaipur has municipality and mechanism to collect the solid waste dumping ground. Before the waste is transported to the Gopalpura dumping city important materials are picked up which can be reused or recycling (Usha et al, 1991)

Sandwar, (1991) present a paper on in depth picture of hazardous waste management practices that are being followed to regulate the handling of hazardous waste. The health and environmental effects of the waste in handling have been highlighted discussed by Subramaniam (1991)

A change in the design of covered markets and improvements in waste handling are essential to reduce the potential health hazards in developing countries. The study examines in Karakoo market, Dar es Salaam. The man problems identified were pool market design and lack of well organized waste storage and collection systems discussed by Yhdego Michel, (1992)

In the mid 1990 in Bangkok, waste pickers were estimated to recycled about 5% of the municipal solid waste in the city (ESCAP 1990 as reported in Muttamara et al 1992) Scumb, (1992) reported the existence of
waste pickers in a community based solid waste collection system in Shanghai.

In the present paper, on operations research study on planning and design on improved solid waste collection system in the city I2 mir, Turkey is discusses This study is based on a mixed integer-programming model, occurring on the optimization of total solid waste collection costs (Or et al., 1993) During the spring, (1994) Central of Research Industrial of Quebec (CRIQ) project, main object of the project was on collection of organic solid wastes separated at the sources to perform composting studies discussed by Desgagnes et al., (1997)

Abddult, (1995) reported on present status of solid waste in Tehran and Sub Sea urgently, drawn up a policy regarding their collection, on site handling and storage.

In Germany, with the per capita biodegradable waste collected from bio bins varying from 40 to 170kgs per year (Jackche, 1995) Yhdego, (1995) discussed that urban solid waste in Tanzania in general and in Dar es Salaam city in particular is a serious problem Scavenging of urban solid waste is a In present study scavenging of urban solid waste is a critical dimensions in management of solid waste Haq (1995) reported that economically weak countries like Bangladesh, rag pickers, through
themselves steeped in poverty and misery, ensure a relatively clean environment.

In 1988 37000 waste pickers in Jakarta were reported to recover 25% of the city’s waste, thereby saving the city $270000 to $300 000 each month in waste collection costs. In addition, between 60 and 80% of the disposed glass and paper were recycled, with waste pickers responsible for 90% of the recycled material (Oepen 1993, as reported in van de Mundert and Lardinois, 1995)

In the early 1990’s 17000 waste pickers were estimated to working Metro Manila’s dumpsites (CAPS, 1992, as reported in Van de Kiundert and Lardinois, 1995) Thurgood, (1995) refers to an efficient local scavenging network through which building management employees and street scavengers in Hong Kong remove and sell valuables before municipal solid waste is delivered to refuse collection points.

Kaseva and Gupta, (1996) study conducted in the city Dares Salaam between the years 1993 to 1995 on the scavenging activities. There are currently about 600 solid waste scavengers in Dar es Salaam approximately 109 of who operate at Vingunguti dumpsite and other at 14 different collection centres. Many of them opted for scavenging due to unemployment. The study findings indicate that their average monthly
income exceeded the official minimum wage, mobbing them to support their families.

Solid wastes collected from the college campus including hostels were sorted out into degradable and non-degradable wastes (Rajendran and Sundararajan, 1996). In 1990 in Surabaya’s, Indonesia, the city’s 2500 to 3000 waste pickers annually generated US$ 7 million personal income and saved the city about US$ 3.5 million in waste disposal costs (Indrayana and Silas, 1993), in the 1990’s Surabaya’s waste pickers were estimated to recover 12% of the city’s total municipal solid waste (Sakurai, 1996).

In the Mid 1990’s in Ho Chi Minh City, waste recyclers involving 5000 women in the informal sector, were determined to direct purchase 51 to 62 tonnes of non-perishable/day, which comprised 7% of the total non-perishable generated in the city (Mehra et al., 1996).

Korfmacher et al., (1997) experience with appropriate collection system for urban and peri-urban areas of developing countries in accumulating. The collection system must be designed to accumulate the particular conditions of community. A case study is presented designing a solid waste collection system for the winter veld, Bophuthatzwana in South Africa. Including community survey. The case study shows that even within on country, collection systems are not automatically transferable from one
community to another. The implication of the New Japanese law for premotion of sorted collection of wastes are briefly discussed (Anon, 1997) Porcel et al., (1997) discussed the methodology used includes a previous selection of municipal solid waste collection circuits which represent three socioeconomic sectors: popular sector, residential sector, and commercial sector. The circuits were studied every two months during the whole year. A total of 117 different characterizations were carried out.

In the mid 1990's, waste pickers were estimated to sort and recycle 19% of Bandung's and 31% of Surabaya's overall inorganic waste production (Listyawan, 1997).

Environmental services focused on occupational exposures and adverse health effects related to the collection, sorting, and recycling of household waste (Midtgard and Poulsen, 1997).

During the period between generation & collection, the solid waste must be properly stored. In Chandigarh, about 60% of residents store their solid waste in storage bins placed in front or rear of their houses. The rest of residents throw their solid waste in open spaces. The Chandigarh Sanitation Department collect the solid waste from all the sectors. The practice being followed is house to house collection form open spaces. A lot of time is wasted in the collection process. This increases the overall cost of solid
waste management discussed by Parrija et al., (1997) Arcadio et al., (1997) reported the collection is fundamental function of solid waste management. The methods are adopted for collection hauled container system & stationary container system. In hauled container system, the container is hauled from the collection point to the final point of disposal. In stationary collection container system the container is emptied into collection vehicles at the point of collection.

Division of municipality collects the municipality of Onitsha, Nigeria into six sanitation zones. Refuse discharge into 1.5 m³ storage bins. Container for residential areas while 1.6 m³ storage bin containers in the commercial and industrial areas. It was found a great part of the budget (77% was spent on collection. Reported by Agunwamda et al., (1998)

The guidelines are intended to improve the quality and Polythene (PE) Plastic bags and film collected by local authorities for kerbside recycling programmes. The achieve quality, source, separation is recommended. But given the trend towards coming led collection, best plastics for a non-source separated approach is out lined. (Environmental and Plastic Industry council, 1998) Albert Andrade, (1998) reported to be seeking, to solve the city is Lima, capita of ‘Peru’ Problems by privatizing municipal waste collection. In this study the wide spread poverty and large informal waste collection
system separated by scavengers makes it difficult for the council to collect revenues. Scheinberg, (1998) reported that the lack of source separation collection of municipal solid waste in Hungary. Cooper (1998) discussed on handling a variety of wastes is briefly described. Door to door surveys to assess attitudes and knowledge about hazardous household waste, home storage survey to assess the hazardous proportion of waste put out for collection in Ireland (Environmental Protection Agency, Ireland, 1998).

Gupta et al., (1999) discussed in India the collection of municipal solid waste are unscientific and chaotic. In the absence of waste segregation practices, recycling has remained to be an informal sector working on outdated technology. The collecting municipal solid waste is sorted manually into organics, inorganic and saleable, recyclable. The waste collection system in Perel Mahan, Minomartani discussed by Zurburgg and Aristanti, (1999) in Bosnia & Herzegovina, solid waste collection form residential areas, collection from commercial, industrial, institutional facilities (Shekdkar, 1999). Otto (UK) Ltd, the range of wheeled bins and waste removal containers available from Otto (UK) Ltd. Including chemical waste and hazardous waste containers, trade bins and domestic bins. The small bin can be used in the house for collection of grass, cons or newspapers. The advantages of the bin, which has been tested by Basingstoke Borough
Council, UK, are stressed (Otto, 1999) The proposed regulation establishes a framework for the production of European Community statistical Information for household waste and municipal wastes collection schemes discussed by European Community, (1999) The effectiveness of community participation in municipal solid waste collection in low-income areas of developing countries was studied in a pilot project set up of SANDEC in an urban slum area of Karachi, Pakistan studied by Zurbrugg and Ahmed, (1999) Stentiford, (1999) discussed that in city Ho Chi Minh residents tend to store their waste in plastic bags and collecting the waste from 360 rendezvous point around the city or to a special collection point Waste pickers tend to operate at these rendezvous points Waste from homes and business in areas where the alley ways are too narrow or without a waste collection contract are not collected by the formal municipal solid waste collection service The waste collection system is inefficient, with overloaded tricycles being pulled along and aumenning at rendezvous points The problem in Greece is the lack of standardized mechanism for the collection of waste statistics Given the large number of small isolated communities of less than 200 people on islands & mountains, waste collection is considered satisfactory Over 70% of the population receive regular waste collection, while less than 5% has no access to waste
collection. Wheeled containers and mechanized collection are used in most towns and cities. Poor organization means that collection costs are high and may exceed 45 ECU/tonnes discussed by Association of Attica (ACMAR) and association of Greater Thessaloniki, (1999) Rhemisch Westfalischer, (1999) the results showed that per capita collection and recycling levels were higher in rural areas. There was evidence that consumers tended to sort metal and plastic wastes more carefully than other household waste materials. The study also found that homes with a Green Dot Yellow container or collection bag collected more recyclables per person than those without. Ashok Shekdar, (1999) discussed that solid waste collection in Bosna and Herzegovina, residents store the solid waste in their names and within a day or two days, place it on the curb in bags. In many place communal containers (capacity of 1 1 m³) are placed on the curb for residents for deposit their wastes. However, in many localities because of a lack of containers, the residents of ten store waste in open piles. Each city is divided into various districts sometimes with different frequencies of collection depending on factors such as the quantity of solid waste generation, the distance from the centre of the city and the number of residents. Most waste collection services could be improved if the system was monitored to improve utilization of available resource. At some
locations containers were over flowing with waste, while at others containers were empty because of lesser accrual of solid wastes collection of solid wastes from commercial establishments, institutions and industries is comparatively high, requires larger sized demountable containers [normal capacity 50 m$^3$] in order to store solid waste. The objective of the present work was to describe this association in sample of children under 5 years of age living in seven low income neighborhoods and navel in the city of Belo Horizonte, Minas Gerais Brazil. In present study “exposed” those children whose families were not served by waste collection and “not exposed” were children who lived in areas with waste collection. Epidemiological study revealed an association between the absence of domestic solid waste and public health. The results suggest that the children exposed to the absence of solid waste collection have a 40% higher odds (OR = 1.40) of presenting diarrheal, parasitic and dermatological diseases than not exposed children reported by Catapreta and Heller, (1999).

A house to house collection system is not commonly used, except in some parts of Mumbai and Kolkata. In commercial areas of many cities the collection staff moves at specific times with sized hand carts and the waste form adjoining premises is collected. The industrial arrange collection of waste within their premises. In India community bin system is used and it is
the responsibility of the owner or his emp to deposited the waste in the community. Bins located at street corners. A variety of bins are in use in different cities. The simplest and most common type consists RCC pipe section (1m dia, 1m high) open at both ends. The GI community bins (circular or rectangular), which are, previously use. Wherever the quantity of waste collection large, masonry bin sore constructed These have usually two or more opening for the worker either to deposited and removes the waste. In big cities, bins in the form of enclosed room having two or more openings are often constructed. In different cities these are known by various – sub as chamber Dalao [Binde, 2001] Mamta, (2001) reported on the collection methods currently adopted by the civic authorities are primitive and lacking in specific standards & guidelines, which are required to be laid for designing and sitting of collection centers. The solid waste management’s application in an optimized area within the Regi one Companies in Italy demonstrates how to evaluate the economic advantages pertaining to different municipal solid waste collection and treatment options (Fabbri, 2001)

Themelis et al, (2002) discussed that 4.1 million metric tonnes of municipal solid waste collected by New-York city annually. A municipal solid waste and recycled material curb side pickup bus system was recently
initted in a Taiwan city to improve collection service. For such an municipal solid waste pickup system, selecting appropriate collection stops critically affects hauling cost and service efficiency. Conventionally municipal solid waste collection points are heuristically and manually chosen, resulting in a hauling system that is not as effective as intended in terms of location suitability and the number of collection points. The shortest service location (SSL model, which minimizes the some of services distance). The results shows that the SSL solution can shorten walking distance by approximately 10% and reduce the overlap of service areas covered discussed by (Kao and Lin, 2002). In this study alternative waste management scenarios that include the selective collection of organic waste reported by Wilson, (2002). In work presents an integral methodology for four pre sorting & waste collection ratios that are beginning to be implemented in Spanish cities (Vidal et al, 2001).

Some remarkable work reported are carried out by the below listed workers on present collection system of municipal solid waste.


In this study, an operations research study on the planning and design an improved solid waste transportation system in the city Izmir, Turkey is discussed. This study is based on a mixed integer-programming model, focusing on the optimization of “total solid waste transportation costs” and considering various transfer site, fleet size and transportation options (Or et al, 1993).

Kaseva and Gupta (1996) discussed that the increasing tonnages of refuse due to expansive of urban entries which implies increased the transportation and disposal costs is currently acceptable as a sustainable approach to solid waste management.

The study pointed out the most important elements to take into consideration when planning, collection, transportation of organic solid wastes, separated at sort the source discussed by Desgagnes et al., (1997) The Chandigarh Sanitation Department is employing the direct method of
transportation in this method, as the collection vehicles gets filled to its capacity, it proceeds direct to the site of disposal. After emptying it comes back and collects the solid waste from the remaining areas. Since most of the collection and transportation vehicles are of small capacity, they have to make a number of trips between their respective areas of collection and the site of disposal. In this way not only a lot of time is wasted in transportation of solid waste but also increase the cost of transportation discussed by Patnaik et al., (1997) Agunwamda et al., (1998) reported that vehicles for waste collection including open tipper, side loaders, lift able container truck and rear loading composers, used in city Onitsha, Nigeria. Gupta and Kansal, (1998) reported on present practices of waste transportation in India.

Ho Chi Minh City, Vietnam collected municipal solid waste daily by a fleet of handcarts and 3000 tricycles. Over half the tricycles are operated by private sector companies. Each tricycle makes up to three journeys a day collecting waste. The compacter trucks are also used to collect the waste to transfer stations for onward haulage in large trucks to landfills discussed by Stentiford, (1999). Pramod. Kumar and Singh (1999) reported that the appropriate design for transport vehicles, primary collection transfer to disposal facilities. In this study finds a use of low cost locally made pedal tricycles would substantially reduce the requirement & fuel. Shekdar,
(1999) discussed the solid waste in Bosnia and Herzegovina transported from residential areas, commercial areas and other public places to a landfill for ultimate disposal. Most of the collection vehicles are old and required replacement.

Subbarao, (2000) reported that hand carts are used to carry the waste to the place where the trolley with tractor is kept to receive the material. In this study, suggested that one handcart used for per 1000 population or 200 families, required 250 hand cards. The capacity of this handcart is 0.5 m³/trip in the Miraj city.

Transportation of garbage is carried out using old outdated trucks, tippers & refuse collectors. Inadequate of transportation fleet and frequent breakdown of vehicles are the major breakdowns of vehicles are the major hardship in proper collection of garbage investigated by Mamta Saxena (2001). Bhide (2001) investigated that the waste is loaded in trucks to transport the waste for final disposal. This is normally carried out manually by 4-6 numbers of labourers.

In present investigation data of collection system of municipal solid waste collected from Aurangabad Municipal Corporation. The municipal solid waste collected from residential sectors, commercial sectors as well as industrial & institutional sectors. The wastes normally carried by labors that
transfer waste material from storage dust bins to vehicles using baskets

In Aurangabad city house to house collection system is not commonly used the community bins system is not commonly used the community bins system is used and it is the responsibility of the owner to deposit the waste in the community bins located at street corners or open space at different localities The collection system is totally manually

Community Dust Bin System

A variety of dustbins are used in Aurangabad cities The simplest and most common type consist RCC pipe section [1m dia & 1m high] open at both ends As these are quiet heavy and do not have resale value another type of storage dustbin is GI Community dustbins The capacities of these storage dustbins are near about 100kg of solid waste Aurangabad Municipal Corporation appointed 148 workers to collect the solid waste from all sectors of Aurangabad city These workers are used spraw & Ghemela to collect solid waste manually Aurangabad Municipal Corporation appointed private vehicles to collect the solid wastes There are 34 x numbers of tractors with trolleys and trucks During the manual loading of municipal solid waste 4-5 workers are deployed on each truck or tractor with trolleys Small hand carts are also used to collects the solid waste from narrow residential and commercial lanes having capacity 0.4 m3/trip can empty the solid waste
material into truck or trolley. After the bin is emptied, the vehicles, along with the labourers to the next bin and so on till fully loaded. Most of the vehicles are now equipped with tipper and hence these workers need not travel to disposal site and can be dropped after the vehicle at another storage bin.

Recently, number of vehicles such as container carrier system and dumper placer system has been introduced. The capacity of these vehicles nearly 1 50 tonnes/trip.

Collection and Transportation of municipal solid waste should be done an everyday basis throughout the year. The municipal solid waste during transportation to the disposal site is exposed to the open conditions thus causing public nuisance. The vehicles carrying garbage are covered.
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**A-** Food waste, fruit waste, vegetable waste and non-vegetable waste.

**B-** Paper

**C-** Plastics

**D-** Glass

**E-** Rubber

**F-** Metal

**G-** Clothes

**H-** Leather

**I-** Fine earth and ash
TABLE-2

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A- Food waste, fruit waste, vegetable waste and non-vegetable waste.

B- Paper

C- Plastics

D- Glass

E- Rubber

F- Metal

G- Clothes

H- Leather

I- Fine earth and ash
### TABLE-3

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*Values are expressed in tonnes.*

140.3
### TABLE-4

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<td><strong>Total</strong></td>
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* Values expressed in tonnes.
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<th>MONTHS</th>
<th>2000-01</th>
<th>2001-02</th>
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<tr>
<td>June</td>
<td>244.16</td>
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<td>November</td>
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<td>March</td>
<td>270.70</td>
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<td>April</td>
<td>272.43</td>
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<td>May</td>
<td>269.60</td>
<td>270.35</td>
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### TABLE- 6

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Hospitals</th>
<th>No. Of wards</th>
<th>No. of Beds.</th>
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<tr>
<td>1</td>
<td>Govt Medical College and Hospital</td>
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<td>1054</td>
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<tr>
<td>2</td>
<td>M G M. Hospital</td>
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<td>Hedgewar Hospital</td>
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<td>4</td>
<td>Dhoot Hospital</td>
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<tr>
<td>5</td>
<td>Small Hospitals (20 No )</td>
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<td>400</td>
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### TABLE- 6

**Medicals waste generated in Aurangabad city**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Hospitals</th>
<th>Waste generated/day</th>
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<tr>
<td>1</td>
<td>Govt. Medical College and Hospital</td>
<td>250-300 Kg</td>
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<td>M G M. Hospital</td>
<td>150-220 Kg</td>
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<tr>
<td>3</td>
<td>Hedgewar Hospital</td>
<td>150-175 Kg</td>
</tr>
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<td>4</td>
<td>Dhoot Hospital</td>
<td>100-150 Kg</td>
</tr>
<tr>
<td>5</td>
<td>Small Hospitals (20 No )</td>
<td>130-140 Kg</td>
</tr>
</tbody>
</table>
Monthly municipal solid waste generated in summer season Year 2000-01 & 2001-02
Average municipal solid waste generated in rainy season Year 2000-01 & 2001-02

Average municipal solid waste generated winter season Year 2000-01 & 2001-02
Average municipal solid waste generated in summer season Year 2000-01 & 2001-02
A- Food waste, fruit waste, vegetable waste and non-vegetable waste.

B- Paper
C- Plastics

D- Glass
Composition of municipal solid waste
Year 2000-01 & 2001-02

E - Rubber

Composition of municipal solid waste
Year 2000-01 & 2001-02

F - Metal
Composition of municipal solid waste
Year 2000-01 & 2001-02

G- Clothes
H- Leather
Composition of municipal solid waste Year
2000-01 & 2001-02

I- Fine earth and ash
SOLID WASTE MANAGEMENT OR DISPOSING METHODS

Despite the existence of extensive resources invested in solid waste management practices in the country the eventual service provided is largely inefficient, with substantial quantity of refuse left uncontrolled in many cities. The overall emphasis on waste management system lies in technology opposed to efficient labour management. With due focus on the labour needs of the system, not only could staff inefficiencies and inadequacies be addressed but were it is more appropriate labour could replace technology, for instance in the collection of waste from low accessibility areas.

The physical chemical and biological characteristics of humus produced from the biodegradable organic fraction municipal solid waste, using anaerobic composting processes. The results obtained, the anaerobic composting process represents an effective alternative technology, with the added advantage of the recovery of energy in the form of methane (Kayhman and Tihobanoglous, 1993). After taking samples of gases from Beishenshu Municipal solid waste dumping site in Beijing and making the qualitative and quantitative analysis of the samples discussed by Zhou et al., (1994)
Analyze the present status of solid waste management in Tehran. Through the detail survey, all functional element like recycling and safe disposal of present solid waste management system in Tehran were studied by Abduli, (1995) A steadily increasing demand for recycling of polymer has resulted in a demand for methods making it possible to compare different disposal processes. The disposal processes are studied i) Two different material recycling processes that include separation of plastic waste ii) Recycling without separation iii) Pyrolysis iv) Incineration with heat recovery v) Landfill discussed by Molgourd, (1995) Hockett et al, (1995) reported that the variables are selected to capture the residential, institutional and components of municipal solid waste stream as well as the overall structure of waste management through inclusion of waste disposal fees. Scott, (1995) discussed sampling and analysis of household waste. This work has focused on method used to determine the concentration of trace organic compounds present in landfills gas. Rao et al (1995) described the heavy metal contents of urban waste in Hyderabad, results shows the iron content was higher than that of other metals. Among the heavy metals Cu, Pb, Ni and Zn were relatively more valuable than Mn, Co, Cd, Cr and Fe, which are least available.
The current status of knowledge on the relationship between the environment and the use municipal solid waste compost in terms of health risk assessment. Lung damage and allergies may occur because organic dust discussed by Deportes and Denis Zmircou, (1995) Municipal solid waste composting has been increasingly recognized as a promising alternative for municipal solid waste management. Results indicates that the trace element contents of municipal solid waste composts are in general lower than the average trace element contents of municipal solid waste are general lower than the average trace element investigated by He-Xin-Tao and Samuel Trana, (1995) Lober, (1995) examines the nature of public participation in implementing household source reduction of municipal solid waste in order to inform the development of waste policy. The results indicate that the activity of source reduction using a variety of measures is being widely practiced. Over 50% of respondents participate in at least one source reduction activity. Yang, (1995) discussed on urban waste recycling program in Taiwan. During the past few years, the quantity of urban waste generated in Taiwan has greatly increased about 8-10% per year. Approximately 50% or more of the urban items in urban waste are found to be valuable and worth recycling. Wang, Jue et al (1995) reported information system has been developed for management of solid waste exchange which is means of
waste recycling and recovery and a kind of exchange between waste
generators and potential waste users Arinola and Arinola, (1995) reported
on disposal and utilization of solid waste as well as agricultural wastes has
presented new risk and problems for our society and environment

Kaseva and Gupta, (1996) discussed on traditional solid waste
management have evolved as mainly the removal of municipal wastes by
hauling them out of the city boundaries Recycling is currently accepted as a
sustainable approach to solid waste management Out of 294 tonnes of
studied waste material, only 4 tonnes are recovered and recycled The
remaining 290 tonnes/day of recyclable materials are left to pollute the
environment are collected and transported to final disposal Plastics are the
fastest growing components of municipal solid waste in the h1 USA and over
the past decade there has been increasing public demand for plastic recycling
reported on the potential for using waste carpets as part of cover and liner
systems at municipal solid waste landfills using bioreactor Tyson et al.,
(1996) examines the potential supply of municipal solid waste, which could
use to support new energy capacity in year 2000 The municipal solid waste
is not recycled or burned, which could be landfilled unless new municipal
solid waste energy conversion capacity is constructed

Landfill characterization has been carried out by analysis of waste sample collected from different depth in the municipal landfill of Torino. The result has been that landfill drilling to collect samples can provide useful information about landfill morphology suggests that landfill behavior and biogas production can be predicted in a more reliable way if very simple chemico-physical analyses of collected samples are performed. Investigated by Chiampo and Cometto, (1996) El-Fadel et al., (1996) discussed that microbial growth models are often used to evaluated anaerobic biodegradation processes and estimate gas generation rates from solid waste decomposition in sanitary landfills. Temperature effects on anaerobic
processes have been commonly evaluated in anaerobic digestion studies. Temperature had a greater effect on the modelled system at the beginning of the stimulation. Change, Christine and Richard Schules, (1996) discussed on models for solid waste management usually focuses on the economic optimization. However, the sitting of important facilities such as landfills, incinerators and transfer stations, in the solid waste management system. Elliott et al, (1996) reported that problems of cancer incidence of over 14 million people living near 73 municipal solid waste incinerators in Great Britain was examined from 1974-86 (England), 1974-84 (Wales) and 1975-87 (Scotland) observed two stages: first stage 20 incinerators and second stage 52 incinerators. Over the two stages of study was a statistically significant decline in risk with distance from incinerators for all cancers combined stomach, colorectal, liver and lung cancer. Among these cancers in the second stage the excess from 0-1 KM ranged from 37% of liver cancer (0.95 excess cases 10-5 years) to 5% for colorectal cancer. Ponka et al, (1996) discussed on management of wastes from healthcare facilities.

The large amount of municipal solid waste in many cities in China were transported to suburban districts and dumped into the low laying land directly without site occupying an area of 58692 hectares of which 4060 hectares is potential farming land. The total amount of industrial solid waste.
in Wahan was 5.6 million tonnes in 1992, of which 5.0 million tonnes was recycled 30,000 million tonnes was treated physically chemically and finally disposed off, 0.31 million tonnes was deposited near plant and 0.26 million tonnes was discharged into river, lakes and seas (Wei et al., 1997) Ro et al., (1997) reviewed and analyzed results of recent research activities pretraining to characterization, treatment and disposal methods of solid wastes Wang et al., (1997) reported the status and development of solid waste treatment and disposal technologies in China was based on analysis of the status of solid waste pollution problems in solid waste management, proposed that the technological system of regional treatment and disposal centre should be established Recent studies regarding solid waste management system planning frequently emphasize that the socioeconomic and environmental impact risk is impossible, the analytical concern actually rests upon the concept of risks and costs in an efficient management system discussed by Chang and Lue, (1999) Westlake, (1997) described that a sustainable landfilling is optional technique (bioreactor landfilling) Rather than the more appropriate of managing landfilling The technique achieves the lowest risk landfill will vary according to the number of factors like waste composition, climate and local geology/hydrology vary from country to country, region to region and site to site He and Shao, (1997) investigated
on the energy value of municipal solid waste. The conclusion is that the energy can be recovered through a landfill gas utilization process and energy produced by incineration process Desgagnes et al., (1997) to perform composting studies on variety of different mixtures of organic wastes. The results show best composting conditions to produce good quality compost Eleazer et al., (1997) discussed the objective of this research was to characterize the anaerobic biodegradability of municipal refuse components by measuring methane yields Martin et al., (1997) biogas production from a mixture of food and paper waste with addition of in column buffer and nutrient, began after 24 weeks and reached 0.8 vol/vol Day from 40 to 51 weeks at 55-65% (v/v) methane. A study conducts on environmental monitoring and impact assessment of the On-Nooch solid waste disposal site in Bangkok, Thailand. Four water-sampling stations were established at the site. Grab water samples were collected from leachate treatment plant, near by stream were collected during rainy & dry season. During dry season results showed COD- 618mg/l, BOD- 80mg/l, SSP- 100mg/l, Total Kjedahl nitrogen- 282mg/l, which were still higher than standard, limits for effluent in Thailand (Muttamara and Shing, 1997).

Some remarkable investigated worked are carried out by the below listed worker on the recycling of municipal solid waste.

The groundwater contamination by solid waste disposal using both hydro chemical and geophysical methods, the Halkali (Istanbul) solid waste site was closed in 1994 was investigated. The groundwater sample collected from boreholes, which drilled, on site. The results indicate that TDS and chloride concentration decreases horizontally away from the waste site where as increase with depth, discussed by Kayabahi et al., (1998) Agunwamda et al., (1998) investigates the waste management in municipality of Omtsha, Nigeria handling by division of municipality into six sanitation zones. A sanitary landfill is the main method used for waste disposal in addition open dumps, controlled landfill are exploded. Boni et al., (1998) reported that the municipal solid waste consists of several fractions, which respond differently to biological degradation when they are discharged in the environment of in a landfill. The results show and suggest the reasons why individual fractions are more or less biodegradable. Donahue et al., (1998) reported that the food wastes composted using traditional methods of windrow composting and experiences vermin and

149
odour problems The proto type in vessel system was evaluated to various mixtures of food waste and bulking agent were tried ranging from 1 4 The results show that if food waste is composted in-vessel system for 14 days, vermin and odour problem are reduced In India, disposal of municipal solid waste are unscientific and chaotic Uncontrolled dumping wastes on outskirts landfilling which are not only impossible to reclaim because of the haphazard manner of dumping but also have serious environmental problems in terms of groundwater pollution and contributing to global warming Burning of waste leads to air pollution problems increased discussed by Gupta and Arun, (1998) The treatment of domestic waste has been one of the major problems in Hong Kong The Government has a started policy to advocate the minimizing of waste disposal through the encouragement of waste reduction, reuse and recycling discussed by Chan (1998) The Quality of waste treatment processes and final (recycled) products relies upon the availability of standards and testing methods discussed by Quevauviller, (1998) Due to the complexities of real world systems solid waste management programs have to be quickly reorganized for handling various types of issues These issues are intimately related to solid waste recycling, treatment and disposal This paper is the culmination of 2 years experience in information technology for nationwide solid waste management analysis
Morf and Poul, (1998) reported on efficient waste management. Instruments are needed to the impact of legislation, organizational and technical measures on waste stream. Since waste incineration plants transform heterogeneous waste into homogenous residues, they are well situated for easy and cost-effective monitoring of the chemical composition of wastes. Daskalopoulos et al., (1998) discussed that the economic-viable and environmentally acceptable disposal of municipal solid waste is major concern in any industrialized countries. The main problems facing policy makers in waste management sector. Chang and Chang, (1998) reported that an operational program in solid waste management system should be based on not only the cost saving principles but also energy and material recovery requirements for the target incinerators in Taipei metropolitan region. Renkow and Robin (1998) discussed on municipal solid waste management by composting. The composting cost compare with the cost of alternative forms of waste disposal (special traditional land disposal). The results showing of 19 municipal solid waste composting generally cost around 50 per tonnes. Modelling techniques were used to potential acute health effects resulting from exposure to short-term emissions of metals from hazardous waste.
incinerators, a medical waste incinerator and municipal solid waste incinerator (Hasselius and Wood, 1998)

Some remarkable investigated worked are carried out by the below listed workers management of disposing by incineration municipal solid waste


Waste management is needed to reduce pollution and improve the quality of life for residents of Ho Chi Minh City, Vietnam. Most of the MSW in Ho Chi Minh City ends up at two out of the nine landfills sites. Some 1,760 tonnes/day is taken to the Dong Thanh landfill site. In disposing methods recycling and composting methods are adopted (Ed-Stentiford, 1999). The Eurostat survey indicated the disposing methods of hazardous waste were landfilling and incineration (European Union’s Statistical Agency, 1999). Pramod and Singh, (1999) management of municipal solid waste of Ghazipur city was studied. Methods of disposal analyzed to assess its impacts on environment. The findings revealed various shortcomings in the present disposal system with the conclusion that riches are more
wasteful. Recommendations were made to improve disposal practices. Mamta Gandhi, (1999) studied on disposing of animal waste, kitchen waste and miscellaneous waste by 100 families.

Two hospitals located in same sectors of a class B city, review the present dumping method of disposal. A combustibility analysis of hospital wastes would help to decide whether to adopt incineration for disposal (Ray et al., 1979).

The management of medical wastes in Hungary on the basis of experiences the medical wastes are proposed to range into categories as follow, I) waste should be handle in special way within and outside the health care facilities. II) Waste should be handled in special way within the healthcare facilities. III) General waste, on basis requirement is the segregating collection of wastes. Colour coding is proposed to identify the content of containers and bags. Incinerator combined with pyrolysis and emission control units should be preferred to the disposal of medical waste. (Horvath, 1991) Hylton, (1991) reported medical waste is part of the larger issue of solid waste disposal facing America today. Its management often elicits deep fears concerns among the public. The reality is that medical waste poses few health risks and many hospitals may be using more caution that actually necessary to protect the public. Collins, (1991) showed the
clinical and laboratory waste disposed on domestic refuse landfill sites causing public disquiet about health hazards and environmental pollution. Landfill is officially discouraged.

The vulnerability to HIV contraction among rag picker who unknowingly may be exposed to this occupational hazard, while picking hospital and dispensary wastes (Rajkumar Bansal, 1993) The hospital waste at the National Taiwan University Hospital (NTUH) design an incinerator for the treatment of infectious waste, plastic syringes pathological wastes and kitchen wastes (Li and Jenq, 1993)

The management of hospital waste in Chandigarh city, waste from hospitals and nursing homes are being dumped along with general refuse and garbage to be collected by municipal collection van. The Scavengers sort out whatever can be recycled unwilsful of the health and safety aspects (Sami and Dadhwal, 1995) Hasselris, (1995) discussed that medical waste incineration today is a highly technique process under the watchful eyes a state laws in United States

Out of 0.75kg / patient / day biomedical waste constitute only 6.27% through all resources have been provided, a large implementation gap for waste management is seen because of attitudinal problem. A particular difficulty is experienced for disposal of green coconut shells. Incineration
has been advocated as available method of disposal Cost of incineration is Rs 27.1/patient/day (Basu, 1996)

Mato and Kassenga, (1997) discussed that the disposal of medical waste in Tanzania facing environmental problems that needs immediate attention before it goes out of hand The management of medical waste has received little attention despite their potential environmental hazards and public health risks. This study revealed that medical wastes are not properly managed in most hospitals and dispensaries. A number of remedial measures to improve the situation including the construction of commercial incinerators in the city are suggested. Audit Commission, (1997) investigated the hospital waste management in England and Wales. The report examines the extent of the problem, recent legislative changes, variations in the cost of waste removed and disposal between hospitals, the elements of the cost of waste management in hospitals there are three stages of waste management process source, transfer and disposal, the main sources of waste in hospitals, waste minimization, the potential for reuses, recycling initiatives cost saving through waste sorting and segregation ways, the incineration of clinical waste contract prices for clinical waste disposal.

In UK Clinical waste management by incineration Alternative technologies designed to render safe clinical waste are outlined, steam
sterilization, dry heat sterilization, gasification/pyrolysis and microwave disinfections are described by Rayner and Cowell, (1998)

Sian, (1999) discussed that many NHS trust have engaged contractors to collect and dispose of clinical wastes or have invited waste disposal firms to take over on site disposal facilities or construct new incinerator. A new clinical waste incinerator built. The hospital waste may be transported up to 400 mills to a suitable incinerator. It is estimated that about 120,000 tonnes of the UK’s total clinical waste is currently incinerated while 16,500 tonnes is landfilled and 15,000 tonnes rendered safe by a range of other treatments.

Management of hazardous industrial and medical wastes in Dar es Salaam, Tanzania is presented. The inadequacies of current management practices, which results in hazardous wastes being left at the Vingunguti dumpsite. Needs for greater public awareness, more legislation and better regulatory enforcement are identified discussed by Mato and Kaseva, (1999).

A national waste management policy was set up in Japan with a target of achieving 100% incineration of combustible waste. This resulted in the establishment of more than 2000 municipal solid waste incinerators, a substantial increase in the amount of incineration residue in landfills and some serious problems in the leachate treatment system discussed by Toshihiko, (1999). Gronow, (1999) described the priority given to licensing
in the control of waste management in UK. It outlines both the historical and present day impact of EU legislation on UK practices and explains potential problems and benefits from the implementation of the EU landfill directive Jugal et al., (1999) reported on proper disposal of hospital waste could be effective cost because this practices could minimize the waste and infected waste could be recycled.

The issue of managing solid waste in the major cities is a growing concern to the municipal organizations in India. The performance of system is to be unsatisfactory. The results show the validity of the approach (Raja et al., 2001) Ferreira, dos Anjos, (2001) attention to public and occupational health problems related to poor municipal solid waste management resulting A development model that views environmental protection, public health and workers health as secondary issues The discussion aims to incorporated solid waste management into the public health agenda El-Fadal et al., (2001) described the environmental impacts associate with solid waste disposal in a converted quarry site and the mitigation measures that can be adopted to alleviated potential adverse impact. The adequate management of municipal solid waste in developing countries is difficult because of the scarcity studies about their composition in the city of Morelia, Michoacan, Mexico residential and non-residential source. The results show that the
recorded amount of solid waste deposited in the municipal dumping ground
is less than that estimated amount of waste generated discussed by
between municipal solid waste produced at different places and different
times In this paper, ingredient, heating value and their temporal varying
trends of typical municipal solid waste in Beijing were continuously
measured and analysed by the process of incineration Fabbricino, (2001),
used mathematical model in planning an integrated program for the
management of municipal solid waste to solve an economical optimization
problem and allow preliminary decisions to be made at the operational
planning phase Patil and Shekdar, (2001) discussed on disposal off medical
waste with municipal solid waste At many places, authorities are failing to
install appropriate systems for a variety of reasons, such as non-
availability of appropriate technologies inadequate financial resources and absence of
professional training on waste management The rules for management and
handling of biomedical waste are summarized, giving the categories of
different wastes, suggested storage container including colour coding and
treatment options A waste management plan for health-care establishments
is also proposed, which includes institutional arrangements, appropriate
technologies, operational plan, financial management and appropriate staff
training programs Hagen et al., (2001), Dhahram Health Centre reduced infectious waste to 407 kg/day after segregation of waste (reduction 65%). Incineration operation was reduced from daily to 3 day in week with reducing in incinerators emissions.

Some remarkable investigated worked are carried out by the below listed worker on the management municipal solid waste.


Bai and Sutanto, (2002) discussed on the current solid waste management in Singapore, yearly disposed solid waste increased from 0.74 million tones in 1972 to 2.80 million tones in 2000. The hierarchy of solid waste management in Singapore is waste minimization (reduce, reuse and recycled followed by incineration and landfill). The present study examines a
recent experience of private sector participation in municipal solid waste management in the Great Beirut Area. The results of a field survey concerning public participation of municipal solid waste management is presented. Analysis of alternatives for private sector involvement in waste management is considered and management approaches are outlined discussed by Massoud and El-fadel, (2002) Waste characteristics are essential data for waste disposal facilities planning and waste management policy formulation discussed by Chung and Poon Wilson, (2002) discussed on alternative waste management scenarios that include the selective collection of organic material and composition are illustrated. Theimeis et al., (2002) examined the policy and technology implication of alternative for managing the municipal solid waste of New York City. At this time, of the 41 million metric tones of municipal solid waste collected by the city annually, 16.6% are recycled, 12.4% are combusted in waste to energy plants, and the remaining 71% are landfilled. Al-Yaqout and Hamoda, (2002) evaluates current operational practices in municipal solid waste landfills in Kuwait to provide existing knowledge on uncontrolled landfilling and associated problems of solid waste disposal in developing countries. The current landfilling practices are safe neither for humans nor for the environment. The wastes are dumped on landfill sites, spread and compacted.
in an uncontrolled manner and cover material is not applied regularly. Dust created within the landfill site and gas emissions cause a public nuisance. There are no provisions for leachate and landfill gas collection at the landfill sites.

Incineration is an effective way of treating municipal solid waste, in many countries the potential health risks associated with stack emissions, particularly those of (PCDD’s & PCDF’s), have become a cause great controversy and concern discussed by Domingo, (2002). The use of municipal solid waste compost as fertilizer may increased leaching due to its high contents of trace metals and pose a threat to ground water quality discussed by Kaschl et al., (2002). Xi et al., (2002) discussed on the effects of complex microorganisms in composting process of the municipal solid waste. The results shows complex microorganisms are effective to decompose organic matter and speed up composting change into humus. The effect of municipal solid waste compost and its water soluble and humic fraction to suppress the effect of *Pythium ultimum* on pea plants was studied and compare with other chemical pesticide (metalaxyl). The addition into soil of whole composts and their humic fraction reduced the effect of the pathogen on per plants discussed by Pascual et al., (2002)
Campbell et al., (2002) discussed plastics wastes from municipal solid waste plant have a high energy content which make it an interesting option for co-processing with coal. The resulting efficiency increases due to the improved gasification qualities of plastics over coal. Collivignarelli and Sorlini, (2002) study is aimed at assessing the feasibility of concrete production using stabilized municipal solid waste incineration fly ashes in addition to natural aggregates. Bruder et al., (2002) investigated the incineration of municipal solid waste results in the annual production of 27 million tones of bottom ash in France. This bottom ash utilized in road construction. Komastu et al., (2002) investigate recycling of municipal solid waste is vigorously promoted in Japan and necessity of energy recovery from organic waste is increasing.

In the present investigation disposal methods or management in Aurangabad city is a landfilling. The municipal solid waste is carried out to disposing site Naregaon, 3 Km away from city. The Aurangabad Municipal Corporation owns 46 acres of land near village Naregaon for dumping the garbage.

The municipal solid waste is carried out from different parts of Aurangabad city. The amount of solid waste is about 250 tonnes/day carried out for disposed off.
Recently Aurangabad Municipal Corporation has given solid waste management project to private firm will process the garbage collected from the city, treat it properly and prepare manure from the waste. This will improve the environment of the exiting dumping ground and its surrounding.

On dumping site and near the community dustbins, the rag pickers are collected the recycling materials like paper, plastic, glass and leather. In Aurangabad city rag pickers are collected 75% of recycling materials from solid waste. Rag pickers play an important role in the management of municipal solid wastes. They work day and night on the garbage dumpsite to collect the recycling materials. In Aurangabad city, rag picking by children is a matter of concern. It is observed that each group of rag pickers takes a specific item for segregation task. After segregation of waste, rag pickers sell it to kabaariwala or the recycling party.

It was also observe that 75% of rag picking is being done by female workers and children. About 35% of rag pickers earn up to Rs 25/- per day and 65% of rag pickers earn Rs 35/- per day or little above.

Every day nearly 100 tonnes of municipal solid waste is not disposed off by landfilling or by composting. So there are large quantities of solid waste left on dumping site.
Effects Solid Waste

Disposal of solid waste is a serious health concern. Particularly during rainy season, run off and a high humid condition increases the health hazards. The landfill sites, which are not well maintained, are prone to groundwater contamination due to leachate percolation. Open dumping of solid waste serves as ground for diseases vectors such as flies, mosquitoes, cockroaches, rats and other pets.

The villages near Naregaon dumping site are like Bridgewadi, Masantpur, Misarawdi, Mandki, Gopalpur, Rampur, Warud, Warzadi, Mahalpimpri, Kachheghati, Pokhari, Sultanpur, Gangapur, Pisadevi and Wadkha etc. This solid wastes having high risk of spreading diseases like typhoid, cholera, dysentery, yellow fever, encephalitis, plague and dengue fever in these villages. The villagers as well as farmers hew and crow about this solid waste in Aurangabad Municipal Corporation. So Aurangabad Municipal Corporation has planned to use incineration method in near future.