Reduction of Odour from Garbage Transport Vehicle

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Abstract- **Indian traditional method of garbage collection is very straight. It collects garbage and dump into dumping yards. This results into huge amount of economical losses and further treatment process become tedious. The waste disposal and treatment process starts at this stage which result in adopting more complex method and less success in its safe disposal. The problem of odour and gas ejection has become an issue. Dump yard stink unbearably which affect the surrounding settlement. This unwanted odour has to be eliminated at initial stage which may result in saving energy, money and time. In this project we are proposing reformed method to eliminate odour at the collection stage of garbage collection system by installing a gadget which will suck in the odorous gas, treat it and give out clear air.**

I. INTRODUCTION

We breathe in air which should be clean and safe. For better civilization supply of natural clean air is very essential. Domestic garbage collection and disposal system running traditionally has become a crucial problem to society. The enormous release of toxic gas throughout the system from collection to disposal result into problem of air pollution, suffocation and irritation. Odour controlling from the stage of waste loading into garbage truck is the main point where odour elimination should be taking care of. Odour emission from the day to day domestic waste start releasing once it is collected from home. This odour has created nuisance to workers under the system as well. As the vehicle collecting domestic garbage travel in the whole area for garbage collection, this area is filled with odorous smell which in turn irritates locality and annoy them. The collected garbage has potential to health hazard, which has attracted public complaints. To maintain the asthetic value of present system new methods should be adopted. The purpose of this study is to take an important step in odour management and to permanantly find solution to it. As no permanent and full-proof odour management system present, this project offer enormous opportunities in this field.

II. LITERATURE REVIEW

Magda Brattoli, Gianluigi Gennaro, Valentina de Pinto, in this paper they worked on the odour emissions and its impact. Monitoring of the odour emission and its impact. Which cause the psyco physical wellness. At the time of different processing it is essential to manage the odour emission and its necessity is given in this paper. How to evaluate odour emissions and its impact. The guideline regarding this is proposed in this paper.

Suchi Gupta, Krishna Mohan, Rajkumar Prasad, Sujata Gupta, Arun Kansal mention in their paper about the waste management system in 1998, they predicted that the increasing waste would result into municipal co-operation investment in infrastructure facility. They suggested to adopt scientific waste disposal system in addition to adequate collection system. They suggested to insure proper unaerobiosis should take place and methane gas should be collected and used. The landfill was predicted to produce 50-60% methane which was contributing to global warming, so use of sophisticated gas control measure to be adopted. They said that Particulate Matter 10 micrometers is more damaging than TPS so increasing efficiency from 70-95% of particulate emission by efficient waste collection.

Josee Brosseau, Michele Heitz listed type of trace compounds generated by MLS. Saturated and unsaturated hydrocarbon, acidic hydrocarbon and organic alcohol, aromatic hydrocarbons, halogenated hydrocarbons, sulphur compounds, inorganic compounds. They observed that domestic waste buried for some times generate hydrocarbons. This gases cause harm to human health, increase risk of cancer, it will have chronic effect on human health. This gas if inhaled is filtered to blood. This gases also

have atmospheric polluting effect. They corrode the landfill gas collection and combustion. The subsurface migration of this gas in nearby locality may result into hazardous effects. They suggested the methods of managing and controlling trace gases by collecting the landfill gas and extraction of trace constituents. They also suggested the destruction of trace constituents by incineration.

Andrey livchak, Derek Schrock, Zeqiang Sun, the effect of humid and uncomfortable environment at the commercial kitchen due to the hot air and the losses due to this conditions are taken into account in this paper and also the various aspects of the air coming into and out of the kitchen are mentioned here. Makeup air system is introduced in this paper which gives the solution to simply replace the air in the kitchen with the outside air by using different systems. PPS i.e. Perforated Perimeter System is introduced to replace the air, which less affect the hood. Instead of using air-conditioning system to cool the air this system can be used.

Shilpa Patil, Anushree Chandragade proposed technique to reduce odour nuisance. It mention to control odour from source area. It depends upon the size of area from which odour emanates. intensity of odour and frequency of odour. They proposed that best management practice should be adopted which include site selection and building of facilities. The paper mention the sprays to suppress the odour rotary automizer is one effective odour controller. The paper supports the odour control from point source. The gas generated from point source can be collected through the piping and ventilation system which depends upon volume of gas, its flow rate, mixtures, chemical composition and water content from stream. Mist filters help in removing solid and liquid from the gas stream. Bio filtration is a natural process occurring in the soil. Bio filter contain micro organism that break down compounds such that water carbon dioxide. green belts forms sorbing and forming sinks for odourous gas adsorbtion can also be adopted to exhaust gas. The paper promotes the use of biowizard odor, a product which is eco-friendly, non toxic, non irritating, non flammable, non pathogenic and non hazardous. It has capability to permantly reduce odour emission from old and newly added waste.

Richard Swierczyna, Paul Sobiski and Donald Fisher have done the research on the effects of range hood. The research is based on the various effects regarding the change in the height, volume of the hood. Which is designed for capture and containment exhaust rate requirements. The sizes matters at the time of selection of the hood. This research is organized by them in the laboratory under controlled conditions. With the minimum requirement of the exhaust rate the effects of range top diversity, range accessories and range dimensions for complete C and C of cooking effluent. All the physical characteristics of the hood are taken into account in the research i.e. the height at which the hood can effectively work, the height of the hood and also the position of the hood is also matters. With the use of proper instruments this experiment is done.

Krzysztof Barbusinski, Katarzyna Kalemba, Damain Kasperczyk, Krzysztof Urbaniec, Violetta Kozik said that bio filteration is oldest biotechnical method for undesirable gases reduction those are fixed-bed bio reactor in which micro-organisms are immobilize. The Contaminated gas flows via porous material where biological oxidation takes place. Main advantage of the process is suitability for treating large volume of low concentration odourants, low investment and operation cost, low pressure drop. The pollutants are transfer from gas to liquid phase which are then bio degraded, the bio film is a key compound to distract pollutant. It is widely used to treat organic and inorganic pollutant industry and municipal exhaust gas stream.

Jian-cheng Liang, Guan-wen Cheng and Hao-pin Feng proposed an odour control method and engineering practices of terminal control technology in sewage treatment plant. In physical method adsorption of gas on activated carbon treats the pollutants in chemical method, NaOH, NaClO and hydrogen sulphide like gases react with odourous substance to dissolve into liquid phase and remove them. Biological method uses micro organism to consume gaseous products. It has high treatment efficiency, no secondary pollutants, low cost and maintenance, ION method uses reactive oxygen technology in which high voltage electro static device is used to produce oxygen ion in air, the odourant is decomposed into carbon dioxide water and hydrogen sulphide.

III. OBJECTIVES OF PROPOSED WORK

Objective of proposed work would be:

1. To propose the method to eliminate the odour at initial stage i.e. collection stage.
2. To improve the work efficiency of workers working under system of garbage collection and disposal.
3. To under control the unnecessary release of toxic gases hence preventing air pollution.
4. To create a healthy living environment by reducing unwanted irritating stinking smell.

IV. FUTURE SCOPE

1. The reformation in vehicle's loading-unloading container can help in suppressing the odourous gas which otherwise is release into atmosphere creating nuisance.
2. The health of the workers can be improved by installing odour controlling extractor which in turn will appreciate workers entering into field of garbage collection and disposal system.
3. The project will help to provide effective service to public which will result in reducing the complaints regarding odour and thus satisfy the society
4. The reform system will help to less complicate the dumping site problems thus helping smooth working.

V. METHODOLOGY

An extractor hood is a concept used in kitchen or any other room to draw out the polluted air i.e. from the kitchen the steam, smoke, and unwanted smells. We used the principle of the kitchen hood in this project. The basic principle of the kitchen hood is to suck the air from kitchen, draw the polluted contents i.e. the dust or any other particles from the air, neutralize the odour and the throw the air out of the kitchen. In this system the size of the hood is decided on the basis of the volume of the room. This system we are going to use in the project by installing the hood in the vehicle carrying garbage, by using the closed container instead of open container. By reforming the outlet from where air is going out, we proposed to adopt this system to reduce the odour. After elimination of odourous gases from the hood containing mesh/baffle filter, reformation of outlet is carried out by installing trapezoidal prism like structure at the top of the hood. The outlet is installed such that the bigger opening is facing the flowing air when the vehicle is running. This will help to neutralize the air after passing through the hood so that if any particle or toxic content is left in the air leaving the hood will neutralize and increase the efficiency of the system installed. This will help in reduction of odour content releasing from the garbage collection and disposal vehicle.

REFERANCES

[1] Magda Brattoli, Gianluigi Gennaro, Valentina de Pinto. "Odour impact monitoring for land field", Integrated waste management (2011), volume 1 pp. 485-506

[2] Suchi Gupta, Krishna Mohan, Rajkumar Prasad, Sujata Gupta, Arun Kansal. "Solid waste management in India: options and opportunities", Resources, Conservation and Recycling 24 (1998), page 137-154.

[3] Josee Brosseau, Michele Heitz. "Trace gas compound emission from municipal landfield sanitary site", Atmospheric Environment Vol 28, No 2,pp. 285-293, 1994 ISSN 1352-2310/94

[4] Andrey livchak, Derek Schrock, Zeqiang Sun. "The effect of supply air system on kitchen thermal environment ". ASHRAE Transaction 2005, Vol 111, part 1

[5] Shilpa Patil, Anushree Chandragade. "Odour neutralizer- A solution to minimize the odour from municipal solid waste", Global Research and Development Journal for Engineering, Recent advances in Civil Engineering for Global Sustainability, March 2016, ISSN 2455-5703

[6] Richard Swierczyna, Paul Sobiski and Donald Fisher. "Effect of range top diversity, range accessories and hood dimension on comericial kitchen hood performance", Supplemental research to ASHRAE 1202-RP, January 2006.

[7] Krzysztof Barbusinski, Katarzyna Kalemba, Damain Kasperczyk, Krzysztof Urbaniec, Violetta Kozik. "Biological methods of odour control: A review"

[8] Jian-cheng Liang, Guan-wen Cheng and Hao-pin Feng. " Engineering practice of deodorization of odour in urban sewage treatment plant in China", Advance in Economics, Business and Management Research volume 30, International Conference on Engineering Management (Iconf-EM 2016)