

“TO STUDY OF EVALUATION OF TOXIC GASES FROM SANITARY NAPKIN INCINERATOR”

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ABSTRACT : Sanitary waste disposal has become an increasing problem in India as the plastic used disposable sanitary napkins are not bio-degradable and lead to health and environmental hazard. No knowledge of how to dispose napkins, most women just throw them in the garbage bin which usually gets mixed up with dry, wet and hazardous waste apart from the fact that it cannot be recycled. Other method of disposal of napkin by flushing into the drain or by burning. Flushing the napkin in drains results in clogging of drain line and associated plumbing problems. Burning the sanitary napkins often causes air and soil pollution. To overcome this problem for destroy napkin waste using incinerator. There are mainly two incinerators. Existing incinerator and proposed incinerator. Existing incinerator is not working on IOT based mechanism. proposed incinerator based on IOT sensor based mechanism. To measure the toxic gases from both incinerator by using sensor. The outcome of proposed study shall help to use of result for system of incinerator and effective planning to better environment. Also help to achieving the “swachha Bharat” mission and avoid the large amount of diseases.

KEYWORDS: sanitary napkins, Incinerator, sensor, IOT, Toxic Gases.

INTRODUCTION

1.1 Introduction

Disposal of used sanitary napkin is very common problem everywhere. The napkins are commonly disposed either by flushing them in the drains of toilet or by burning them to open ground or throwing in dustbins. Above mentioned means of disposing sanitary napkins create big problems. Flushing the napkin in drains results in clogging of drain line and associated plumbing problems, burning the napkins create air pollution into the atmosphere, and throwing in dustbins results in health related problems due to hazardous contents in the used sanitary pad. Almost 90 percent of sanitary napkin is plastic. The thin top layer on napkins, known as the top sheet, is made of a plastic polymer (polypropylene). The padding is wood pulp mixed with super absorbent polymers and the leak-proof layer is made from an impermeable polyethylene. The plastic used in sanitary napkins, which is non-biodegradable. It is not only harmful for health, but also has negative consequences on the environment. Since it is non-biodegradable, the soiled napkins stay in the landfills for about 700 years. The informal practice of burning soiled napkins in the open releases toxic gases

like dioxins and furans. Hence safe disposal of napkins is very important. The correct way to dispose the used sanitary napkins is by burning and converting it into ash and ensuring that toxic gases are not let into the atmosphere. So the need of the hour is a portable automatic napkin disposal system, which should avoid soil and air pollution.

Need of the study

Every month, 353 million women and adolescent girls across India need to dispose of their sanitary napkin. Women did not want the menstrual waste in their houses so they disposed it away without thinking much about how it will be disposed of further. In fact it was found that even if the facility was provided the behavior did not change much because of human psychology patterns. Sanitary napkin incinerators are used to resolve these problems. Incinerators need to be used at a certain temperature level. Schools, colleges, institutions and even at community level these incinerators can be installed. Incinerators can be used in controlled environment so that the gases released do not harm a larger area. However this can only be a better alternative. The Government of India has laid down specific laws for waste management and handling, keeping in mind environmental protection and prevention from health hazards.

Why is it necessary to dispose of sanitary napkins:

- If they are left in the open, they are sore sight.
- May lead transmission of infections like hepatitis B and hepatitis C.
- No danger of HIV infections.
- Will attract flies and insects.

Objectives Of Study

1. To maintain environment pollution free.
2. To solve the problem of sanitary napkin disposal by installing incinerators.
3. To reduce spread of infection due to unhygienic disposal of sanitary napkins.
4. To reduce environmental pollution due to non-biodegradable sanitary napkins.
5. To avoid clogging of public drainage system due to spongy nature of napkins.
6. To evaluate the toxic Gases from sanitary napkin disposal incinerator.

2 LITERATURE SURVEY

2.1 Definition of Incinerator

A safe, hygienic, scientific & quick method of disposal of sanitary napkins is to incinerate them at relatively low temperature to harmless sterile ash. It helps in instant disposal of used napkins in a very scientific and hygienic way without generating harmful emissions. Proposed Incinerator come with Ceramic high density insulation for external thermal protection, Auto Thermal Cut off for power saving. Capacity of 200 napkins per day.

Disposal of used sanitary napkins has been a very common problem everywhere. Women do not like to carry their used sanitary napkins to a household bin in front of family and friends. Sanitary napkins can't be kept in normal bathroom bin as it leads to embarrassing visuals and odor. Packing the sanitary napkin in plastic bag and dropping it in dustbin is also not feasible in many cases. A study says that over 80% Girls flush their used sanitary napkins because they are messy, smell bad and is embarrassing. Both the above mentioned means of disposing sanitary napkins create problems. The flushing in drain results clogging in drain (drainage line chock-ups/plumbing line blocking problems) and throwing in dustbins results in health related problems due to hazardous contents in the used Sanitary Pad.

The health hazards associated with unsafe disposal of napkin have been presented. Almost 90 percent of a sanitary napkin is plastic. The thin top layer on napkins, known as the dry-weave top sheet, is made of polypropylene (a plastic polymer). The padding is mostly wood pulp mixed with super absorbent polymers and the leak-proof layer is made from an impermeable polyethylene. The plastic used in sanitary napkins, which is non-biodegradable, is not only harmful for health, but also has negative consequences on the environment. Since it is non- biodegradable, the soiled napkins stay in the landfills for about 800 years. The informal practice of burning soiled napkins in the open releases toxic gases like dioxins and furans. Hence safe disposal of napkins is very important.

(Thakre and Rathi 2011) This study has highlighted the need of adolescent girls to have accurate and adequate information about menstruation and its appropriate management. Formal as well as informal channels of communication such as mothers, sisters and friends, need to be emphasized for the delivery of such information. In view of the vital role of the mothers, it is very important that the mother be armed with the correct and appropriate information on reproductive health, so that she can give this knowledge to her growing girl child. It is also essential for the teachers, who may not have the necessary skills to impart reproductive health education, including menstrual hygiene to their students. They have to be given requisite skills – usually through training or workshops. Much more efforts are needed to curb the misbeliefs and taboos among the adolescent school girls

(Zippay patent filed 1968) The disposal of sanitary napkins has been problem some, especially in public facilities such as lavatories. Attempts to dispose of these items by flushing them down the toilet have resulted in clogging of the toilet or of the plumbing associated therewith. Further attempts to provide ordinary receptacles in the public lavatories have also not met with success since these receptacles have not been used by the general public. While attempts have been made to solve the problem of disposing of sanitary waste, such as human excrement, by incinerator systems, no prior attempts have been made to satisfactorily dispose of sanitary napkins in such systems. Furthermore, the systems of the prior art concerned with sanitary waste disposal in general have been found to be cumbersome in construction and too costly for practical adaptation to dispose of sanitary napkins in public lavatories. A portable sanitary

napkin incinerator comprising a heating chamber having reflecting surfaces for reflecting and concentrating heat to burn the sanitary napkin. There is further provided a removable tray for removing debris and a hood assembly with cooperative filter elements for eliminating undesirable odors and fumes emanating from the chamber.

(Rao and Harish ,2018) Women hygiene is of utmost importance and is to be taken care of. Women in India are still shy of buying napkins from medical shops and other stores. A solution to this problem is installing napkin dispensing system in schools, colleges and public places. The main drawback of the existing coin operated dispensing system is that there is no mechanism available for the person refilling the napkins to know about the status of napkins available in the system. So, a person has to regularly check the availability of napkins in the system manually and refill it. This work aims at installing an automatic napkin dispenser in toilets and places that can keep track of available napkins and inform the person concerned when fewer napkins are available. Women hygiene is of utmost importance and is to be taken care of. Women in India are still shy of buying napkins from medical shops and other stores. This issue has been addressed by fabricating a coin operated and RFID based Sanitary Napkin Dispenser. The system has the feature of intimating the person concerned through SMS for refilling the Napkins in the machine. This system can be designed to load more napkins by using the rack and pinion method, so that frequent loading of napkins can be avoided. Napkin disposer too can be fabricated and integrated with the vending machine, so that dispensing and disposing can be achieved in a single unit.

(Kulkarni and Lohar 2018) Sanitary napkins typically used by women's, but an issue where disposal system do not operate effectively and affordable thought that come to every women's mind when she picks up sanitary napkin. Every month 353 millions women's and adolescent girls across India need to dispose their sanitary napkins. Linda scott, paul Montgomery, laurel stinfielt, Catherine dolan, sue dopson have presented that frequently hear a public concern about providing sanitary napkins to women's and adolescent girls in developing countries. We believe that the impact of pads disposal should be weighed against the potential to help girls delay child bearing by preserving privacy about puberty. Disposal of commercial sanitary napkins is also a problem Even when the community does burned in the open, often incompletely, leaving gobs of half-consumed objects for dogs or children to pick out. Fan Bai, Xiaochang Wang is said Aerobic composting is a method for sanitary napkins disposal of human feces as has been used in bio-toilet systems. As the composting products can be appropriate as fertilizer, it would be agreeable if the composting condition could be well controlled for holding fecal nitrogen as far as possible in the composts. It draws attention especially from regions and areas where provision of sufficient water for toilet flushing is difficult due to water shortage, therefore it is necessary to biodegradation of the human feces in which organics and fecal nitrogen are decomposed or transformed under the action of microorganisms. The aim of our project is to keep environment clean by means sanitary napkin disposal system we also need to give solution to dispose sanitary napkin and avoid current ways of disposal like sanitary napkins are mixed with regular

waste and it is difficult to separate them and dispose them off. This exposes viral borne waste to the environment, animal and public at large causing diseases like Hepatitis B & C. Incinerating this napkin is the only way of getting rid of these problems hence installation of this system is developed. A safe, hygienic, scientific and quick method of disposal of sanitary napkin is dispose them at relatively low temperature to ash. It helps to dispose sanitary napkin in hygienic way without generating harmful emission. This system requires less power, capacity of 60 per day. Every month, 353 million women and adolescent girls across India need to dispose of their that women did not want the menstrual waste in their houses so they disposed it away without thinking much about how it will be disposed of further. In fact it was found that even if the facility was provided the behavior did not change much because of human psychology patterns. Sanitary napkin incinerators are used to resolve these problems. Incinerators need to be used at a certain temperature level. Schools, institutions and even at community level these incinerators can be installed. Incinerators can be used in controlled environment so that the gases released do not harm a larger area. However this can only be a better alternative. The Government of India has laid down specific laws for waste management and handling, keeping in mind environmental protection and prevention from health hazards. Following is an exhaustive list of acts that govern the disposal system of India according to the ministry of Urban development.

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- May lead transmission of infections like hepatitis B and hepatitis C.
- No danger of HIV infections.
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(Rao and Kumar 2017) A portable sanitary napkin incinerator comprising a heating chamber having reflecting surfaces for reflecting and concentrating heat to burn the sanitary napkin. There is further provided a removable tray for removing debris and a hood assembly with cooperative filter elements fore laminating undesirable odors and fumes emanating from The problems associated with disposing of a napkin are elaborated. Disposal of used sanitary napkins has been a very common problem everywhere. Women do not like to carry their used sanitary napkins to household bin in front of family and friends. Sanitary napkins can't be kept in normal bathroom bin as it leads to embarrassing visuals and odor. Packing the sanitary napkin in plastic bag and dropping it in dustbin is also not feasible in many cases. A study says that over 80% Girls flush their used sanitary napkins because they are messy, smell bad and is embarrassing. Both the above mentioned means of disposing sanitary napkins create problems. The flushing in drain results clogging in drain (drainage line chock-ups/plumbing line blocking problems) and throwing in dustbins results in health related problems due to hazardous contents in the used Sanitary Pad.

(Chalasani srinivas, Mohan kumar ch.Dec.2017) These days harmful gases leakage is the main reason for industrial accidents and deaths of workers in industries. Pollutants released by industries in to atmosphere is also a cause for the environmental pollution and such the reason greatly effects humans and animals health by minimizing the levels of oxygen and increasing the levels of harmful gases like ammonia, carbon monoxide, nitrogen tri fluoride, sulfur hexafluoride etc., .These gases are mainly the reason for increasing the no of pollutants in atmosphere. These environmental pollutants are mainly released by industries working with chemicals. Industries management only have a eye on profits and consider environmental safety as least priority which in turn affects the atmosphere and industrial workers health who are living in and around industries as the level of harmful gases are high around industrial areas compared to normal living places. As the population depends more on usage of oil, gas and coal for generating energy to meet the energy demand by increasing population the release of harmful pollutants increases day by day .it is observed that about a 1.1 billion of human population respiration is done through unhealthy air and recorded 7 million deaths occur globally. Industries started peoples or industries owner fully focus on the profit oriented. They do not focus on the workers, people safety and environment safety also. Generally industries are located in the outside cities. But some industries are located at the middle of the cities and village because of the transport reasons or for the availability of raw materials. Due to human error and machine failures etc gas leakage accidents occur often but ceases many workers in to death beds. Gas leakage and detection of gas leakages and harmful gases in and around industries and can be effectively handled by using sensors and automation using IoT . Here we developed a basic model for detection of harmful gases and measurement of harmful gases on a self-calibrated ppm scale and notifying the workers of industry by sms in case any gas leakage is occurred in any sector of the industry. (Bichinapally Sruthi, E.Sreenivasulu 2017) Industries disasters are the purpose for the increasing unreliability in the human life particularly to the workers. To decrease these industries disasters, we developed a gadget that might recognize the poisonous gas and other physical condition utilizing the Internet of things (IoT). This project planned to avoided industries accident and checking the contamination control board. A central microcontroller is joined with sensors like shoot sensor, temperature, gas sensor. Sensors would be used to get the information from the environment at the leakage time. This will be utilized with single or multi dangerous gasses leakage that provides the fast resultant response time is also high. An alarm may be used to generate a sound signal alert by industries to the nearby area living humans. If assume the level of the gasses and temperature goes above the average level than the indicated values than the alert will be provided for utilizing the internet of the web page and the android app which is created. Firstly, when the framework is developed we make one web page and an android app. Several numbers of clients who have a security ID (password) might see the information about temperature and gases leakages is an included principle advantage. This information of the sensors is stored on the internet in the equivalent website that could make utilized for future and further processing,

and this will be good begin for industries to secure the humans in the surroundings and guarantee them a secured existence.

(**Kannappan A.,K.H.Prasad 2017**) Industries disasters every increases that reason in security the human life. Reduces Industries disasters developed one device having poisonous gas and radiation detection monitoring system with in Internet of things. This project intended to avoided industries accident and monitoring the pollution control board. Arduino Uno r3 board is used as central microcontroller which is connected with sensor. Such as temperature, gas sensor, radiation sensor. Sensor to get the data from environment at the leakage time. This device used for as multi gases and multi radiation detection as possible. The program tested with single or multi harmful gases and radiation leakage which resulted is quick and response time is high. An alarm is used produced sound signal alert by industries areas surrounding living people. if suppose level of the gases and radiation goes above the normal level means indication through the internet particular website and as well as indicated android app. Initially system developed there at a time create one webpage and android app. Multiple number of user also see this data about radiation and gases leakage main added advantages. Sensor getting every data is stored in internet corresponding website. which can be used for further processing and it will be good start for industries surrounding staying people secured in life.

Industries started peoples or industries owner fully focus on the profit oriented. They do not focus on the workers, people safety and environment safety also. Developed countries built industries, company proper follow but in developing countries do not follow properly .Generally industries are located in the outside cities. But some industries are located middle of the cities and village because transport reasons or company of raw material availabilities based. Initially industries are forming highly safety precaution based but sometimes accident occur industries like because of no proper maintain industries, human error ,components failure etc. This project used for monitoring and controlling hazardous environment, chemical industries, industries area . Controlling & monitoring purposes using internet of things. Industrial safety industrial working people safety &industries surrounding living people safety To avoid major industries accident or any industries accident occurring time give alert warning to fire station police station, hospital etc. Pollution controlling board monitoring also used this project. Wi-Fi module to internet of things (Iot) module. Most dangerous area accident occur time intimated data sending speed is high must needed. Iot module using transmitting and receiving data range is high and extendable as possible. The poisonous gas and radiation monitoring system realized the real-time detection and control of the poisonous gas and radiation improved the ability of the automation and the intelligent of the poisonous gas and radiation detection monitoring.

3. Methodology

There are mainly two incinerators. Existing incinerator and proposed incinerator. To measure the toxic gases from both incinerator. Existing incinerator is not working on IOT based mechanism. proposed incinerator based on IOT sensor based mechanism.

- 1) Finding existing sanitary napkin disposal technique.
- 2) To measure the toxic gases from existing incinerator.
- 3) Performance and efficiency of both incinerators.
- 4) Finding proposed sanitary napkin disposal technique.
- 5) To measure the toxic gases from proposed incinerator
- 6) Evaluate the gases from sanitary napkin disposal incinerator.
- 7) To measuring or detecting a particular gas the MQ series gas sensors are the used.

3.1 Existing Incinerator-



Fig 8: Existing Incinerator

This model is not working on IOT based mechanism. The offered machine are used for incinerating the used sanitary napkins. These machines are environmentally friendly and are operated with electricity.

Features: Used for incinerating sanitary napkin , operated by electricity, Demanded in colleges and hostels, Add up hygiene in your campus toilets by dispossessing the waste through hygiene Top-up incinerators

3.2 Proposed Incinerator



Fig 9: proposed incinerators

This model is completely based on IOT sensor based mechanism. It is supported to remove toxic gases at large extent. We offer Proposed Incinerator to our valuable purchasers. In fashionable trends no labours out there for improvement disposed hygienic napkins. if therefore the napkins will spread the wellness to one who do the work. By exploitation furnace we will simply avoid the varied bacterium spreading from commonly disposed napkins. Disposed of hygienic napkins in restrooms results in blockage of bogs and involves large price in regular maintenance. In schools, colleges, factories, mills, IT, company corporations and huge establishments disposal of hygienic napkins cause untidy and insanitary atmosphere within the premises.

About Proposed Napkin Incinerator:

- It is the ultimate solution to destroy the sanitary napkins in hygienic way.
- It is wall mountable and can be fixed inside the toilet and burns the used sanitary napkins very quickly and completely in one switch mode.
- It is smallest incinerator in the world which can be used for burning sanitary napkins.
- You can keep this machine on the floor, in an open area, in the terrace or mount it on the wall. it is very small in size and can be mounted inside wash rooms.

Advantages: Less Building Maintenance ,Increase In Attendance ,Stress Free For All Hygienic Environment ,Avoid Blockages ,Saving Water ,Avoid Waterway Pollutions ,Avoid Drainage Line Checkups.

Specifications:

- MODEL: CLASSIC
- For Institutions: 750 Students
- For Industrial Use: 500 Persons
- Burning Per Day: 400 Napkins Approx
- Per Time Storage: 25 Napkin Approx
- Dimension in MM: L*B*H = 280*280*500
- Construction: MS Powder Coated
- Heater Watts: 2000 Watts
- Mode: Automatic
- Operation: Micro Processor
- Color: Blue
- Option: Sensor
- Safety Cut Offs: 4 Steps

4. RESULTS AND DISCUSSIONS

4.1 Name Of Minor & Major Toxic Gases From Sanitary Napkin Disposal Machine

1)Carbon Dioxide Carbon dioxide is the most common gas produced by from sanitary napkin disposal machine. As an organic material, napkin is largely carbon and when exposed to heat in the fire this carbon changes into carbon dioxide, the same gas that is produced when any type of biomass is burnt. Napkin absorbs carbon dioxide through the air as it grows, changing it into carbon in its fibers. Burning the napkin reverses this process, releasing about 1900g of CO₂ for every 1000g of napkin that is fully burnt.

Carbon monoxide It is also released when napkin is burnt and toxic gases release from sanitary napkin disposal machine, although in smaller quantities. This is another carbon gas, but it tends to be produced more often when the fire does not have much access to oxygen. It is odorless and colorless, and in large amounts can be more dangerous for humans than carbon dioxide.

NOx and VOCs Napkin also produces Oxides of Nitrogen (NOx) and Volatile Organic Compounds (VOCs) as it burns. NOx is an acidic compound that combines with water easily in the atmosphere, forming the

infamous acid rain. Volatile Organic Compounds are evaporated carbon compounds that have a variety of unhealthy effects on human lungs, but they can also creates ozone when exposed to sunlight.

Water Vapor It is also a very common type of gas emitted by napkin when it is burnt, especially young napkin that still has a lot of moisture trapped in its fibers. This water is heated by the fire until it evaporates along with tars and resins, floating away as water vapor. Although harmless on its own, this vapor can carry more dangerous particles from the smoke as it rises.

MAJOR TOXIC GASES

4.2 Toxic Gases From Existing Incinerator-

if at a time 1 napkin burn in incinerator we can find the toxic gases for 1 napkin.

SR.NO.	TOXIC GASES NAME	FOR 1 NAPKIN (μgm^{-3} = micrograms per cubic meter)
1)	Carbon Monoxide	0.55 μgm^{-3}
2)	Chlorine	0.67 μgm^{-3}
3)	Nitrogen Dioxide	0.57 μgm^{-3}
4)	Phosgene	0.41 μgm^{-3}

Table(1)-Toxic gases from existing incinerator for 1 napkin

if at a time 3 napkin burn in incinerator we can find the toxic gases for 3 napkin.

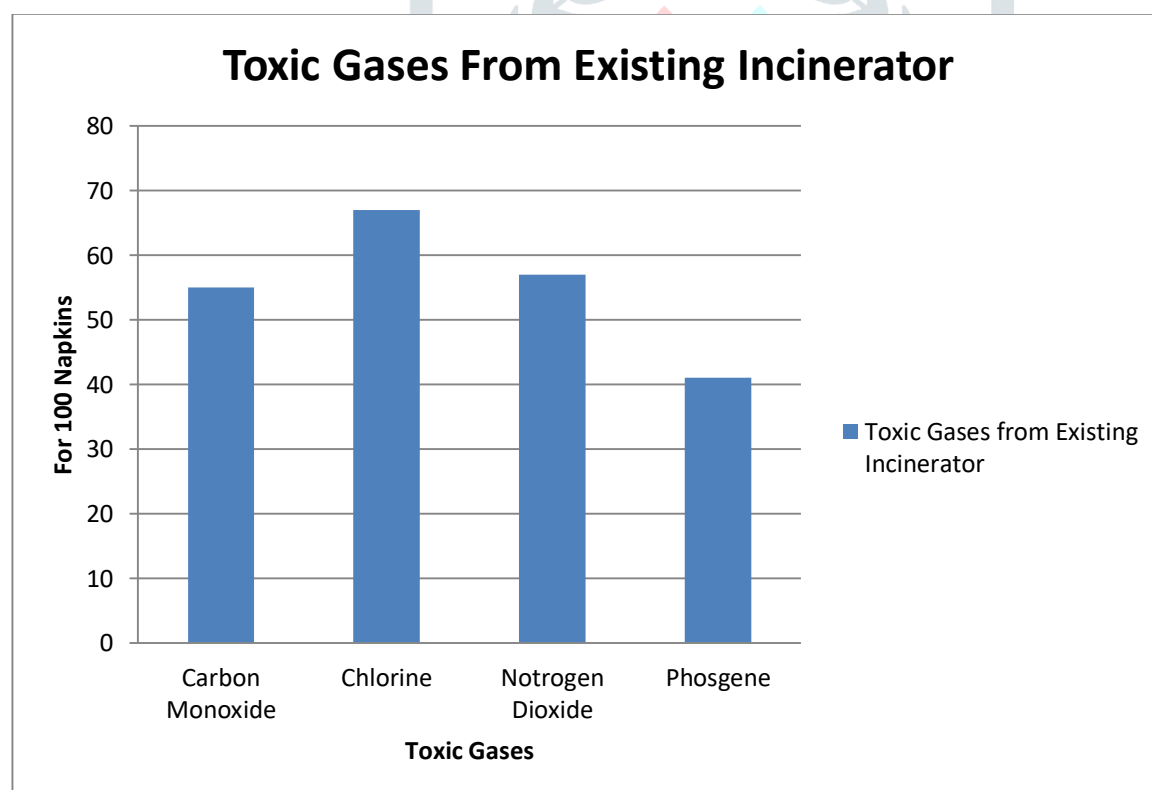
SR.NO.	TOXIC GASES NAME	FOR 3 NAPKIN (μgm^{-3} = micrograms per cubic meter)
1)	Carbon Monoxide	1.67 μgm^{-3}
2)	Chlorine	2.01 μgm^{-3}
3)	Nitrogen Dioxide	1.71 μgm^{-3}
4)	Phosgene	1.23 μgm^{-3}

Table(2)-Toxic gases from existing incinerator for 3 napkin

If assume per day 100 napkin burn from incinerator, We can also find value of toxic gases for 100 napkins.

SR.NO.	TOXIC GASES NAME	FOR 100 NAPKIN (μgm^{-3} = micrograms per cubic meter)
1)	Carbon Monoxide	55 μgm^{-3}
2)	Chlorine	67 μgm^{-3}
3)	Nitrogen Dioxide	57 μgm^{-3}
4)	Phosgene	41 μgm^{-3}

Table(3)-Toxic gases from existing incinerator for 100 napkin.



4.3 Toxic Gases From Proposed Incinerator-

if at a time 1 napkin burn in incinerator we can find the toxic gases for 1 napkin.

SR.NO.	TOXIC GASES NAME	FOR 1 NAPKIN (μgm^{-3} = micrograms per cubic meter)
1)	Carbon Monoxide	0.15 μgm^{-3}
2)	Chlorine	0.18 μgm^{-3}
3)	Nitrogen Dioxide	0.11 μgm^{-3}
4)	phosgene	0.09 μgm^{-3}

Table(4)-Toxic gases from proposed incinerator for 1 napkin

if at a time 3 napkin burn in incinerator we can find the toxic gases for 3 napkin.

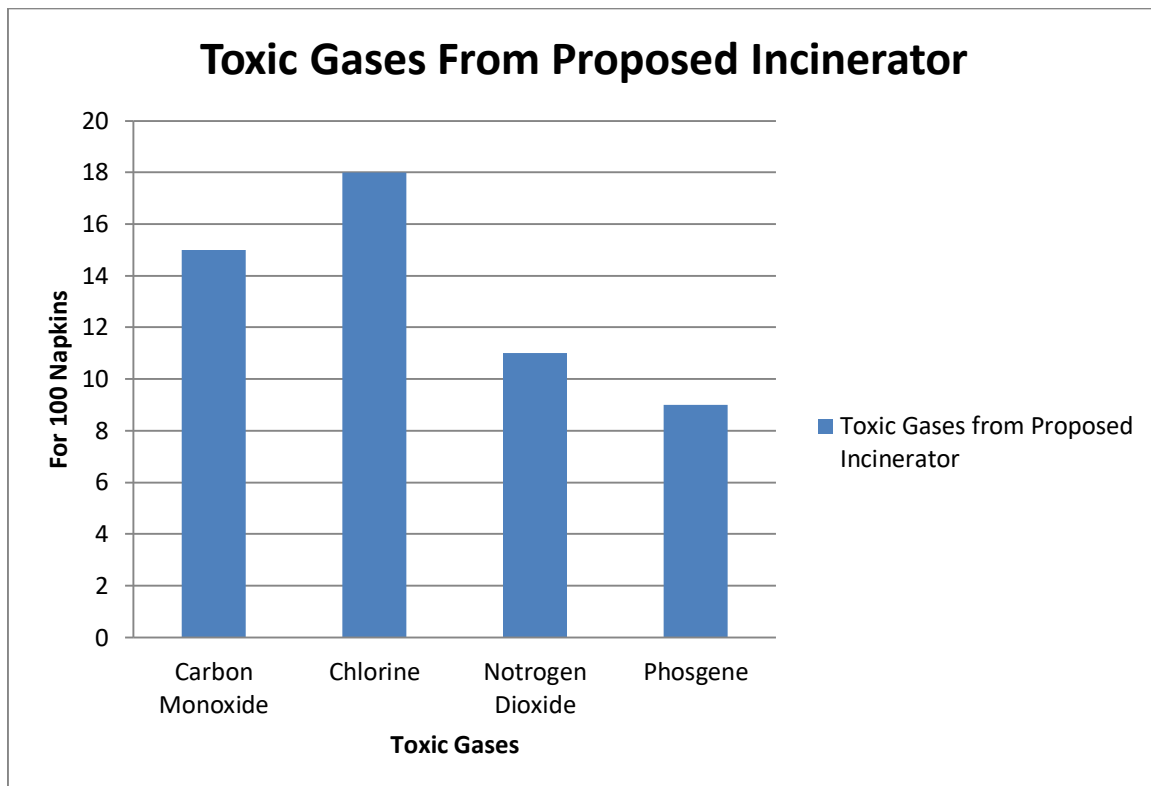
SR.NO.	TOXIC GASES NAME	FOR 3 NAPKIN (μgm^{-3} = micrograms per cubic meter)
1)	Carbon Monoxide	0.45 μgm^{-3}
2)	Chlorine	0.54 μgm^{-3}
3)	Nitrogen Dioxide	0.33 μgm^{-3}
4)	phosgene	0.27 μgm^{-3}

Table(5)-Toxic gases from proposed incinerator for 3 napkin

If assume per day 100 napkin burn from incinerator, We can also find value of toxic gases for 100 napkins.

SR.NO.	TOXIC GASES NAME	FOR 100 NAPKIN (μgm^{-3} = micrograms per cubic meter)
1)	Carbon Monoxide	15 μgm^{-3}
2)	Chlorine	18 μgm^{-3}
3)	Nitrogen Dioxide	11 μgm^{-3}
4)	phosgene	09 μgm^{-3}

Table(6)-Toxic gases from proposed incinerator for 100 napkin.



5.CONCLUSION

From the consideration of all the above points I conclude that the Disposal of sanitary napkins is a very big problem. The napkins are commonly disposed either by flushing them in the drains or by burning them. Flushing the napkin in drains results in clogging of drain line and associated plumbing problems. Burning the sanitary napkins often causes air and soil pollution. To overcome this problem, sanitary napkin disposal has been proposed, which burns the napkin to ashes and ensures pollution is minimum.

The study shows the minor and major toxic gases from sanitary napkin incinerator. the conclusion derived from the table is that the maximum amount of chlorine is emitted in the atmosphere by incinerator.

From the result , the toxic gases from existing incinerator is high as compare to proposed incinerator therefore to avoid air pollution and effect of toxic gases to use preferred of proposed incinerator. The outcome of study help to use of result for system of incinerator and effective planning to better environment.

6. Acknowledgment

Would like express my sincere thanks towards my guide S.B.Thakare, principal of Civil Engineering A.P.C.O.E.R.Pune for their constant guidance and motivation during such research work.

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