ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 12, Issue, 07, pp.12410-12412, July, 2020

DOI: https://doi.org/10.24941/ijcr.39155.07.2020

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

USE OF DISPOSABLE PERSONAL PROTECTIVE EQUIPMENT KITS TO COMBAT COVID 19: POLLUTION AND DISPOSAL

***Pranita Das**

Department of Chemistry, Barama College, Barama, Assam, India

ARTICLE INFO

Article History:
Received 21st April, 2020
Received in revised form
30h May, 2020
Accepted 07th June, 2020
Published online 28th July, 2020

Key Words:
COVID 19,
PPE kits,
Plastic pollution,
Recycling.

ABSTRACT

The recent pandemic COVID 19 is taking many nations into its grasp. The medical workers are working as the frontline force in tackling this global epidemic. The virus being very contagious, it is necessary to prevent the spread from an infected person to the medical personnels. This requires the use of PPE (Personal Protective Equipment) kits by the medical workers. The PPE kits are available in both disposable and non disposable variants. The PPE kits such as coveralls and protective gowns are manufactured commonly from HDPE (High Density Poly Ethylene). The disposable PPE kits are adding to the burden of non disposable garbage. As HDPE is non biodegradable and can take centuries to decompose, therefore HDPE PPE kits are impacting the environment. The safe measures of disposal of the biomedical waste is a prime concern now a days as the COVID 19 pandemic spreads from the infected. The alternatives of HDPE for manufacturing of PPE kits and disposal of HDPE PPE kits are one of the major concerns now.

Citation: ***Pranita Das.*** **2020.** "Use of disposable personal protective equipment kits to combat covid 19: pollution and disposal", *International Journal of Current Research*, 12, (07), 12410-12412.

INTRODUCTION

The Covid 19 pandemic is impacting most of the nations in the world. The medical workers are the frontline defence against the pandemic. The number of infected cases are increasing steeply day by day. The safety of the medical personnels is of utmost importance in this time. According to the WHO guidelines, PPE (Personal Protective Equipment) kits are recommended for every medical worker when dealing with any suspected COVID 19 infected patient (https://www.who.int/medical_devices/meddev_ppe/en/) In general, most PPE is designed to be used only one time and by one person prior to disposal. Therefore, the used PPE kits require prompt disposal unit and place. These HDPE PPE kits being non biodegradable accumulate in the dumping grounds. The decontamination and recycling of these PPE kits is a major concern now. Otherwise they will lead to emission when burnt or degrade the soil as large number of used PPE kits are disposed off everyday. With India needing an estimated 25 lakh units of Personal Protective Equipment (PPE) every day, experts and scientists have highlighted the need for proper post-usual disposal, treatment and recycling of the discarded plastic gears to safeguard the environment. Therefore, recycling and proper disposing of used PPE kits is a major concern in the recent times (Mishra, 2020).

****Corresponding author:*** **Pranita Das,**
Department of Chemistry, Barama College, Barama, Assam, India.

Plastic pollution is the accumulation of plastic objects and particles (e.g. plastic bottles, bags and microbeads) in the Earth's environment that adversely affects wildlife, wildlife habitat, and humans**.** Plastic pollution, accumulation in the environment of synthetic plastic products to the point where they create problems for wildlife and their habitats as well as for human populations. Plastic is a polymeric material—that is, a material whose molecules are very large, often resembling long chains made up of a seemingly endless series of interconnected links. Since synthetic plastics are largely nonbiodegradable, they tend to persist in natural environments. Moreover, many lightweight single-use plastic products and packaging materials, which account for approximately 50 percent of all plastics produced, are not deposited in containers for subsequent removal to landfills, recycling centres, or incinerators. Instead, they are improperly disposed of at or near the location where they end their usefulness to the consumer. According to the trade association Plastics Europe, world plastic production grew from some 1.5 million tonnes (about 1.7 million tons) per year in 1950 to an estimated 275 million tonnes (303.1 million tons) by 2010 and 359 million tonnes (nearly 396 million tons) by 2018; between 4.8 million and 12.7 million tonnes (5.3 million and 14 million tons) are discarded into the oceans annually by countries with ocean coastlines. And now with the advent of COVID 19 bringing in the requisite of PPE kits which are disposable are adding to the prevailing plastic pollution (Moore, 2000)

Fig I HDPE disposable PPE kit

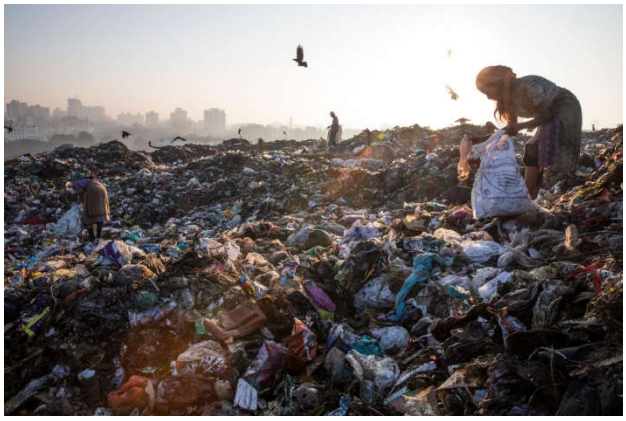

Fig II Plastic Pollution in Kalyan, Mumbai (Fig, 2019)

Fig III Biomedical waste in Chennai (Fig, ?)

The disposable PPE kits should be recycled in the safest way possible. Because the used PPE kits are prone to be the carrier of the deadly coronavirus from the infected person to the dumping areas if not properly disinfected and recycled. Most PPE is not recycled and is sent to landfill (Fig, 2019). The main environmental impacts of landfill include:

- toxins released by the waste into soil and groundwater
- highly toxic liquids, known as leachates, are created as water runs through waste that is breaking down
- greenhouse gases released by waste as it decomposes (Jadhav, 2020)

Used PPE kits which are categorised as medical waste should be disinfected before recycling processes. Mechanical treatment to tear waste apart goes by verbs: granulate, pulverizes, shreds, grinds, mixes, agitation, and crushing. This can reduce the bulk volume of the waste by 60 percent or more. Waste can be moved through the processing facility with augers, conveyor belts, and other material handling systems. In addition to being able to reduce bulk waste volume, mechanical systems can increase the surface area of the solid pieces before subsequent chemical or heat treatment. Chemical disinfection, primarily through the use of chlorine compounds, kills microorganisms in medical waste and can often oxidize hazardous chemical constituents. Ethylene oxide treatment is used more often to sterilize equipment that will be reused. The EPA identifies chemical disinfection as the most appropriate method to treat liquid medical waste. Treated liquid waste can usually be discharged into the sewer system. Sometimes it goes to a holding tank for testing before discharge (https://www.malsparo.com/treat2.htm).

If the waste is in solid form, the treatment process often has a mechanical cutting or mashing procedure included. The primary function here is to reduce size of the solid waste pieces and increase surface area, to make the chemical treatment more effective. After treatment with the liquid disinfectant, the solids are filtered out and the liquid filtrate goes to the sewer or for more treatment. Irradiation disinfects waste by exposing it to gamma rays that are fatal to bacteria. A radioactive isotope of cobalt is employed. UV used for wastewater is a lower frequency and less lethal than gamma radiation. When UV is used for disinfection, the radiation in the UV-C spectrum, which is more germicidal is employed. Some irradiation treatment systems use electron beams. Both gamma rays and electron beams can penetrate plastic bags used for waste collection, so the waste does not need to be removed from the bag before treatment. Although it is rarely used, vitrification can be an effective treatment for medical waste. The solid waste is mixed in when glass is formed (vitrification means production of glass). The high temperatures kill pathogens and some combustible material may burn or pyrolyze, resulting in an off-gas. Remaining material is encapsulated in glass, which has a very low diffusivity. There is little danger of hazardous materials leaching out of glass in significant quantities. The vitrified waste can therefore be put in a landfill with confidence (Khobragade, 2018).

List of Abbreviations

- HDPE – High Density Poly Ethylene
- PPE – Personal Protective Equipment
- WHO – World Health Organisation

REFERENCES

Personal protective equipment. World Health Organisation, 2020. Available via https://www.who.int/medical_devices/ meddev_ppe/en/

Mishra, L. 2020. Experts stress on proper disposal of PPE, The Hindu. Available via

https://www.thehindu.com/news/national/experts-stress-on-proper-disposal-of-plastic-ppes/article31475746.ece

Moore, C., Plastic pollution, June, 2020. Encyclopaedia Britannica. Available via https://www.britannica.com/ science/ plastic-pollution

Fig II. 2019. Plastic Pollution in Kalyan, Mumbai. Plastic bans spread in India. Winners and losers aren't who you'd expect, National geographic. Available via https://www. nationalgeographic.com/environment/2019/02/india-single-use-plastic-bans-maharashtra-tamil-nadu/

Jadhav, A., PPE kits must, ensure proper disposal of waste: PMC lays down guidelines for staff at Covid, quarantine centres., May, 2020. The Indian Express. Available via https://indianexpress.com/article/cities/pune/coronavirus-india-lockdown-pune-ppe-kit-covid-centre-6410398/

The Problem with landfill., June 2013. Environment Victoria. Available via https://environmentvictoria.org.au/ resource/ problem-landfill/

Collection, Storage and Treatment of Medical Waste., Malsparo. Available via https://www.malsparo.com/ treat2. htm#:~ : text=Chemical%20disinfection% 2C% 20primarily% 20through%20the,often%20oxidize%20hazardous%20chemical%20constituents.&text=But%20almost%20all%20liquid%20medical,to%20treat%20liquid%20medical%20waste.

Fig III. Biomedical waste in Chennai. Chennai: Biomedical waste raises eyebrows., Deccan Chronicle. Available via https://www.deccanchronicle.com/current-affairs/190116/chennai-biomedical-waste-raises-eyebrows.html

Khobragade, D. S. Health Care Waste: Avoiding Hazards to Living and Non Living Environment by Efficient Management, December, 2018. Fortune J Health Sci 2. Available via http://www.fortunejournals.com/ articles/ health-care-waste-avoiding-hazards-to-living-and-non-livingnbspenvironment-by-efficient-management.html

****