

# NEW STRATEGIES FOR RECYCLING SINGLE-USE NITRILE GLOVES

Disposable gloves play a vital role in **reducing the risk of contamination** in medical facilities, food factories, and research laboratories!

## 65 BILLION

The number of gloves used globally every month in 2020.



Nitrile gloves release:

**MICROPLASTICS**

**HEAVY METALS**

**TRACE ELEMENTS**

These substances have serious negative effects on human and environmental health!



## 26g CO<sub>2</sub>E

The climate impact of a single nitrile glove!

Innovative **recycling strategies** have emerged as opportunities to **divert waste away from landfills**.

## CONVERTING WASTE GLOVES TO RENEWABLE FUEL

**Co-pyrolysis** of waste nitrile gloves with biomass can be used to increase the heating value and reduce viscosity of liquid fuel!

## USING WASTE GLOVES AS STRENGTHENING ADDITIVES

Used nitrile gloves can be employed as a **strengthening and stabilizing additive** in expansive soil and could play an important role in displacing carbon-intensive cement!

However, more research is needed to consider:

**CLIMATE IMPACT  
OF DISINFECTION  
PROCESSES**

&

**BIO-DEGRADABLE  
DISPOSABLE GLOVE  
ALTERNATIVES**

## REFERENCES

Bosco, F., & Mollea, C. (2021). Biodegradation of Natural Rubber: Microcosm Study. *Water, Air, & Soil Pollution*, 232, 227. <https://doi.org/10.1007/s11270-021-05171-7>

Garçon, M., Sauzéat, L., Carlson, R., Shirey, S., Simon, M., Balter, V., & Boyet, M. (2016). Nitrile, latex, neoprene, and vinyl gloves: A primary source of contamination for trace element and Zn isotopic analyses in geological and biological samples. *Geostandards and Geoanalytical Research*, 41(3), 367–380. <https://doi.org/10.1111/ggr.12161>

Hayemasae, N., Salleh, S.Z. & Ismail, H. (2019). Utilization of chloroprene rubber waste as blending component with natural rubber: aspect on metal oxide contents. *Journal of Material Cycles and Waste Management* 21, 1095–1105. <https://doi.org/10.1007/s10163-019-00862-0>

Kilmartin-Lynch, S., Roychand, R., Saberian, M., Li, J., & Zhang, G. (2022). Application of COVID-19 single-use shredded nitrile gloves in structural concrete: Case study from Australia. *Science of the Total Environment*, 812, 151423. <https://doi.org/10.1016/j.scitotenv.2021.151423>

Mishra, R., Iyer, J., & Mohanty, K. (2019). Conversion of waste biomass and waste nitrile gloves into renewable fuel. *Waste Management*, 81, 397–407. <https://doi.org/10.1016/j.wasman.2019.04.032>

Mishra, R. & Mohanty, K. (2020). Co-pyrolysis of waste biomass and waste plastics (polystyrene and waste nitrile gloves) into renewable fuel and value-added chemicals. *Carbon Resources Conversion*, 3, 145–155. <https://doi.org/10.1016/j.crcon.2020.11.001>

Rahman, M., Rusli, A., Misman, M., & Rashid, A. (2020). Biodegradable gloves for waste management post-COVID-19 outbreak: A shelf-life prediction. *ACS Omega*, 5(46), 30329–30335. <https://doi.org/10.1021/acsomega.0c04964>

Rizan, C., Reed, M., & Bhutta, M. F. (2021). Environmental impact of personal protective equipment distributed for use by health and social care services in England in the first six months of the COVID-19 pandemic. *Journal of the Royal Society of Medicine*, 114(5), 250–263. <https://doi.org/10.1177/01410768211001583>

Wang, Z., An, C., Lee, K., Chen, X., Zhang, B., Yin, J., & Feng, Q. (2022). Physicochemical change and microparticle release from disposable gloves in the aqueous environment impacted by accelerated weathering. *Science of the Total Environment*, 832. <https://doi.org/10.1016/j.scitotenv.2022.154986>

Zhu, J., Saberian, M., Perera, S., Roychand, R., Li, J., & Wang, G. (2022). Reusing COVID-19 disposable nitrile gloves to improve the mechanical properties of expansive clay subgrade: An innovative medical waste solution. *Journal of Cleaner Production*, 375. <https://doi.org/10.1016/j.jclepro.2022.134086>