Anti-Forma Chitogel From the Hydrogel of Chitosan of Shells of Hermetia Illucens

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Formaldehyde is an air-borne, carcinogenic indoor pollutant. Shells of hermetia illucens, Black Soldier Flies (BSF) are leftovers when the insects mature from pupae to adults. BSF shells are rich in chitin which can be converted into chitosan by demineralization and deacetylation. Chitosan and its ammonium salt (chitogel) can remove formaldehyde via condensation of water. In this investigation, the efficiency of removal of formaldehyde by Anti-forma Chitogels of shells of BSF and common commercial product. Anti-Forma Chitogel was found to be effective in removing (91.2%) formaldehyde (1:20 by mass). Anti-Forma Chitogel is also put into an air purifier as a filter. The formaldehyde level of air purifier with and without Anti-Forma Chitogel are reduced by 44.5% and 27.7% respectively. This shows that Anti-Forma Chitogel can be put into an air purifier as filter. The Anti-forma Chitogel of BSF was found to be eco-friendly with high formaldehyde removal efficiency when placed in a drawer (removal of 54.8% of in 24 hours), drawer of a newly assembled wardrobe (the conc. of formaldehyde was kept below 0.125mg/m3 most of the time over a month especially <21?); removal of 83.7% at 20.2? in 1 day reducing the conc. of formaldehyde from 0.49 mg/m3 to 0.08 mg/m3), the chamber of a newly renovated room (removal of 84.9% in 30 minutes reducing the conc. of formaldehyde from 0.53 mg/m3 to 0.08 mg/m3; cf. the safety limit of formaldehyde <0.125mg/m3) [1] proving that Anti-forma Chitogel is effective in removal of formaldehyde on the spot and can be applied to households. Anti-Forma Chitogel is found to be anti-microbial and can be completely degraded in 11 days in wet soil. It can also help achieve Target 3.9 and 12.2 of the Sustainable Development Goals of the United Nations.

Awards Won:
Sigma Xi, The Scientific Research Honor Society: Second Physical Science Award of $1,000