Research on the Emulsification and Dispersion Effects of Natural Surfactants on Bird Dropping Stains

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Bird enthusiasts conducting extensive surveys have found it difficult to remove bird droppings stains from parks and roads. The existing bird dropping cleaning agents on the market contain sodium hydroxide and ammonia, which are not environmentally friendly. This study has developed a simulated bird dropping solution formula consisting of 4 parts pancreatic enzyme, 8 parts diatomaceous earth, 100 parts water, 2 parts titanium-dioxide, and 6 parts calcium phosphate, which closely resembles real bird droppings in terms of adhesion. Further research was conducted based on the characteristics of surfactants. Using a controlled variable method, 18 types of surfactants were tested on a single cement substrate. The experimental results showed that the surfactant with the best cleaning power was APG0814, reaching 1.093g/g. The agent that foam the highest was OB-2/OA-12, reaching 440.0%. The one that featured well emulsification was APG1214, with no phase separation observed after 60 minutes. Based on the result of single formula examination, a composite bird dropping cleaning agent formula was developed, consisting of 89% water, 5% APG1214, 2.5% OB-2/OA-12, 2.5% GMMEA6511, and 1% CMC. The cleaning power for bird droppings was 1.836g/g, reaching the cleaning effect of similar products on the market, but have the advantages of being natural, highly degradable, non-toxic, and odorless. Based on the HLB value of the surfactant, this study discussed the chemical principles of surfactants in removing bird droppings and discovered the suitable HLB value range of 7-15. This study has developed a bird dropping cleaner formula and provided reference for future research.

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