

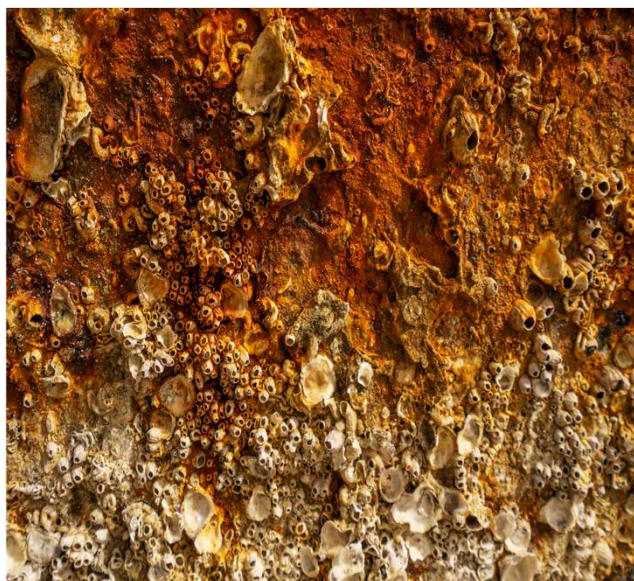
How to Clean a Boat

Product Formulation Development



Summary

A serious issue for any water-borne craft is that of marine fouling. Seaweed and sea life are remarkably adept at adhering to boat hulls. This condition causes two problems. Firstly, fouling causes a substantial loss in hull efficiency, increasing power consumption and reducing range. Secondly, it increases the risk of species migration and entry into sensitive environments. Cleaning large boats is costly and time consuming due to the need to dry-dock and manually clear the bio-burden. An ideal solution would avoid the need to dry-dock the boat.

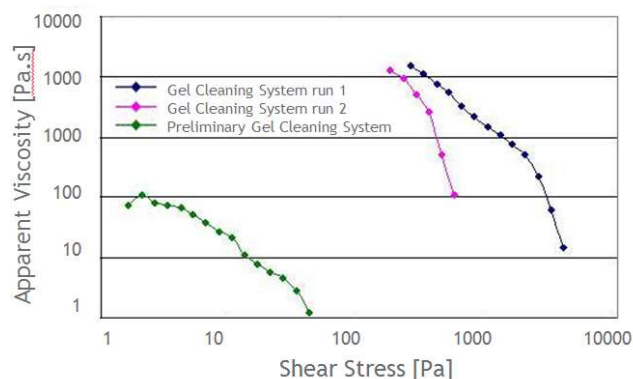


Description

The issue of marine fouling has been a problem since well before the days of Admiral Nelson and John Paul Jones. Traditional techniques involve use of materials that discourage or retard growth, such as copper bottoms in wooden sail boats or more sophisticated materials in modern ships. However, fouling still occurs and the only truly effective method is complete dry-docking and mechanical removal.

Client Request

The Naval Coastal Systems Station contracted Cambridge Polymer Group to develop a new method of cleaning large boats *in situ* without the expense and difficulty of dry docking or time-consuming mechanical abrasion. The solution was designed for application by divers using a gun applicator, aiming to minimize the mechanical effort needed to remove fouling while safeguarding the underlying surfaces.



Discussion

The primary requirements for the ideal cleaning method described above was a system that can erode marine fouling, that is environmentally safe and that can be easily applied and removed. Cambridge Polymer Group developed a slow-dissolving hydrogel formulation based on muriatic acid that could be “painted” on to the hull underwater, resisted dissolution for the working time and then exhibited a yield stress tuned to allow it to slough off as the boat moved. Simple dilution rendered the acid compound safe for aquatic life.

Applications

- Basic rheology and formulation engineering can often be leveraged to develop new and novel solutions to existing problems
- The ability to test concepts and analyze outcomes is critical for success in these kinds of projects

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Cambridge Polymer Group, Inc. is a contract research laboratory specializing in materials. We partner with our clients to solve the world's toughest polymer problems utilizing our multi-disciplinary research team and full service laboratory.

We work with clients throughout the product life cycle to:

- Develop new materials
- Design prototypes for proof-of-concept studies
- Create and execute experimental design
- Validate and verify manufacturing processes
- Perform root-cause analysis in product failures

Cambridge Polymer Group, Inc. was founded in 1996 to provide a cost-effective resource for testing, research and development to clients who need periodic access to Ph.D.-level scientists and their support structure. We have developed a host of testing methods and materials for our clients, which number more than 1,000.

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