

HUMAN HAIR AGAINST OIL POLLUTION

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I. BRIEF DESCRIPTION

Oil pollution is caused by oil spills, which often occur in instances when cargo ships leak oil into the water or if there are accidents involving drilling rigs and storage facilities. This is a big problem, because the presence of oil in marine waters can damage sea life and can contaminate waters. If large scale oil spills occur, it can lead to big risks for humans to have severe health problems like heart damage, stunted growth, immune system effects and even death (NOAA, n.d.).

There are a lot of solutions against oil pollution such as booms and petroleum. However, none of them are as environmentally friendly as hair.

It has been confirmed that human hair can be used as an absorbent material against oil pollution because human hair is a lipophilic material. Thus, it repels water but actively takes in oil. According to Berenger, one kilogram of human hair can take up to eight liters of oil, making it a highly effective material for cleaning up spills (Petro Online, 2020).

II. SCIENCE CONCEPTS INVOLVED

Here are the science concepts involved in using human hair against oil pollution:

Biology is involved in using human hair against oil pollution due to it being a natural bio-sorbents consisting of dead cells made up of the cuticle, water, lipids, trace elements and 65-95% proteins, mainly polymers of amino acids such as keratin and cysteine, medulla and cortex. The cuticle is highly hydrophobic, which makes it water repellent. It also contains numerous peptide bonds and CO- as well as NH- group which forms hydrogen bonds between neighboring molecules on the human organic follicle surface and has a highly porous cortex.

Chemistry is involved in human hair against oil pollution due to it being a lipophilic material, meaning it repels water but takes in oil. Human hair is especially effective at taking in oils and other polluting chemicals due to its physicochemical characteristics. It takes up water and oil once it comes into contact with it because of its porous cortex (Vargiolu, 2013). But compared to the affinity between water and hair, the oil's affinity for the hair surface is significantly stronger. As a result, oil is taken up more easily than water. This soaking up is purely physical, and no chemical binding is created. This is what makes it possible to use hair to create hydrocarbon-specific depolluting filters.

Physics is involved in using human hair against oil pollution through the process of adsorption. Adsorption occurs when particles become attached to the top layer of materials, but does not enter the bulk phase of a liquid or solid. In this case, hair adsorbs oil, in a way where oil clings to hair due to the tiny scales that hair has, which snag and hold onto the oil (Rozell, 1998).

III. HOW TO USE THE OUTPUT

Before these hair mats, chemicals such as petroleum were used to clean big oil spills which caused more problems to the environment and marine life. Thus it is not a sustainable resource compared to human hair, and human hair is a more efficient and environmentally-friendly solution against oil pollution.

Polypropylene mats are commonly used for removing oil from land. Producing polypropylene, however, involves more oil drilling because it is a non-biodegradable material. Instead, we can use hair to create these hair mats. Hair is an abundant, renewable resource that is both hydrophobic and biosorbent, and has been shown to be as effective as polypropylene.

Hair mats are manufactured from leftover human hair from salons or donated by businesses or other people, which are trimmed, sown, and turned into mats which are placed in areas where there are oil spills. To filter water in cities, airports, and other locations, they can be put in storm drains, wells, filtration systems, and rivers. Hair booms (long tubes) can even be used to sandbag coves and beaches to conserve natural habitats and prevent soil erosion. A hair mat soaks up roughly five times as much oil as it weighs. However, the mat has to be removed quickly and cannot stay in the oil spill area for a long period of time because there is no plastic to keep them buoyant, and they can be weighed down by plastics, seaweeds, and other substances (Kiger, 2022).

When the user enters the home page of the website, they can stroll down and see the general information about hair mats and an introduction as to how they can help against oil pollution. The user can further explore the website by pressing the how to use icon in the navigation bar. A new tab will be opened, revealing the applications of the three science branches to using human hair against hair pollution. Another icon in the navigation bar is dedicated to explaining the immense importance of said innovation and also elaborates as to the significance of the promotion of this innovation.

IV. RESOURCES

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