

Studies on the Oil Adsorption Efficiency and Reusability of Various Fibrous Materials

임 소 연, 주 창 환, 이 래 연
충남대학교 공과대학 섬유공학과

INTRODUCTION

Oil spills are almost inevitable due to the rapidly growing demand for petroleum products. These oil is transported across seawater before final usage. Spills of these petroleum products during transport damage recreational area, contribute an undesirable taste and odor to drinking water and endanger marine life. Thus, the removal techniques of oil slicks have demanded and developed¹⁻²⁾.

In this study, the efficiency of various fibers such as natural fibers and man-made fiber on the purpose of oil removal from the seawater was investigated and the effect of oil content and reusability on the oil adsorption in seawater was determined, as well as, the effect of oil type on the oil adsorption was compared.

EXPERIMENTAL

Fiber bundles were made of four different fibers such as cotton, wool, silk and PP, and prepared two types oil as kerosene and bunker C oil. Oil adsorptive materials were placed to a 1-liter glass beaker which contained oil and 500ml artificial seawater and then shaken for 10 minute at 100 cycles/minute on the stirring machine. At this time, oil content in seawater and oil adsorptive fiber content are changed to 10, 20, 30, 40, 50g and 2, 3, 4, 5, 6g, respectively. The adsorbed materials were dried in oven for 30 minutes at 70°C to evaporate water content. Finally, oil adsorption weight was determined from fiber bundle weight after dry and before adsorption.

RESULTS AND DISCUSSION

The results of effect of fiber type, oil content and different oil types on the oil adsorption weight of fiber bundles in seawater are shown in Fig. 1, Fig. 2 and Fig. 3, respectively.

The oil adsorption weight of fiber bundles, as shown in Fig. 1, was generally increased with increasing fiber content. In case of first adsorption, oil adsorption weight of PP was highest, but according to increasing reusable cycle, oil adsorption efficiency of PP was rapidly decreased. Fig. 2 shows the effect of oil content on the oil adsorption of fiber bundles in seawater. In spite of increasing oil content, oil adsorption weight was little changed.

Fig. 3 indicated that oil adsorption weight of kerosene is higher than bunker C oil, except PP.

CONCLUSION

- (1) Oil adsorption weight of fiber bundles was generally increased with increasing fiber content, and the adsorption efficiency quite different from the kinds of

fibers and number of recycle.

- (2) PP fiber bundles had highest oil adsorption at initial stage, but rapidly decreased with reusable cycle. Meanwhile, natural fibers such as cotton, silk and wool had not change to reusable cycle.
- (3) Most of fiber bundles, oil adsorption efficiency of kerosene is higher than bunker C oil.

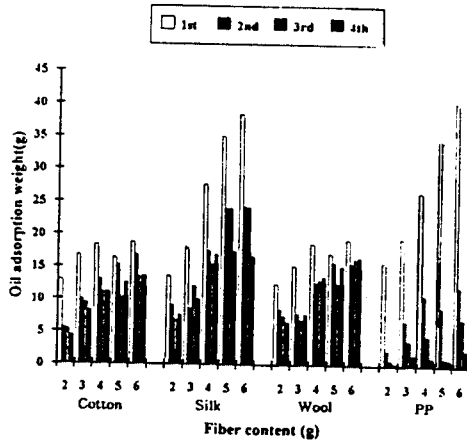


Fig. 1 Effect of fiber content and type on the oil adsorption weight and reusability in seawater (kerosene).

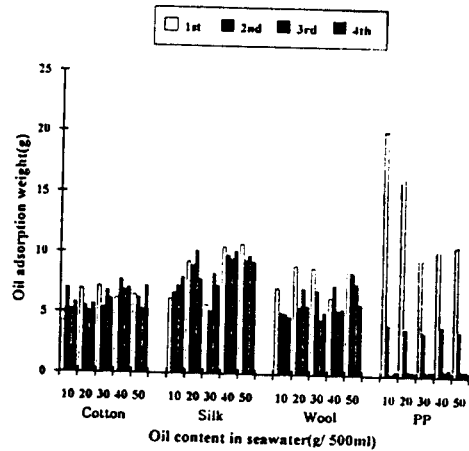


Fig. 2 Effect of oil content and fiber type on the oil adsorption weight and reusability in seawater (bunker C oil).

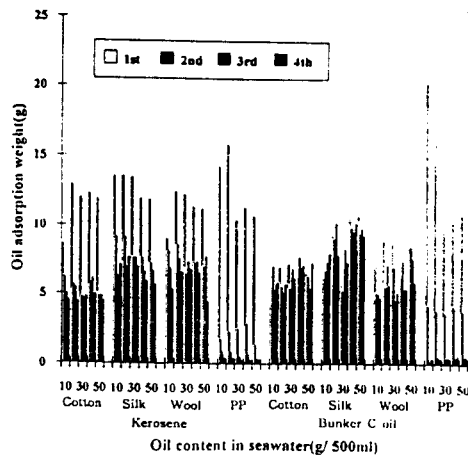


Fig. 3 Effect of oil type on the oil adsorption weight and reusability.

REFERENCES

1. H.M.Choi and H.J.Kwon, Cotton Nonwovens as Oil Spill Cleanup Sorbents, *Textile Res. J.*, 63(4), 211-218, 1993
2. H.M.Choi and R.M.Cloud, Natural Sorbents in Oil Spill Cleanup, *Environment Sci. Technol.*, 26(4), 772-776, 1992