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REMOVAL AND PRECONCENTRATION OF SURFACTANTS FROM
WASTEWATER WITH OPEN-PORE POLYURETHANE

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ABSTRACT

A COLUMN OF IN-SITU POLYMERIZED OPEN-PORE POLYURETHANE (OPP) WAS EVALUATED FOR REMOVING AND CONCENTRATING LINEAR ALKYLATE SULFONATE (LAS) FROM SYNTHETIC WASTE WATER. THE OPP CAN BE USED TO EFFECTIVELY REMOVE LAS FROM WASTE WATER FOR TREATMENT AS WELL AS A PRECONCENTRATION STEP PRIOR TO ANALYSIS. PRELIMINARY RESULTS OF COMPARISONS OF BREAKTHROUGH CAPACITIES AND ELUTION RATES FOR LAS ON OPP, ACTIVE CARBON AND MACRORETICULAR RESINS ARE PRESENTED.

MUCH WORK HAS BEEN REPORTED ON THE USE OF CELLULAR (FOAMED) POLYURETHANE FOR THE COLLECTION, SEPARATION, AND RECOVERY OF INORGANIC AND ORGANIC COMPOUNDS FROM AQUEOUS SOLUTIONS (1). HOWEVER, OPEN PORE POLYURETHANE (OPP), A RIGID YET VERY PERMEABLE STRUCTURE OF AGGLOMERATED SPHERICAL PARTICLES, HAS RECEIVED ONLY LIMITED APPLICATION IN COLUMN CHROMATOGRAPHY (2).

RECENTLY, OPP HAS BEEN EVALUATED FOR THE COLLECTION AND PRECONCENTRATION OF POLYNUCLEAR AROMATIC HYDROCARBONS FROM WATER (3). THE GOOD RECOVERY OF THESE SUBSTANCES PROMPTED A STUDY TO TEST OPP FOR ITS ABILITY TO REMOVE DETERGENTS AND CORROSIVE ANIONS FROM WASTE WATER, AND TO COMPARE OPP TO OTHER ADSORBENTS.

OPP COLUMNS ARE PREPARED IN GLASS OR METAL COLUMNS BY IN-SITU PRECIPITATION-POLYMERIZATION OF AN ISOCYANATE AND A POLYOL IN 60-40 VOL % TOLUENE-CARBON TETRACHLORIDE SOLUTIONS ACCORDING TO THE FOLLOWING REACTION:

VARIATIONS OF THE MONOMER CONCENTRATIONS AND REACTION CONDITIONS CHANGES DENSITY, POROSITY AND SURFACE OF THE OPP.

THE CROSS-LINKED COMPOSITION OF OPP MAKES IT RESISTANT TO MOST CHEMICAL ATTACK. IT IS COMPATIBLE WITH MANY ORGANIC SOLVENTS AND DILUTE ACIDS.

OPP CAN BE TAILORED TO SPECIFIC SEPARATION APPLICATIONS BY CHEMICALLY BONDING FUNCTIONAL GROUPS AT THE -OH AND -NCO SITES OF OPP.

MATERIALS FOR PREPARATION OF OPEN-PORE POLYURETHANE

MATERIAL

STRUCTURE

GRAMS OF MATERIAL
PER 25 ML SOLVENT

Mohay Chemical Co.
Mondur MR

2.00

Union Carbide
LA-475

4.00

-4-

PRELIMINARY, QUALITATIVE RESULTS SHOW A HIGH CAPACITY FOR, AND GOOD ELUTION OF LAS (LINEAR ALKYLATE SULFONATE), FIGURE 1.

OPP SHOW A HIGHER BREAKTHROUGH CAPACITY THAN ACTIVE CARBON OR MACROVETICULAR RESIN. FIGURE 2.

THE OPP ELUTION RATE OF TOTAL ORGANIC CARBON (TOC) APPEARS COMPARABLE WITH MACROVETICULAR RESIN. FIGURE 3

mls methanol

FIGURE 1. BREAKTHROUGH AND ELUTION
BEHAVIOR OF LINEAR ALKYLATE
SULFONATE (LAS) ON OPEN-PORE
POLYURETHANE (OPP)

FIGURE 2. BREAKTHROUGH CURVES FOR ADSORBENTS WITH ACIDIFIED DETERGENT (pH 3.5)

FIGURE -3. TOC ELUTION CURVES FOR THREE ADSORBENTS
Methyl alcohol (MeOH) flow 1.5 ml min^{-1}

FUTURE WORK WILL QUANTIFY THE AMOUNT AND TYPES OF SURFACTANTS RECOVERED FROM WASTEWATER; AND OPTIMIZE COLUMN DESIGN, ESPECIALLY WITH REGARD TO OVERCOMING THE HIGH PRESSURE DROP ACROSS THE COLUMN.

FOR FURTHER INFORMATION, PLEASE CHECK THESE REFERENCES:

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TITLE AND AUTHORS

ABSTRACT

CAPTION
RESULTS

INTRODUCTION

FIGURE 1

CAPTION: OPP
PREPARATION

FIGURE 2

FIGURE 3

PHOTOGRAPH
OF OPP

CONCLUSION

CHEMICAL
FORMULAS

REFERENCES