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ANALYSIS OF CHEMICAL SPECIES FOR TRACE METALS IN
NEAR-SHORE SEDIMENT BY SEQUENTIAL LEACHING METHOD



Miss Penjai Sompongchaiyakul

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เพ็ญใจ สมพงษ์ชัยกุล : การวิเคราะห์รูปแบบของโลหะปริมาณน้อยในตะกอนใกล้ฝั่ง โดยวิธีการสกัดล้างตามลำดับขั้น (ANALYSIS OF CHEMICAL SPECIES FOR TRACE METALS IN NEAR-SHORE SEDIMENT BY SEQUENTIAL LEACHING METHOD) อ.ที่ปรึกษา : ดร. ศิริชัย ชรรณวานิช และ รศ.ดร. ชัยยุทธ ชันษาปราบ, 178 หน้า.

ตะกอนจากอ่าวไทยตอนบนซึ่งเก็บตัวอย่างในระหว่างเดือนมีนาคม-เมษายน 2528 ได้ทำการวิเคราะห์หาคุณสมบัติทางธรณีวิทยา แร่วิทยา และธรณีเคมี เพื่อเลือกตัวแทนกลุ่มตะกอนในอ่าวมาทำการวิเคราะห์ ฟิล์ม และทดสอบวิธีการสกัดตามลำดับขั้น พบว่าทั้งชนิดและความเข้มข้นของตัวสกัดมีความสำคัญ ความเข้มข้นของตัวสกัดจะต้องเพียงพอที่จะปลดปล่อยโลหะจากตะกอนออกสู่สารละลายได้ นอกจากนี้สัดส่วนระหว่างตะกอนกับตัวสกัดจะต้องมีอัตราส่วนที่เหมาะสม

จากการทดลองนี้พบว่าลำดับขั้นของการสกัดและความเข้มข้นของตัวสกัดที่เหมาะสมและมีประสิทธิภาพเพียงพอสำหรับตะกอนจากอ่าวไทย คือ (1) exchangeable, carbonate and sorbed fraction : NaOAc (1.0 M) + HOAc, pH 5.0; (2) oxyhydroxides fraction : $\text{NH}_2\text{OH}\cdot\text{HCl}$ (1.0 M) + Na-citrate (0.175 M), pH 5.0; (3) organic bound fraction : acidified H_2O_2 ; และ (4) residual fraction : HF-HNO₃-HClO₄ ตามลำดับ ในสัดส่วนระหว่างตะกอนกับตัวสกัด 1 : 20

สำหรับตะกอนจากอ่าวไทยพบว่า Cd, Cr และ Zn มีรูปแบบทางเคมีในตะกอน ดังนี้
Cd exchangeable, carbonate and sorbed > oxyhydroxides ≥ organic bound
Cr organic bound ≥ exchangeable, carbonate and sorbed > oxyhydroxides
Zn organic bound > oxyhydroxides > exchangeable, carbonate and sorbed

ศูนย์วิทยทรัพยากร จุฬาลงกรณ์มหาวิทยาลัย

ภาควิชา วิทยาศาสตร์ทางทะเล
สาขาวิชา สมุทรศาสตร์สภาวะและเคมี
ปีการศึกษา 2532

ลายมือชื่อนิสิต เพ็ญใจ สมพงษ์ชัยกุล
ลายมือชื่ออาจารย์ที่ปรึกษา ศิริชัย ชรรณวานิช

๒๕๓๐ สิบ

PENJAI SOMPONGCHAIYAKUL : ANALYSIS OF CHEMICAL SPECIES FOR TRACE METALS IN NEAR-SHORE SEDIMENT BY SEQUENTIAL LEACHING METHOD. THESIS ADVISORS : SIRICHAJ DHARMVANIJ, Ph.D. AND ASSO. PROF. CHAIYUDH KHANTAPRAB, Ph.D., 178 pp.

Sediments samples from the Gulf of Thailand collected during March-April 1985 were analyzed for geological, mineralogical and geochemical properties. A representative from each group of sediments was chosen. The sequential extraction methods were investigated and the developed method was tested with the representatives of these groups. It was found that both type and strength of extractants were very important. The strength of the extractants must be strong enough to liberate metals from sediments into the solution. However, the ratio of sediment : extractant must be optimized.

The sequence and concentration of extractants found from this study to be suitable and efficient for the Gulf sediments are (1) exchangeable, carbonate and sorbed fraction : NaOAc (1.0 M) + HOAc, pH 5.0; (2) oxyhydroxides fraction : $\text{NH}_2\text{OH}\cdot\text{HCl}$ (1.0 M) + Na-citrate (0.175 M), pH 5.0; (3) organic bound fraction : acidified H_2O_2 , pH 2.0; and (4) residual fraction : $\text{HF-HNO}_3\text{-HClO}_4$, respectively. The optimum sediment : extractant ratio is 1 : 20.

Cd, Cr and Zn are distributed among the non-residual fractions as follows :

Cd exchangeable, carbonated and sorbed > oxyhydroxides \geq organic bound
Cr organic bound > exchangeable, carbonated and sorbed \geq oxyhydroxides
Zn organic bound > oxyhydroxides > exchangeable, carbonated and sorbed

ภาควิชา.....วิทยาศาสตร์ทางทะเล.....
สาขาวิชา.....สมุทรศาสตร์สภาวะและเคมี.....
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ลายมือชื่อผู้พิมพ์.....
ลายมือชื่ออาจารย์ที่ปรึกษา.....

Signature

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