

**DISSOLUTION OF ANALCIME: THE NATURE OF ACID ATTACK AND  
THE REACTION KINETICS**

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เมทริกซ์อะซิไดซ์เซชัน (Matrix acidization) เป็นวิธีการกระตุ้นการผลิตน้ำมันวิธีหนึ่ง  
 ที่มีการใช้กันอย่างกว้างขวางในอุตสาหกรรม อย่างไรก็ตาม การใช้วิธีนี้ในบางครั้งได้ประสบ  
 ปัญหา เนื่องจากการตกตะกอนของแร่ธาตุบางชนิด งานวิจัยนี้ศึกษาธรรมชาติในการทำปฏิกิริยา  
 ของกรดกับอะนาซิม (Analcime) ซึ่งเป็นซิลิโกลิไทต์ชนิดหนึ่งที่พบในแหล่งน้ำมันโดยทำการ  
 ทดลองในไวอัล ภายใต้สภาวะต่างๆ จากผลการทดลองพบว่า อนุภาคอะนาซิมแตกออกภายหลัง  
 ทำปฏิกิริยากับกรด ซึ่งไม่เป็นไปตาม shrinking core model) แต่กลับ  
 สนับสนุนสมมติฐานที่ว่ากรดแพร่เข้าไปทำปฏิกิริยาภายในโครงสร้างของอะนาซิม นอกจากนี้ยัง  
 พบว่า ขนาดของอนุภาคอะนาซิมและความเข้มข้นของกรดมีผลกระทบต่ออัตราการแตกของอนุภาคใน  
 ขณะที่ชนิดของกรดมีผลกระทบเพียงเล็กน้อย นอกจากนี้ยังได้มีการศึกษาจลนศาสตร์ของปฏิกิริยา  
 การละลายของอะนาซิมในกรดซิตริก (Citric acid) จากการทดลองพบว่า อัตราการเกิดปฏิกิริยา  
 ได้รับผลกระทบจากการเปลี่ยนขนาดของอะนาซิมและมีค่าไม่เท่ากันเมื่อทำการนอร์มอลไลซ์ด้วย  
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**ABSTRACT**

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Matrix acidization is one of oil stimulation methods frequently used in oil production industry. However, unforeseen problems sometime arise with the application of this technique due to mineral precipitation which leads to the need in developing a better understanding of the dissolution reaction. In this research, the nature of acid attack was studied by performing batch reaction in vials under various conditions. The results obtained from the breaking patterns of analcime particles did not support the shrinking core hypothesis but rather suggested that acid diffuses into analcime internal structure and dissolves it simultaneously with the external surface. This phenomenon appeared to be affected by the initial size of the particles and acid concentration whereas the acid type had shown to have little effect. In addition, we examined the reaction kinetics of the dissolution of analcime with citric acid in a batch reactor. It was found that the dissolution rate changed with the change in particle size and the dissolution rates normalized by specific surface area clearly confirmed the contribution of the internal diffusion to the dissolution of analcime. In this part of study, differences in the dissolution rates of Si, Al and Na were also observed.

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