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WATER DECHLORINATION BY ACTIVATED CARBON ADSORPTION



Miss Orapat Phrudthaparmoke

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for the Degree of Master of Engineering in Chemical Engineering**

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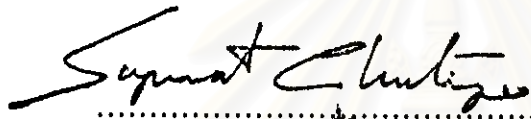
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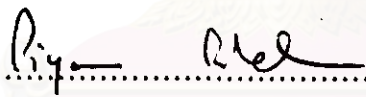
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พิมพ์ที่สำนักงานวิทยานิพนธ์ภายในกรอบสี่เหลี่ยมนี้เพียงแผ่นเดียว

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การกำจัดคลอรีนที่หลงเหลืออยู่ในน้ำโดยการดูดซับด้วยคาร์บอนกัมมันต์ได้ถูกทำการศึกษาโดยใช้คาร์บอนกัมมันต์ที่ใช้ในเชิงพาณิชย์ 3 ชนิด ได้แก่ DEO 8/30, PHO 8/30 และ HRO 8/30. ความเข้มข้นของคลอรีนในน้ำก่อนและหลังจากผ่านกระบวนการดูดซับได้ถูกวัดโดยใช้ Oxidation Reduction Potential (ORP) และ spectrophotometer สำหรับความเข้มข้นของคลอรีนต่ำกว่า 5 ppm สมดุลการดูดซับเป็นแบบเส้นตรง ค่าคงที่สมดุลการดูดซับสำหรับคาร์บอนกัมมันต์ชนิด PHO 8/30 และ DEO 8/30 เป็น 0.0016 และ 0.7849 [(มก./ก)/หนึ่งส่วนในล้านส่วน] ตามลำดับ จากผลการศึกษาการไหลผ่านตะกอนของคลอรีนในคอลัมน์ขนาดเส้นผ่าศูนย์กลาง 2 นิ้วพบว่าความลึกของเบดไม่ควรต่ำกว่า 4-5 นิ้วในขณะที่ต้องการระยะเวลาพักเก็บในเบดของคาร์บอน 2-2.5 นาทีเป็นอย่างน้อย ผลการศึกษาที่ได้สอดคล้องกับพารามิเตอร์ที่ใช้ในทางปฏิบัติในการออกแบบหอดูดซับโดยใช้คาร์บอนกัมมันต์

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

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Dechlorination with adsorption on activated carbons were studied on 3 types of commercial activated carbons; i.e. DEO 8/30, PHO 8/30 and HRO 8/30. The chlorine contents of the feed water and the effluent were measured with Oxidation Reduction Potential (ORP) and spectrophotometer. For the chlorine content less than 5 ppm, the isotherms were linear. The adsorption equilibrium constants on PHO 8/30 and on DEO 8/30 were 0.0016 and 0.7849 [(mg/g)/ppm], respectively. From the breakthrough results, the bed depth of an adsorber should not be less than 4-5 in. While the system required the residence time 2-2.5 minute at least. The results corresponded with the parameters used for the practical adsorber design.



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Nomenclature

| | | |
|------------|---|---|
| b_0 | = | a constant related to the entropy |
| C_{A_0} | = | fluid phase chlorine concentration at time t_0 |
| C_{A_t} | = | fluid phase chlorine concentration at time t |
| C_e | = | the residual fluid phase concentration at equilibrium |
| C_f | = | the impurity concentration of the effluent liquor |
| C_0 | = | fluid phase solute concentration at time t_0 |
| d_c | = | the column diameter |
| E_0 | = | the half cell oxidation reduction potential |
| E_h | = | the potential of the reference electrode |
| h | = | the height of carbon bed |
| h_a | = | the height of adsorption zone |
| ΔH | = | the enthalpy of adsorption |
| K_F | = | characteristic constant |
| K_p | = | partition coefficient |
| m | = | the weight of the carbon dosage |
| $1/n$ | = | characteristic constant |
| N | = | the number of electron e |
| ORP | = | oxidation reduction potential |
| Q^0 | = | the solid phase concentration corresponding to complete coverage of available sites |
| q_e | = | the amount of substance adsorbed per unit weight of adsorbent |
| V | = | volume of liquor treated per unit weight of carbon |
| x | = | weight of adsorbate adsorbed |
| x/m | = | adsorbate adsorbed per unit weight of carbon |