

6. Adsorption of acetic acid on activated carbon

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Date of report submission (yyyy/mm/dd):_____

Dates of experiment (yyyy/mm/dd) 1st day: _____; 2nd day: _____

Write concisely (in the space provided)

【Summary of Experiment】

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There is a vertical margin line on the left side, creating a narrow left margin. The paper appears to be from a notebook or a standard ruled document.

【Results】

1. Preparation of aqueous oxalic acid solution

Mass / g	Concentration / mol dm ⁻³

2. Standardisation of aqueous NaOH solution

Samples A and B have concentrations of approximately 0.1 and 0.01 mol dm⁻³ NaOH respectively.

	Aqueous oxalic acid vol. / cm ³			
No.	Aqueous NaOH titre / cm ³		Aqueous NaOH conc. / mol dm ⁻³	
	A (0.1 M)	B (0.01 M)	A (0.1 M)	B (0.01 M)
1				
2				
3				
Mean				

3. Preparation of aqueous acetic acid solution

	0.4 M	0.3 M	0.2 M	0.1 M
	Acetic acid volume / cm ³			
NaOH used*	Aqueous NaOH titre / cm ³			
	A / B	A / B	A / B	A / B
1				
2				
3				
mean				
	Aqueous acetic acid solution concentration C_b / mol dm ⁻³			
30°C	Mass of activated carbon m / g			
40°C				

*circle A or B

4. Measurement of adsorption amount

《30°C》

	0.4 M	0.3 M	0.2 M	0.1 M
	Aqueous NaOH titre / cm ³			
NaOH used*)	A / B	A / B	A / B	A / B
1				
2				
3				
mean				
	Aqueous acetic acid concentration after adsorption C_a / mol dm ⁻³			
	Adsorption per gram of activated carbon x_n / mol g ⁻¹			

*circle A or B

« 40°C »

	0.4 M	0.3 M	0.2 M	0.1 M
	Aqueous NaOH titre / cm ³			
NaOH used*	A / B	A / B	A / B	A / B
1				
2				
3				
mean				
	Aqueous acetic acid concentration after adsorption C_a / mol dm ⁻³			
	Adsorption per gram of activated carbon x_n / mol g ⁻¹			

*circle A or B

5. Freundlich adsorption isotherm

« 30°C »

	0.4 M	0.3 M	0.2 M	0.1 M
log (C_a)				
log (x_n)				
	parameters			
	n	k		

« 40°C »

	0.4 M	0.3 M	0.2 M	0.1 M
log (C_a)				
log (x_n)				
	parameters			
	n	k		

6. Langmuir adsorption isotherm

« 30°C »

	0.4 M	0.3 M	0.2 M	0.1 M
$1/C_a$				
$1/x_n$				
	Saturation adsorption amount x_s			

« 40°C »

	0.4 M	0.3 M	0.2 M	0.1 M
$1/C_a$				
$1/x_n$				
	Saturation adsorption amount x_s			

【Questions】

1. Provide a critical evaluation of the experimental data.
2. Explain the assumptions/necessary conditions of eq (2) and its physical significance.
3. In equations (1), (3), and (4), the possible value of n is estimated to be in the range $0 \leq n \leq 1$. However, n may also take other values. Consider the adsorption state of this system and the applicability of eqs. (1) and (2) based on the experimentally determined value of n .
4. Comment on the concentration range over which the Freundlich equation is valid in this experimental system.