7.1

q	C
0.02	3.20×10^{-9}
0.08	3.28×10^{-6}
0.10	1.00×10^{-5}
0.50	3.12×10^{-2}
0.70	1.68×10^{-1}
1.00	1.00

FREUNDLICH $\quad q = K C^N$

$\ln q = \ln K + N \ln C$

PLOT $\ln q$ VS. $\ln C$

SLOPE = N

INTERCEPT = $\ln K$

$$\boxed{q = 1.0\, C^{0.20}}$$

IT IS UNUSUAL TO HAVE AN ISOTHERM WITH SUCH A LOW VALUE FOR N

LANGMUIR $\quad q = \dfrac{K_{EQ} S_{TOT} C}{1 + K_{EQ} C}$

CALCULATION OF LANGMUIR PARAMETERS CAN BE SENSITIVE TO METHOD!

METHOD #1 (PARTICULARLY WHEN ISOTHERM IS NOT A LANGMUIR ISOTHERM)

$$\frac{1}{C} + K_{EQ} = K_{EQ} S_{TOT} \frac{1}{q}$$

$$\frac{1}{K_{EQ} S_{TOT}} \frac{1}{C} + \frac{1}{S_{TOT}} = \frac{1}{q}$$

PLOT $\dfrac{1}{q}$ VS. $\dfrac{1}{C}$

INTERCEPT = $\dfrac{1}{S_{TOT}}$

$$\text{SLOPE} = \frac{1}{K_{EQ} S_{TOT}}$$

$$q = \frac{(3.76 \times 10^7)(0.1861)\, c}{1 + 3.76 \times 10^7 c}$$

METHOD #2

$$1 + K_{EQ} c = K_{EQ} S_{TOT} \frac{c}{q}$$

$$\frac{1}{K_{EQ} S_{TOT}} + \frac{1}{S_{TOT}} c = \frac{c}{q}$$

PLOT $\frac{c}{q}$ VS. c

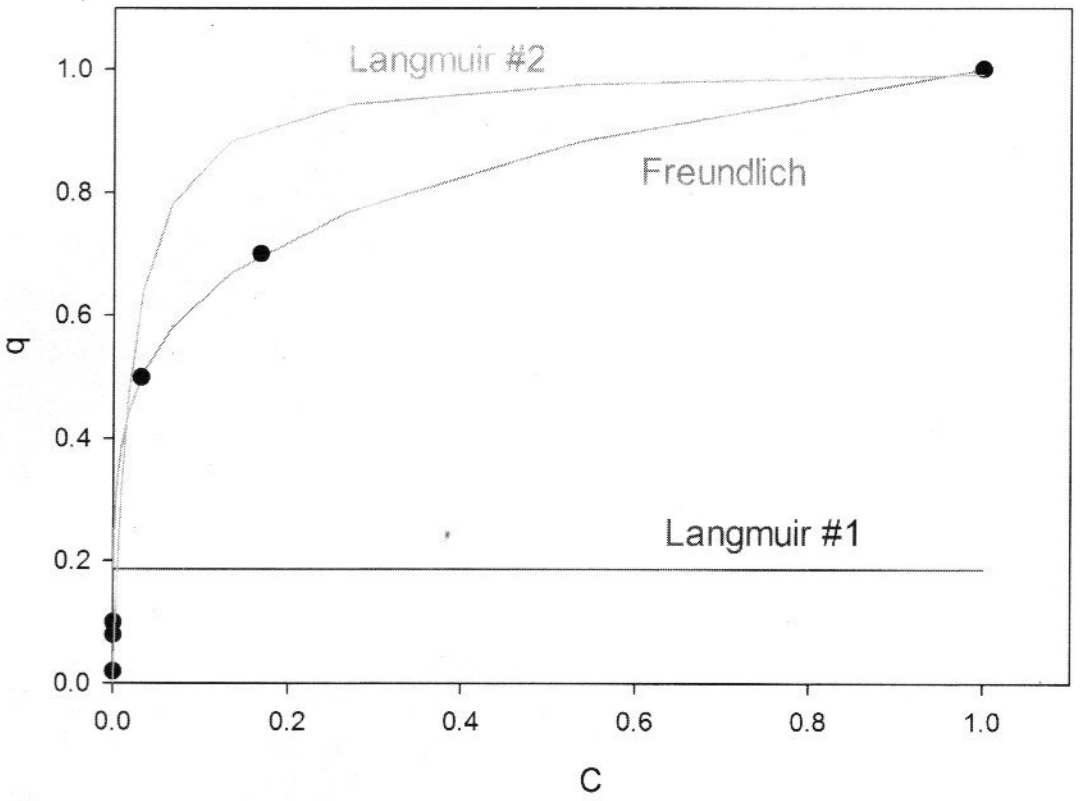
$$\text{SLOPE} = 1/S_{TOT}$$

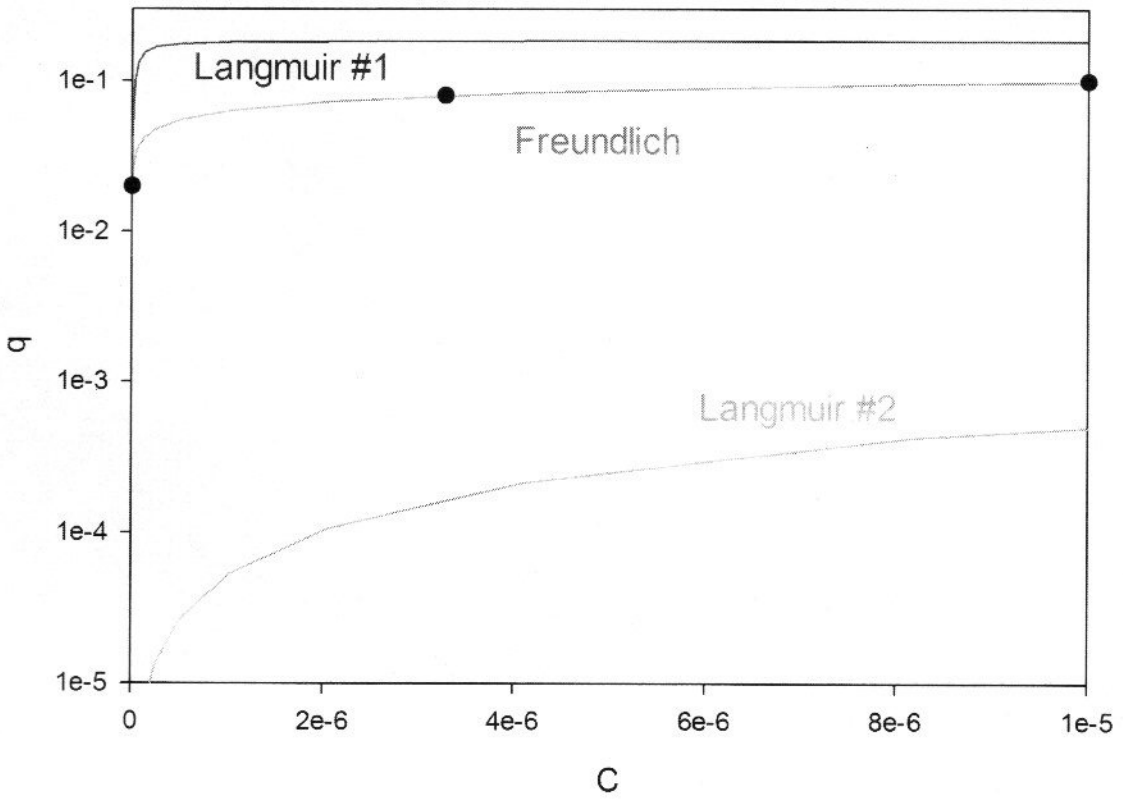
$$\text{INTERCEPT} = \frac{1}{K_{EQ} S_{TOT}}$$

$$q = \frac{(51.7)(1.01)\, c}{1 + 51.7 c}$$ ← COMPLETELY DIFFERENT VALUES!

NOTE: A NON-LINEAR REGRESSION WOULD BE "BEST"

Problem 7.1


Langmuir #2
Freundlich
Langmuir #1
q
C
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0


Langmuir #1
Freundlich
Langmuir #2
q
C
1e-1
1e-2
1e-3
1e-4
1e-5
0
2e-6
4e-6
6e-6
8e-6
1e-5

q	c	lnq	lnc	1/q	1/c	c/q
0.02	3.20E-09	-3.91202	-19.5601	50.0000	3.13E+08	1.60E-07
0.08	3.28E-06	-2.52573	-12.6277	12.5000	3.05E+05	4.10E-05
0.1	1.00E-05	-2.30259	-11.5129	10.0000	1.00E+05	1.00E-04
0.5	3.12E-02	-0.69315	-3.46734	2.0000	3.21E+01	6.24E-02
0.7	1.68E-01	-0.35667	-1.78379	1.4286	5.95E+00	2.40E-01
1	1	0	0	1.0000	1.00E+00	1.00E+00

Freundlich		Langmuir #1		Languir #2	
Slope	0.200	Slope	0.000	Slope	0.990
Intercept	0.000	Intercept	5.372	Intercept	0.019
r squared	1.000	r squared	0.934	r squared	0.994
N	0.200	Stotal	0.186	Stotal	1.010
K	1.000	Keq	3.76E+07	Keq	51.7