Problem Set 3

① $FeS_2 + 4HCl \rightarrow 2H_2S + FeCl_4$

$H_2S + NH_3 + H_2O_2 \rightarrow (NH_4)_2SO_4 + H_2$

$(NH_4)_2SO_4 + 2HCl \rightarrow H_2SO_4 + 2NH_4Cl$

$H_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2HCl$

$$\frac{2.0351\text{ g } BaSO_4}{233.3909} = 8.720 \text{ mmol } SO_4 \rightarrow 4.360 \text{ mmol. } FeS_2$$

$$4.360 \text{ mmol} \times 119.87 = \frac{0.5226g}{.6752g} \rightarrow \boxed{77.40\%}$$

total weight

④ Equal Volumes

$$C_u = \frac{(.001)(.005)}{.002(21-1)} = 1.25\times10^{-4} \quad 0.125mM \quad \text{OR} \quad \frac{(1)(5)}{2(21-1)} = 0.125mM$$

⑤
$$C_{un} = \frac{(10mM)(0.001L)}{(.011L)(1.282)-(.010L)} = 2.44mM$$

OR

$$\frac{(10mM)(1ml)}{[(11ml)(1.282)-10ml]} = 2.44$$

Problem 2-3

K^+ grams 0.0275g

$\Downarrow$

K moles 0.7033 mmol

$\Downarrow$ 1/2

K_2SO_4 moles .3517 mmol

$\xleftarrow{\times MM_{K_2SO_4}}$ 61.29 mg K_2SO_4

Apparent $BaSO_4$ weight 753.2mg

753.2 − 61.29 = 691.9mg $BaSO_4$

61.29 mg K_2SO_4 → .3517 mmol

691.9mg $BaSO_4$ $\xrightarrow{\times MM_{BaSO_4}}$ 2.964 mmol

total 3.316 mmol SO_4

$\Downarrow$

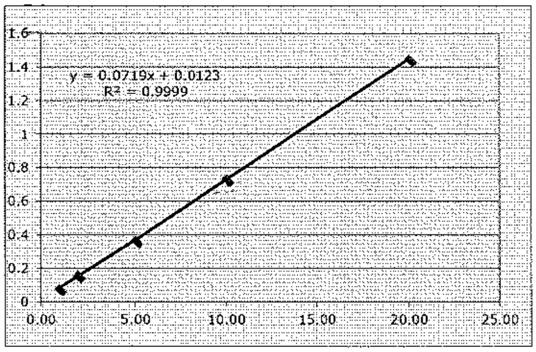
3.316 mmol SO_3

$\xrightarrow{\times MM_{SO_3}}$ 265.5 mg of SO_3

$$\frac{SO_3}{\text{Total Weight}} \times 100$$

$$\frac{265.5}{976.5} \times 100 = 27.2\%$$

Problem 6 (Last Pt. Deleted)



METHOD looks for the smallest square of variation of the dependent variable (Y_i) from the predicted fitted function $Y=Mx_i+b$

DROP LAST POINT SINCE IT IS ON PLATEAU

x_i	y_i
1.00	0.08
2.00	0.161
5.00	0.368
10.00	0.735
20.00	1.448

	N=	5			135.5 ppm
					0.1 L
y	y_i-y	$(y_i-y)^2$			
0.084119403	-0.00412	1.697E-05			1.355
0.1559801	0.00502	2.520E-05			2.71
0.371562189	-0.00356	1.269E-05			6.775
0.730865672	0.004134	1.709E-05			13.55
1.449472637	-0.00147	2.169E-06			27.1
		7.412E-05	$\Sigma(y_i-y)^2$		

Σx	38.0000
Σy	2.7920
Σy^2	2.8047
Σx^2	530.0000
Σxy	38.5520

$D = n*\Sigma x^2 - [\Sigma x]^2$

$m = \{n\ \Sigma xy - \Sigma x\ \Sigma y\} / D$

$b = \{\Sigma x^2 \Sigma y - \Sigma xy\} / D$

SLOPE m= 0.07186

INTERCEPT b= 0.01226

STANDARD DEVIATIONS

$S_y=\Sigma(y_i-y)^2/(n-2)$	0.00497
$S_m = S_y*\{n/[n\ \Sigma x^2-(\Sigma x)^2]\}^{1/2}$	0.00032
$S_b = S_y*\{\Sigma x^2/[n\ \Sigma x^2-(\Sigma x)^2]\}^{1/2}$	0.0033

Signal Detection Limit = $y_{blank} + 3S_y$ 0.0149

Detection Limit = $3\ S_y/m$ 0.2075

CORRELATION COEFFICEIENT

$S_{xx}= \Sigma x^2-(\Sigma x)^2/n$	241.2000	$R=S_{xy}/Sqrt(S_{xx}S_{yy})=$	0.99997
$S_{yy}= \Sigma y^2-(\Sigma y)^2/n$	1.2456	$R^2=$	0.99994
$S_{xy}= \Sigma xy-\Sigma x\Sigma y)/n$	17.3328		