Cheatography

Chem 55 Quantitative Analysis Midterm 1 Cheat Sheet

by MSN006 via cheatography.com/211943/cs/46010/

Units

Exa (E)	Peta (P)	Tera (T)	Giga (G)	Mega (M)	Kilo (k)	Hecto (h)	Deca (da)
^18	^15	^12	^9	^6	^3	^2	^1
Deci (d)	Centi (c)	Milli (m)	Micro (µ)	Nano (n)	Pico (p)	Femto (f)	Atto (a)
^-1	^-2	^-3	^-6	^-9	^-12	^-15	^-18

Sig Figs

Zeros before numbers are not significant. If there is a decimal, zeros after non-zeros are significant.

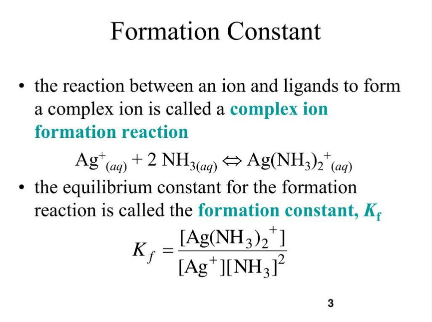
Multiplication, division: sig figs based on given value at beginning with least sig figs

+/-: align decimal places and go based off least decimal places. eg: 25.0+1= 26 since 1 has no decimal place

log: for log(x), digits after decimal place= sig figs of x

multi step equation: sig figs based off of last math step you perform

formation constant



Formation Constant

- the reaction between an ion and ligands to form a complex ion is called a **complex ion formation reaction**

$$Ag^+_{(aq)} + 2\,NH_{3(aq)} \Leftrightarrow Ag(NH_3)_2{}^+_{(aq)}$$

- the equilibrium constant for the formation reaction is called the **formation constant, K_f**

$$K_f = \frac{[Ag(NH_3)_2{}^+]}{[Ag^+][NH_3]^2}$$

3

uncertainty

absolute uncertainty= the plusminus value given

relative uncertainty= absolute uncertainty/ value it is given with

% relative uncertsinty: abs uncertainty/measured value *100

+/- problem: abs uncertainty= square root (each abs uncertainty squared then added)

mult/divis: convert abs uncertainties to % relative uncertainties first , do same squaring everything adding all sqrt , at the end undo % by remultiplying by measured value

sig figs

prop uncertainty

pH

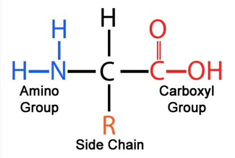
ph+poh=14, ph=-log [h+] so 10^-pH = [H+], poh= -log [oh-] (all log10)

pKa= -log10Ka; HA (aq)⇌ [H+] (aq) + [A −] (aq); ka= [H+][A −]/[HA]

confidence interval

CI= mean +/- ((t from table * stdev)/ sqrt n) (t table confidence%) confidence that the true value is x% away from avg

amino acid structure



F calc

variance 1/variance2

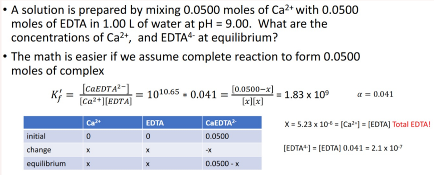
Precision accuracy

Precision= stdev/mean x100

relative accuracy= (experimental mean- known mean)/known mean x100,

accuracy= (experimental mean- known mean)

edta



- A solution is prepared by mixing 0.0500 moles of Ca^{2+} with 0.0500 moles of EDTA in 1.00 L of water at pH = 9.00. What are the concentrations of Ca^{2+}, and $EDTA^{4-}$ at equilibrium?
- The math is easier if we assume complete reaction to form 0.0500 moles of complex

$$K_f' = \frac{[CaEDTA^{2-}]}{[Ca^{2+}][EDTA]} = 10^{10.65} * 0.041 = \frac{[0.0500-x]}{[x][x]} = 1.83 \times 10^9 \qquad \alpha = 0.041$$

	Ca^{2+}	EDTA	$CaEDTA^{2-}$
initial	0	0	0.0500
change	x	x	-x
equilibrium	x	x	0.0500 - x

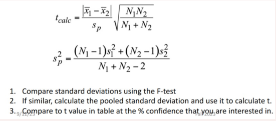
X = 5.23×10^{-6} = [Ca^{2+}] = [EDTA] Total EDTA!

[$EDTA^{4-}$] = [EDTA] 0.041 = 2.1×10^{-7}

Z stats

if given avg and stdev. µ mean, stdev sigma. find range away from mean which will be Z then use table

t calc 2 sets of data



$$t_{calc} = \frac{|\bar{x}_1 - \bar{x}_2|}{s_p}\sqrt{\frac{N_1 N_2}{N_1 + N_2}}$$

$$s_p^2 = \frac{(N_1 - 1)s_1^2 + (N_2 - 1)s_2^2}{N_1 + N_2 - 2}$$

1. Compare standard deviations using the F-test
2. If similar, calculate the pooled standard deviation and use it to calculate t.
3. Compare to t value in table at the % confidence that you are interested in.

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EDTA

$M^{n+} + Y^{m-}$ = MY ^ (n-m)

EDTA is Y

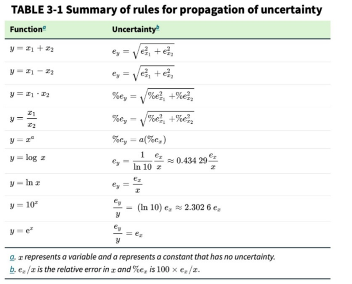

TABLE 3-1 Summary of rules for propagation of uncertainty

Function[a]	Uncertainty[b]
$y = x_1 + x_2$	$e_y = \sqrt{e_{x_1}^2 + e_{x_2}^2}$
$y = x_1 - x_2$	$e_y = \sqrt{e_{x_1}^2 + e_{x_2}^2}$
$y = x_1 \cdot x_2$	$\%e_y = \sqrt{\%e_{x_1}^2 + \%e_{x_2}^2}$
$y = \frac{x_1}{x_2}$	$\%e_y = \sqrt{\%e_{x_1}^2 + \%e_{x_2}^2}$
$y = x^a$	$\%e_y = a(\%e_x)$
$y = \log x$	$e_y = \frac{1}{\ln 10}\frac{e_x}{x} \approx 0.434\,29\frac{e_x}{x}$
$y = \ln x$	$e_y = \frac{e_x}{x}$
$y = 10^x$	$\frac{e_y}{y} = (\ln 10)\, e_x \approx 2.302\,6\, e_x$
$y = e^x$	$\frac{e_y}{y} = e_x$

[a]. x represents a variable and a represents a constant that has no uncertainty.

[b]. e_x/x is the relative error in x and $\%e_x$ is $100 \times e_x/x$.

stdev^2= variance. relative stdev= 100* s/mean. stdev of mean= s/ sqrt n.

z= (x-μ)/sigma

Equilibrium

$$K = \frac{[C]^c[D]^d}{[A]^a[B]^b}$$

Equilibrium

K>1=

Ksp, solubility in material= concentration of both products multiplied. AB⇌ [A+] + [B-], ksp= [a][b]

eg: dissolve in solution that is z molarity of y reactant: corresponding concentration is x+z

solid= always 1