

CHEM 311 INFORMATION SHEET

For $y = 10^x$, $e_y = 2.303 e_x$

For $y = \log x$, $e_y = 0.434 \frac{e_x}{x}$

$$s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{N-1}}$$

$$\sigma = \sqrt{\frac{\sum (x_i - \bar{x})^2}{N}}$$

$$Q_{\text{exp}} = \frac{\text{gap}}{\text{range}}$$

CL for $\mu = \bar{x} \pm \frac{ts}{\sqrt{N}}$

CL for $\mu = \bar{x} \pm \frac{z\sigma}{\sqrt{N}}$

$$|\bar{x}_1 - \bar{x}_2| = \frac{\pm ts_{\text{pooled}}}{\sqrt{\frac{N_1 N_2}{N_1 + N_2}}}$$

$$|\bar{x}_1 - \mu| = \frac{\pm ts_{\text{pooled}}}{\sqrt{\frac{N_1 N_2}{N_1 + N_2}}}$$

$$s_{\text{pooled}} = \sqrt{\frac{\sum s_1^2 (N_1 - 1) + s_2^2 (N_2 - 1) + \dots}{N_1 + N_2 + \dots - N_{\text{subsets}}}}$$

$$\frac{A_x}{A_{x+s}} = \frac{[X]}{[X] + [S]_f}$$

$$F = \frac{(A_x/[X])}{(A_s/[S])}$$

$$A = -\log \frac{I_t}{I_o} = \epsilon cl$$

$$pH = -\log a_{H^+} \cong -\log [H_3O^+]$$

$$N = 16 \left(\frac{t_R}{W} \right)^2$$

$$K = \frac{k' V_M}{V_S}$$

$$R_m = R_t \left(\frac{W_m}{W_x + W_t} \right)$$

$$t_{1/2} = \frac{0.693}{\lambda}$$

$$R_x = kw_x$$

$$R_{x+s} = k(w_x + w_s)$$

$$\frac{N_j}{N_o} = \frac{P_j}{P_o} \exp \left(-\frac{E_j}{kT} \right)$$

$$\sin(r) = m\lambda/b$$

$$\sigma_M = \sqrt{M}$$

$$\epsilon_{\text{cell}} = \epsilon^\circ + \left\{ \frac{2.303RT}{nF} \right\} \log Q$$

$$R = \frac{\lambda}{\Delta\lambda} = nN$$

$$E = h\nu = \frac{hc}{\lambda}$$

Constants

$$h = 6.626 \times 10^{-34} \text{ Js}$$

$$c = 2.9979 \times 10^8 \text{ m/s}$$

$$k = 1.3806 \times 10^{-23} \text{ J/K}$$

$$F = 96485 \text{ C/mol}$$

$$R = 8.3145 \text{ J/K}\cdot\text{mol}$$

Selected Statistical Values

Critical Values for Rejection Quotient

| # Data Points | Q_{crit} at 95% CL |
|---------------|----------------------|
| 3 | 0.970 |
| 4 | 0.829 |
| 5 | 0.710 |
| 6 | 0.625 |
| 7 | 0.568 |

Table of z-values at Various Confidence Levels

| Confidence Level | z |
|------------------|------|
| 68% | 1.00 |
| 90% | 1.64 |
| 95% | 1.96 |
| 99% | 2.58 |
| 99.9% | 3.29 |

Table of t-values at 95% probability

| # Degrees of Freedom | t -value at 95% CL |
|----------------------|----------------------|
| 2 | 4.30 |
| 3 | 3.18 |
| 4 | 2.78 |
| 5 | 2.57 |
| 6 | 2.45 |
| 7 | 2.36 |
| 8 | 2.31 |
| 9 | 2.26 |
| 10 | 2.23 |
| 11 | 2.20 |
| 12 | 2.18 |