

CHEM 116/222

## Exp. 5: Statistical Evaluation of Acid-Base Indicators

Name: \_\_\_\_\_ Date: \_\_\_\_\_

TA's Name: \_\_\_\_\_

**YOUR INDIVIDUAL DATA**

Use the Grubbs test (section 4-6 of Harris) to decide whether any results should be discarded. In your laboratory notebook and the table below circle any outliers. Be sure you have a good reason for dropping a trial! (At most, one trial can be discarded.) After 1) and 2) in the three tables below put the codes for your indicators: two of MR, BB, BG, and MO.

indicator	molarity of HCl (trials 1-6)						mean	$s_x$	% RSD
1)									
2)									

**LAB SECTION DATA POOLED** (data pooled for all lab sections meeting on the same day; Jacob T8, T11 or Adrian R8, R11; raw data provided)

For each of the two indicators combine together all of the data on that indicator ( $S$  = number of students, including you, using that indicator so that there are  $S$  data sets). Pool together the data on the two indicators and use the  $t$  test (Eqs. 4-9a, 4-10a or 4-9b, 4-10b from Harris to calculate  $s_p$  or dof, degrees of freedom, and  $t_{\text{calc}}$ ) on the pair of indicators to determine whether the average molarities for the two indicators are or are not statistically different from each other at the 95% confidence level. Analysis procedure follows the Data Analysis section of the lab write-up.

indicator	# measurements, $n$	# students, $S$	( $n$ values) [HCl], $\bar{x}$	( $n$ values) $s_x$	% RSD	( $S$ sets) $s_p$	$F_{\text{calc}} =$ $F_{\text{table}} =$
1)							$s_p$ or dof =
2)							$t_{\text{calc}} =$ $t_{\text{table}} =$

**YOUR DATA POOLED WITH ABOVE LAB SECTION DATA** (raw data provided)

For each of the two indicators pool your data with all data on that indicator ( $S = 2$  since your data which passes the Grubbs test will be considered to be one data set on a given indicator and all the rest of the T or R lab sections' data will comprise the second set). For each indicator enter your data on line a) and the rest of the T or R lab sections' data (omitting your values!) on line b). Then use the  $t$  test (Eqs. 4-9a, 4-10a or 4-9b, 4-10b from text to calculate  $s_p$  or dof, degrees of freedom, and  $t_{\text{calc}}$ ) on the pair of data for each indicator to determine whether your average molarity is or is not statistically different from the average molarity of the rest of the class at 95%.

indicator	$n$	[HCl], $\bar{x}$	$s_x$	% RSD	$F_{\text{calc}}$	$F_{\text{table}}$	$s_p$ or dof	$t_{\text{calc}}$	$t_{\text{table}}$
1)	a)								
	b)								
2)	a)								
	b)								

**CONCLUSIONS**

State if the two indicators which you used do or do not give statistically different results. Substantiate your answer with the proper statistics and explain.