

## Lab 1 - VOLUMETRIC PRECISION AND ACCURACY

### Agri 201

**Purpose:** to determine the precision and accuracy of various volumetric devices.

#### Materials:

12 scintillation vials with lids	1 pipette bulb
1 ten ml volumetric pipette	1 250 ml beaker
1 ten ml Mohr pipette	1 tongs
1 centigrade thermometer (digi-thermo)	1 desiccator
1 Analytic balance (+/- .0001 g)	de-ionized (DI) water
1 drying oven (105 C)	
1 volumetric device (your choice)	

#### Procedure:

1. Dry vials without caps in oven for at least 1 hour @ 105 C and then place in desiccator to cool for 15 minutes. (Note: If each group will place the vials in the oven when finished then this will save an hour for the next group.)
2. Fill a 250 ml beaker with DI water and record the temperature after the water has set about 20 min. (stable temp).
3. Weigh dry vials and caps to the nearest .1mg on an analytic balance.
4. Pipette 10 ml of DI water into each of four vials and cap the vials. Do this for the volumetric and the Mohr pipette.
5. Weigh the vials to the nearest .1mg. and record data.
6. Repeat this for the other volumetric device you have chosen.
7. Obtain the results from one other group for the volumetric and mohr pipettes.

#### Statistical Analysis

1. Determine standard deviation, coefficient of variation and % accuracy for the volumetric devices.
2. Use either ANOVA to determine if there is significant differences between various volumetric devices and various users.

Note: Do not touch the vials. Use tongs.

#### Questions

1. Discuss the precision of the various volumetric devices.
2. Discuss the accuracy of the various volumetric devices.
3. What is the working range of the balance?
4. What is the resolution of the balance? Is it adequate for this lab?
5. What are the components of your measurement system?
6. What are possible sources of error?
7. What is the parameter that is being measured? What value or unit is being inferred from this parameter?