CH204 Fall 2008

A Few Comments about the Accuracy of Laboratory Glassware

Volumetric glassware (laboratory glassware that is carefully calibrated for delivering precise volumes) is available in Class A and Class B. The allowed tolerances (or errors) for Class B are typically twice those for Class A. These are some typical tolerance values for Class A glassware.

Pipette		**Graduated Cylinder**		**Burette**	
Capacity	Tolerance	Capacity	Tolerance	Capacity	Tolerance
0.5	±0.006	**10**	**±0.09**	25	±0.03
1	0.006	25	0.17	**50**	**0.05**
2	0.006	50	0.25	100	0.10
5	**0.01**	100	0.4		
10	0.02				
25	0.03				
50	0.05				

In our case, we used a 5 mL pipette, a 10 mL graduated cylinder, and a 50 mL burette. As you can see in the above tables, the 5 mL pipette has the lowest tolerance, and therefore the best accuracy, followed by the 50 mL burette, and the 10 mL graduated cylinder is the least accurate of the three. (The accuracy of the graduated cylinder is further hampered by the fact that the other techniques *deliver* the specified volume, whereas the graduated cylinder *contains* the specified volume, and a small amount of Coke or Diet Coke is left behind in the graduated cylinder when the liquid is poured into the beaker for weighing. This is a systematic error which results in lower calculated density values for Coke and Diet Coke when using the graduated cylinder.)

So although our experiment doesn't allow us to compare the accuracies of each type of glassware, you should be aware of the differences. If we wanted to determine the accuracy of our glassware, we would measure out a known volume of water at a known temperature and weigh it (in the case of the graduated cylinder, we would weigh the water while it was still in the graduated cylinder rather than pour it into a beaker for weighing). Since we know the mass and density of the water, we can calculate the volume and compare that to the stated volume of the glassware to determine its accuracy.