

## AP LAB 00a: Density (Significant Figures)

**Aim** To calculate the density of three liquids

**Apparatus** 10 mL graduated cylinder, electronic balance, pipets

**Chemicals** Water, rubbing alcohol (propan-2-ol) and vinegar (ethanoic acid)

### **Method**

1. Fill a new pipet with water, dry the outside of the pipet and record the mass of the entire unit (recording the mass to two decimal places).
2. Empty the water into the graduated cylinder and record the volume (recording the volume to only one decimal place).
3. Record the mass of the empty pipet (recording the mass to two decimal places).
4. Calculate the density (in g/mL) of water, observing the rules for significant figures.
5. Repeat steps #1 through #4 twice. Then determine the average density of water, again observing the rules for significant figures.
6. Repeat steps #1 through #5 using rubbing alcohol instead of water, and then again using vinegar instead of water.

**Results**

	1 <sup>st</sup> trial	2 <sup>nd</sup> trial	3 <sup>rd</sup> trial
Mass of full pipet in g			
Mass of empty pipet in g			
Mass of water in g			
Volume of water in mL			
Density of water in g/mL			

**Average density of water in g/mL = \_\_\_\_\_**

	1 <sup>st</sup> trial	2 <sup>nd</sup> trial	3 <sup>rd</sup> trial
Mass of full pipet in g			
Mass of empty pipet in g			
Mass of alcohol in g			
Volume of alcohol in mL			
Density of alcohol in g/mL			

**Average density of rubbing alcohol in g/mL = \_\_\_\_\_**

	1 <sup>st</sup> trial	2 <sup>nd</sup> trial	3 <sup>rd</sup> trial
Mass of full pipet in g			
Mass of empty pipet in g			
Mass of acid in g			
Volume of acid in mL			
Density of acid in g/mL			

**Average density of vinegar in g/mL = \_\_\_\_\_**

### Conclusion/Calculation

1. What is the purpose of repeating each experiment three times?
2. Why is it important to dry the outside of the pipet each time before massing it?
3. Calculate a % error in each experiment, by using a reliable reference source for the actual value of the density of the liquids used.



4. In a similar experiment, a student attempts to determine the density of propan-2-ol but incorrectly records the volume of alcohol in the graduated cylinder as being 4.5 mL when it *should* have been recorded as 5.4 mL. Comment on the effect that this error has on the calculated density of propan-2-ol.