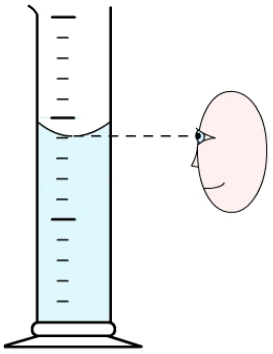
Chem Lab Pretest (a combo of last year's exam, Vanier's lab manual and a few new questions.)

Graduated beakers are used to measure volumes roughly; they are containers with a precision of ±5%.

Graduated cylinders are used to measure volumes approximately; they are usually calibrated to contain volumes with the following precisions:



10 mL:	± 0.1 mL	25 mL:	± 0.2 mL
50 mL:	± 0.5 mL	100 mL:	± 0.5 mL

Pipettes and burettes are used to determine volumes accurately; they are calibrated to *deliver* certain volumes and have a precision of:

1 mL pipette:	± 0.01 mL
5 mL pipette:	± 0.01 mL
10 mL pipette:	± 0.02 mL
20 mL pipette:	± 0.03 mL
25 mL pipette:	± 0.03 mL

50 mL burette : ± 0.02 mL

A volumetric flask *contains* an accurately known volume of solution at a given temperature (often 20°C); it has a precision of :

100 mL volumetric flask:	± 0.2 mL
250 mL volumetric flask:	± 0.1 mL

1. If you want to measure 100.0 ml of acid, which piece of glassware would you use?
2. What is the percent error associated with a 5ml pipette?
3. a)With a pipette, you measure exactly 5 ml. How do you report the measurement?

b) With a 50 ml graduated cylinder, you measure exactly 5 ml. How do you report the measurement?

4. You weigh 2.00 g of Mg. The volume of hydrogen gas generated is measured at 100.22 kPa and at 298.2 K. R = 8.31 LkPa/(K*mole)

a) When converting to moles of Mg should you use exactly 24 g/mole. Why or why not?

b) Calculate the volume of hydrogen expected (it's a 1 to 1 molar ratio) and report the answer in ml with the correct number of significant figures.

5. a) Read the and report the measurement properly:

b) What if it was exactly on the 20 mark?

6. Students mixed powdered iron and acidified $KMnO_4$ in test tube 1. In test tube 2 they mixed acidified $KMnO_4$ with a nail.

Test tube number	observation	Time of reaction
1	purple to light brown	15.2 s
2	purple to light brown	8 minutes 49 s

Why did test tube 2 react more slowly?

b) There were two other variables regarding KMnO4 that had to be held constant in order to study the effect in question (a). Name the two factors.

c) $KMnO_4$ is purple. MnO_2 is brown and so is rust. You suspect that the acid was only a catalyst. What could you have done to verify that the acid played that role?

7. How much more surface area did one of the iron forms have? Calculate, using the following data:

Test tube number	Temperature	Time of reaction
A	25.0 ^{o}C	14.0 s
B	100.1 ^{o}C	2 min 25.0 s
C	25.0 ^{o}C	9 min 12.0 s

8. Why did we wait five minutes *after the end* of the magnesium reaction before measuring the volume of hydrogen gas?

9. What was the purpose of measuring the volume of hydrogen gas and then calculating the volume expected from PV = nRT?

10. $NaOH_{(s)} + HCl_{(aq)} \rightarrow H_2O + NaCl_{(aq)} + heat$

a) TRUE? Or FALSE? The above reaction was more exothermic than the similar reaction involving aqueous sodium hydroxide instead of the solid.

b) Why? Be specific and use chemical equations.

11. Relate this equation to **what was done in the lab** to figure out the percentage of lithium chloride in a LICl-KNO_3 mixture:

$xW + yZ = mc\Delta T$,
where W = J/g for LiCl
Z = = J/g for KNO_3
x = grams of LiCl in unknown
y = grams of KNO_3 in unknown

m = mass of water
ΔT = temperature change caused by unknown

12. How do you use a beaker, water, a test tube, vinegar and pure iron powder to get the percentage of oxygen in the air?

13. Fill in the blanks with the word “larger” or “smaller” to create a valid statement about calorimetry labs in general. (2 marks)

a) Losing water in the transfer of solution to the calorimeter could lead to a _____temp. increase than expected.

b) Losing heat to the air and calorimeter cup could lead to a _____ temp. increase than expected.

14. What is the difference between an average rate of reaction and an instantaneous one? (2 marks)