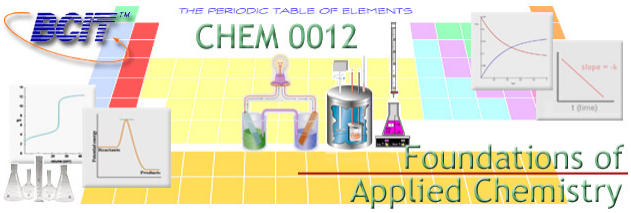


Introduction and Review

- CHEM 0012 course outline
  - Go over course expectations
- Chemistry 11 Review

CHEM 0012 Course Outline

- Course outline
  - my.BCIT
  - http://www.bcit.ca/study/outlines/index.shtml
- bbower@bcit.ca

CHEM 0012 Course Website

- Course website – How to find it?
  - Google CHEM 0012
  - myBCIT
  - http://nobel.scas.bcit.ca/courses/wpmu/chem0012
- Prerequisite is Grade 11 Chemistry (CHEM 0011)
  - Google CHEM 0011
  - http://nobel.scas.bcit.ca/courses/wpmu/chem0011
- Let's go for a websites tour.

Chemistry 11 Review

1. SI system (Unit 1.1)

In the SI system, prefixes are used to represent multiples of 10 or fractions of 10 of the base units. The following table summarizes the basic prefixes that you should know.

PREFIX	MULTIPLE	SCIENTIFIC NOTATION	ABBREVIATION
mega-	1,000,000	10^{6}	M
kilo-	1,000	10^{3}	k
deci-	0.1	10^{-1}	d
centi-	0.01	10^{-2}	c
milli-	0.001	10^{-3}	m
micro-	0.000001	10^{-6}	μ
nano-	0.000000001	10^{-9}	n

Click on the following types of measurements to see how the prefixes are applied to the base units:

1. Mass - base unit of gram (abbreviation: g)
2. Length - base unit of meter (abbreviation: m)
3. Volume - base unit of liter (abbreviation: L)

Chemistry 11 Review

2. How do we record measurements that reflect the accuracy of the quantity measured?

- Use significant figures
- Follow the rules to report calculated values to proper number of significant figures after addition, subtraction, multiplication and division

Chemistry 11 Review

3. Atomic Structure:

56 Ba 137.327	54 Xe 131.293

- # of protons: atomic number
  # of electrons: equals # of protons (for neutral atoms)
- # of neutrons: mass number - # of protons
- Mass number = atomic mass rounded to the nearest integer

Chemistry 11 Review

4. Naming Compounds: --

Types of compounds:

- Binary compounds containing two nonmetals
- Binary compounds containing metals with fixed ionic charges
- Binary compounds containing metals with variable ionic charges
- Ternary compounds
- Hydrates
- Binary Acids
- Oxy Acids

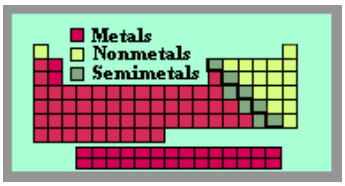
Practice naming compounds:

- Write chemical formulae from the chemical names:
- Write the chemical names from the chemical formulae:

Chemistry 11 Review

5. Metals and nonmetals

Where are the metals and nonmetals on the Periodic Table?



The charges the elements would like to form is related to the number of valence electrons the elements have and the Octet Rule.

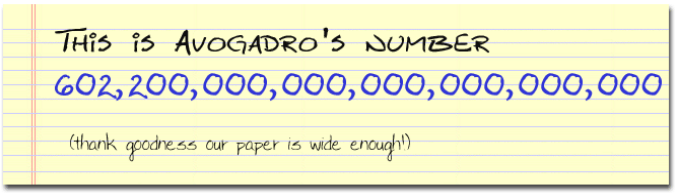
Chemistry 11 Review

6. Calculations based on Formulae

- convert between mass (in grams) and moles
- convert between moles and number of particles.
- convert between mass (in grams) and number of particles.

Chemistry 11 Review

What is Avogadro's Number?



What is a mole?

Dozen	- a dozen is counting by 12. - used to count typical visible quantities eg. marbles, oranges, pencils … etc
Mole	- a mole is counting by 6.022×10^{23}. - used to count extremely small particles eg. atoms, molecules, ions, electrons, protons, formula units … etc

Chemistry 11

What is a 1 molar or a 1 M solution?

$$\text{molarity (M)} = \frac{\text{Moles of solute}}{\text{Liters of solution}}$$

Practice problems:

– Gram/Mole/Particle Calculations

Chemistry 11 Review

7. Compounds

What are oxidation numbers?

There are rules for assigning oxidation numbers to atoms in a compound. The rules are located by clicking:

Chemist's Tools **and then Oxidation Number Rules**

– **Practice problems:**
Assigning oxidation numbers

CHEM 0011 Review – Sig Figs

When a scientist takes a measurement there are three kinds of information that are recorded:

1. The magnitude of the measurement.
2. The reliability of the number.
3. The unit of the measurement.

CHEM 0011 Review – Sig Figs

Mass measurements:

- **crude balance**

  12.4 g

- **sophisticated balance**

  12.4536 g

An analytical balance

CHEM 0011 Review – Sig Figs

Given that the measuring tool is correctly calibrated, in general, *a measurement that has more significant figures is the more accurate or reliable measurement.*

Rules for significant figures will be covered in Physics

CHEM 0011 Review – Sig Figs

Other measuring devices are:

When taking a measurement, estimate to within the finest division!

Erlenmeyer flask
Accuracy: +/- 5%
Capacity: 250 mL

graduated beaker
Accuracy: +/- 5%
Capacity: 250 mL

Glassware manufacturers will provide the glassware's tolerance.

Tolerance:
100 ± 5 mL

CHEM 0011 Review – Sig Figs

Other measuring devices are:

When taking a measurement, estimate to within the finest division!

graduated beaker
Accuracy: +/- 5%
Capacity: 250 mL

Finest division = 25 mL
Because the divisions are coarse, you could, at best, estimate to 1/5 the finest division. It means that you can read to the nearest 5 mL.

The beaker contains 200. mL of liquid.

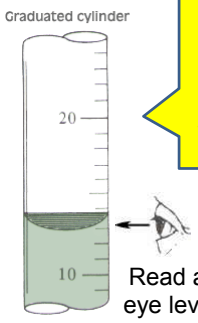
How many sig figs does this volume measurement have?

CHEM 0010 Review – Sig Figs

Other measuring devices are:

When taking a measurement, estimate to within the finest division!

graduated cylinder
Accuracy: +/- 0.4 %
Capacity: 100. mL



Finest division = 1 mL
You could, at best, estimate to ¼ of the finest division. It means that you can read to the nearest 0.3 mL.

The graduated cylinder contains 12.8 mL of liquid.

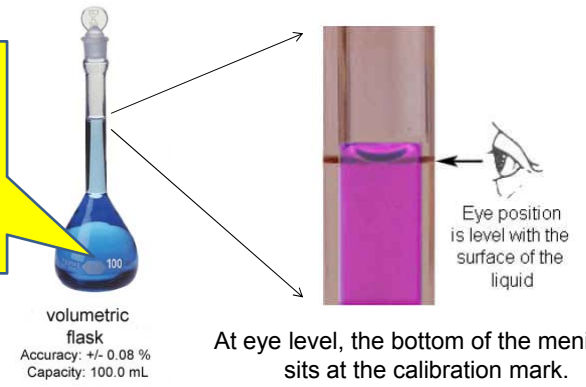
How many sig figs does this volume measurement have?

CHEM 0010 Review – Sig Figs

Other measuring devices are:

- A volumetric flask will only measure a single volume.

The volumetric flask, as indicated on the flask, will only measure accurately **100.0 mL** of liquid.

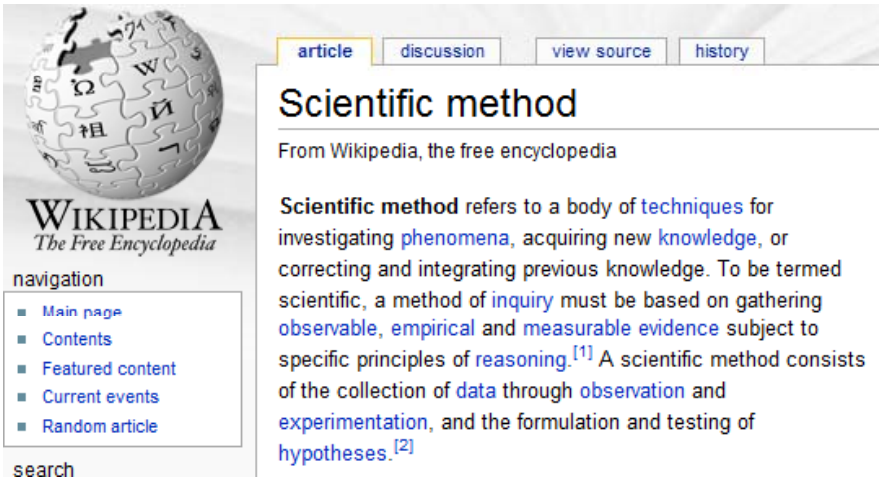


volumetric flask
Accuracy: +/- 0.08 %
Capacity: 100.0 mL

At eye level, the bottom of the meniscus sits at the calibration mark.

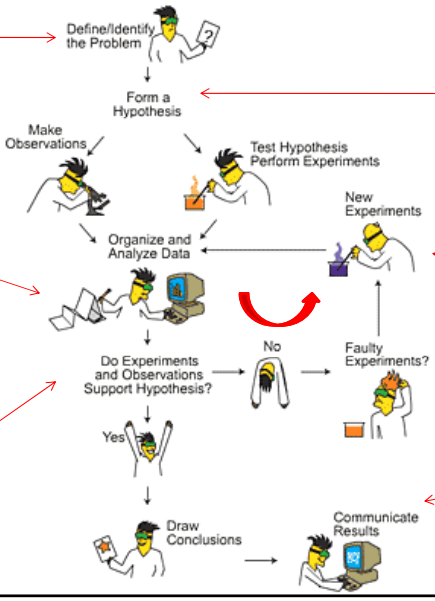
How many sig figs does this volume measurement have?

Scientific Method



Scientific Method

1. Identify what you want to study.



2. Research on the problem. Propose hypotheses (explanations) of phenomena.

3. Design experiments to prove or disprove the hypothesis.

4. Record what happened during the experiment by collecting data.

5. Analyze data and repeat results with more experimentations to see if it is consistent with hypotheses.

6. Draw conclusions and write it up.

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