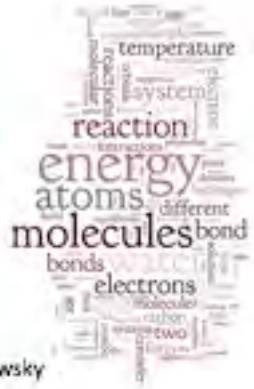
Brief review



Chemistry

- Chemistry is the study of matter and the changes that it undergoes
- Changes in matter are accompanied by energy changes
- While energy and matter can be inter-converted ($E=mc^2$) – we don't normally take this into account in chemistry (more later)

Matter and Energy

- (Most) matter is made up of atoms
- Energy is very difficult to define – we can calculate it and look at the effects of it.
- Energy does not have atoms in it.
- Heat is the transfer of thermal energy (more later)

Atoms

- Atoms are the smallest unit of an element
- There are 92 naturally occurring elements.
- Elements contain only one kind of atom
- Atoms combine together to make molecules
- The radius of an atom is ~ 100 pm (0.1 nm)
- Watch: http://www.youtube.com/watch?v=bw5TE5o7JtE&feature=related

Molecules

- **Atoms** combine together to make **molecules**
- O is the symbol for oxygen atom, O_2 is the symbol for an oxygen molecule.
- Molecules can have more than one kind of element in them.
- Molecules can be very small (smallest H_2) or very large (DNA)

The Standard Units

- Scientists have agreed on a set of international standard units for comparing all our measurements called the SI units
  - *Système International* = International System

Quantity	Unit	Symbol
length	meter	m
mass	kilogram	kg
time	second	s
temperature	kelvin	K

Common Prefix Multipliers in the SI System

Prefix	Symbol	Decimal Equivalent	Power of 10
mega-	M	1,000,000	Base x 10^{6}
kilo-	k	1,000	Base x 10^{3}
deci-	d	0.1	Base x 10^{-1}
centi-	c	0.01	Base x 10^{-2}
milli-	m	0.001	Base x 10^{-3}
micro-	μ or mc	0.000 001	Base x 10^{-6}
nano-	n	0.000 000 001	Base x 10^{-9}
pico	p	0.000 000 000 001	Base x 10^{-12}

Things to review (will be covered/ assumed in other contexts – you need to be ready)

- Sig figs
- Accuracy/precision
- Density
- Dimensional Analysis
- Estimation

Chemistry, life, the universe & everything - Cooper & Klymkowsky