

CHEM1011

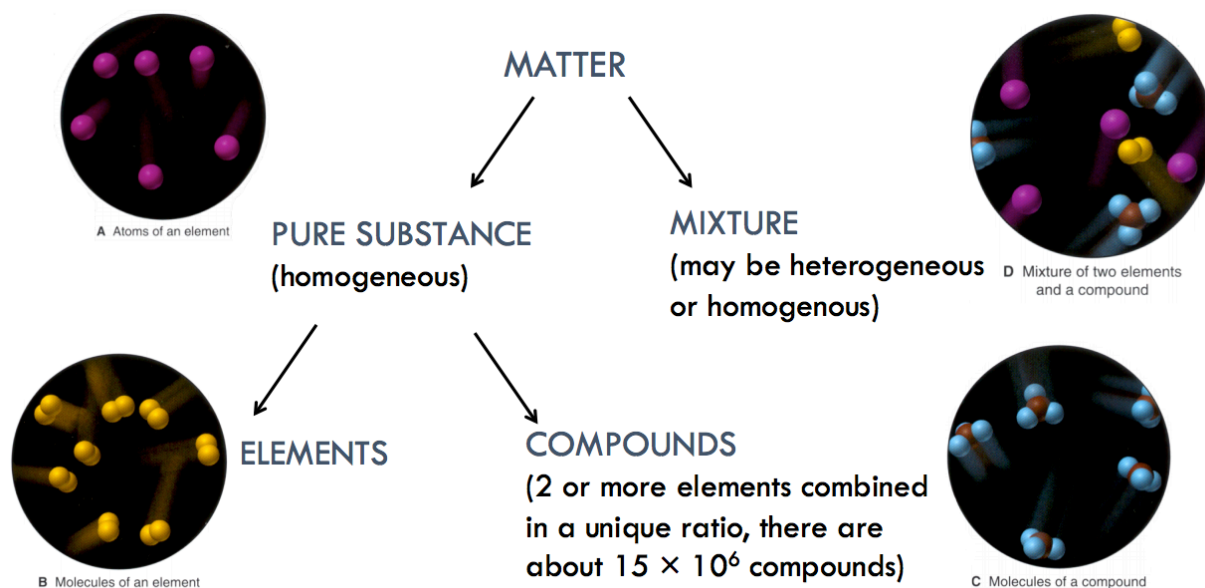
Fundamentals of Chemistry 1A

S1 2018

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CHEM1011 Lecture 1 –



States of matter

Different states of a substance are different physical ways of packing its component particles:

- solid (closely packed together and organized),
- liquid (still closely packed together but disorganized),
- gas (far apart and disorganized)

CHEM1011 Lecture 2 –

Physical and chemical changes

Physical change is associated with a *change of state*.

Physical properties are properties that a substance shows by itself, without changing or interacting with another substance.

e.g. colour, melting point, conductivity, density, surface tension

Chemical change involves changing one substance into another.

Chemical properties are the properties of a substance that result in the formation of a new substance

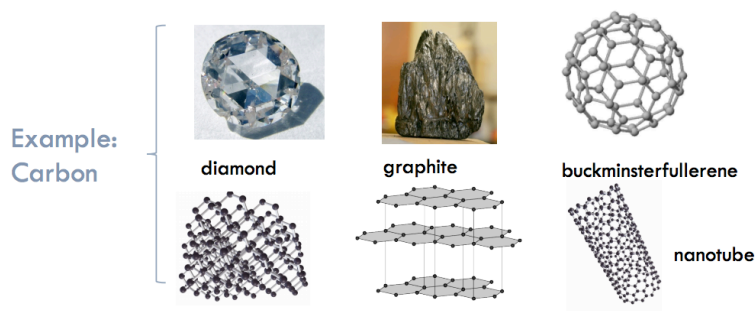
e.g. flammability, corrosiveness, reactivity with acid.

An **intensive property** is independent of the amount of substance present e.g. pH

An **extensive property** depends on how much of a substance you have got e.g. volume.

Allotropes – elements with different bonding arrangements of atoms

e.g. carbon



CHEM1011 Lecture 3 –

Atomic structure

Atomic theory – John Dalton 1808

- All matter consists of atoms – are tiny indivisible particles of an element that cannot be created or destroyed.
- Atoms of one element cannot be converted into atoms of another element.
- Atoms of an element are identical and are different from atoms of any other element.

Cathode ray – JJ Thomson 1897

- Found that all metals produced the same negatively charged particle which was 1000 lighter than a hydrogen atom –
- Atoms are divisible, as such cathode rays renamed electrons.

Plum pudding model of atom – Thomson

- Suggested that atom was one positive particle covered in smaller, negative particles.

Rutherford 1909

- Atoms are mostly empty space occupied by electrons.
- All the positive charge and essentially all the mass lies in a tiny region in the centre – the nucleus.
- The nucleus is made of positively charged particles, protons, and uncharged neutrons.

	Symbol	Relative mass	Relative charge
Proton	p or p^+	1	+
Neutron	n or n^0	1	0
Electron	e or e^-	1/1836	-

Protons and neutrons are also called **nucleons**

Elements

Atomic number = number of protons

Mass number = protons + neutron.

Forces in the atom

Nucleons are held together by the strong nuclear force – only effective over very short distances

These forces are strong enough to overcome the repulsion between the protons.