

atoms & elements

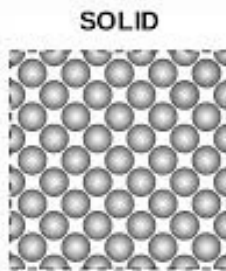
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Ch 2

Matter - Anything that has mass and takes up volume

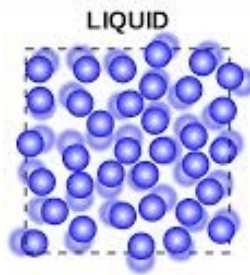
Solid (s)

- definite volume + shape
- Incompressible
- particles in rigid positions
- particles close together
- fixed positions
- low kinetic energy



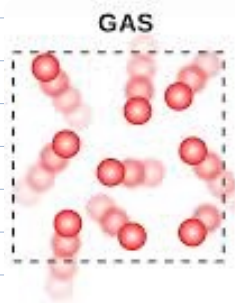
Liquid (l)

- definite volume / not shape
- relatively incompressible
- relatively close together
- particles flow past each other
- high intermolecular forces



Gases (g)

- no definite volume / shape
- compressible
- particles fly around high speeds and hit each other
- far apart
- no intermolecular forces
- very high kinetic energy



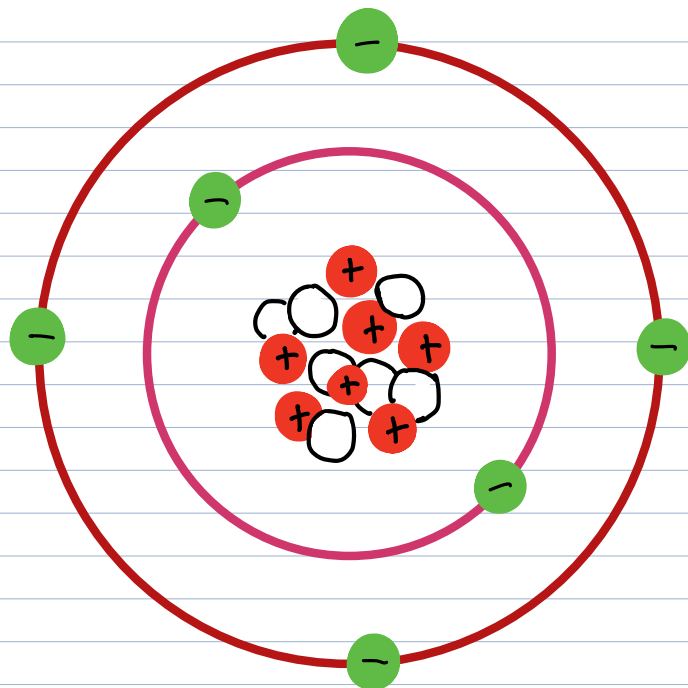
atom - the smallest unit of matter

element - one type of atom

molecules - two or more atoms

The Atomic Model

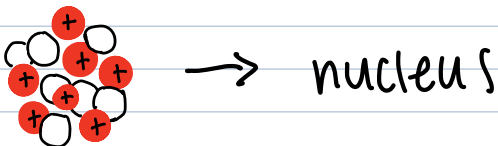
(The Bohr Model)



— - Electron
negative charge

+ - Proton
positive charge

○ - Neutron
no charge



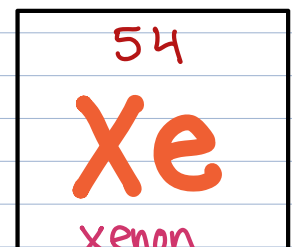
What makes an element unique?

- (A) # of electrons (B) # of protons (C) # of neutrons

Atomic Number (Z) - number of protons an atom has

Elemental Name - name of the element

Elemental Symbol - 1 or 2 letter symbol
that signifies the element

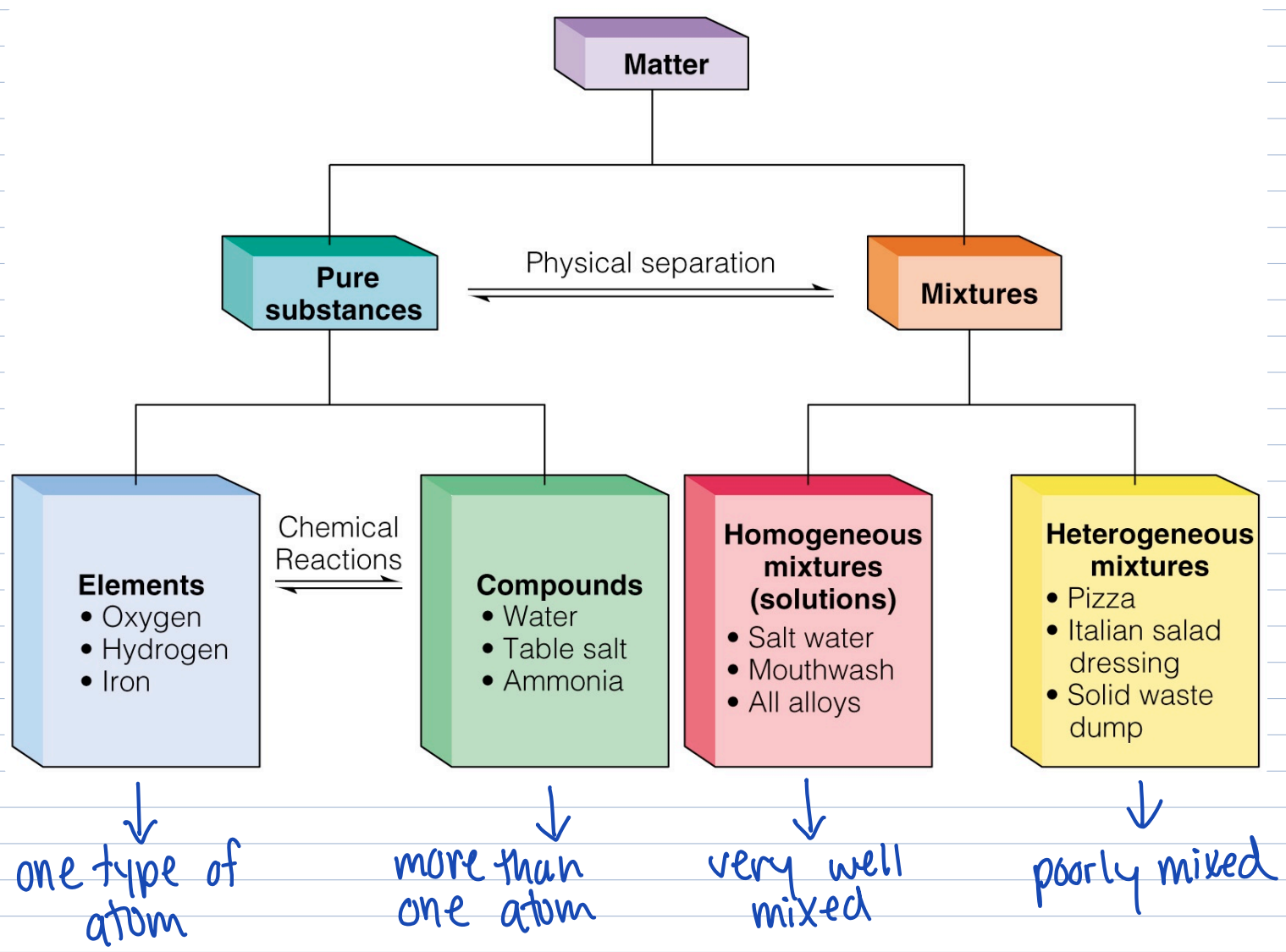


Compounds - substances made up of more than one atom

Ionic compound - cation/anion or metal/nonmetal
Formula units

Covalent compound - nonmetal

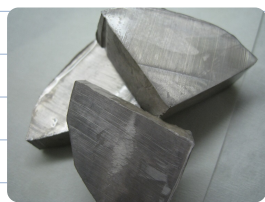
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Classification of Pure Substances

Pure substance - made up of one type of atom OR one type of compound

Element - Made up of one type of atom



(Sodium, Na)



(Iron, Fe)



(Bromine, Br)

★ Elements will always be only with itself

Compound - Substance made up of more than one type of atom chemically bonded together

Avogadro's Number

$$6.022 \times 10^{23} = 1 \text{ mol}$$

35 g C ; how many atoms ?

$$\frac{35 \text{ g C}}{1} \times \frac{1 \text{ mol C}}{12.011 \text{ g C}} \times \frac{6.022 \times 10^{23}}{1 \text{ mol C}} = 1.7 \times 10^{24} \text{ atoms}$$

g of P in 5.89 moles of P ?

$$\frac{5.89 \text{ mol P}}{1} \times \frac{30.974 \text{ g P}}{1 \text{ mol P}} = 182 \text{ g P}$$

How many Mg atoms are in 1.00 g of solid Mg ?

$$\frac{1.00 \text{ g Mg}}{1} \times \frac{1 \text{ mol Mg}}{24.305 \text{ g Mg}} \times \frac{6.022 \times 10^{23}}{1 \text{ mol Mg}} = 2.48 \times 10^{22}$$

How many moles of gold (Au) are in 5.00 kg of solid gold ?

$$\frac{5.00 \text{ kg Au}}{1} \times \frac{1000 \text{ g}}{1 \text{ kg}} = 5000 \text{ g Au}$$

$$\frac{5000 \text{ g Au}}{1} \times \frac{1 \text{ mol Au}}{196.967 \text{ g Au}} = 25.4 \text{ mol Au}$$