# Is Matter Around Us Pure? Cheat Sheet

by Jiwoo via cheatography.com/158602/cs/33461/

## Pure Substances

a single substance or matter which cannot be separated into other kinds of matter by any physical changes

There are two types of pure substances *elements* and *compounds*

**ELEMENTS** = pure substance made up of one type of atoms only

**COMPOUNDS** = pure substance containing two or more types of elements which are combined together in a fixed proportion by mass

## Elements

**SOLID ELEMENTS** = copper silver gold potassium carbon(diamond and graphite) iodine phosphorus etc

**LIQUID ELEMENTS** = only mercury and bromine exist at room temperature. Gallium and Cesium become liquids at a temperature of 302K and 303K. These are slightly higher than the room temperature 298K.

**GAESEOUS ELEMENTS** = eleven elements exist in gaseous state at room temperature. These are hydrogen oxygen chlorine fluorine helium argon neon nitrogen xenon krypton and radon

## Metals

| | |
|---|---|
| Metals are solid at room temperature | *mercury is liquid at room temperature. Gallium and Cesium become liquid at temperature slightly above the room temperature* |

## Metals (cont)

The atoms are very closely packed in space. This arrangement is known as crystal lattice. Lattice varies from metal to metal.

Metals have shiny surfaces. they generally have silver-grey or golden-yellow surfaces. This property is known as lustre.

| | |
|---|---|
| Metals are good conductor of heat and electricity. | *Copper and aluminium* |
| Metals are generally quite hard | *Potassium and sodium* |

Metals are malleable

Metals are ductile

Metals are sonorous

Metals generally have high melting and boiling points

## Non-Metals

| | |
|---|---|
| are either gases or solids at room temperature | *bromine* |
| vary in colour. solids have dull surfaces | *crystals of iodine |
| mostly poor conductors of heat and electricity | *Graphite* |

## Non-Metals (cont)

| | |
|---|---|
| Most of them are quite soft and have less densities than metals | *diamond* |

non malleable and non ductile in nature

have very low melting and boiling points

## Compounds

| | |
|---|---|
| **Inorganic compounds** = have been obtained from non living sources such as rocks and minerals | *common salt marble washing soda baking soda carbon dioxide ammonia etc* |
| **Organic compounds** = obtained from living beings such as plants and animals. contain carbon as their essential component. also called carbon compounds | *methane ethane propane alcohol sugar proteins oils fats etc* |
| **Acids** | Sulphuric acid, hydrochloric acid and nitric acids |

## Compounds (cont)

| | |
|---|---|
| **Bases** | Sodium hydroxide, Potassium hydroxide and calcium hydroxide |
| **Salts** | sodium chloride, calcium nitrate and zinc sulphate |

## Compounds Properties

composed of the same elements combined in a fixed ratio by mass to form molecules

a pure compound is homogeneous in nature

a chemical compound is formed as a result of chemical reaction between constituent elements

properties of a compound are different from the elements from with which it is formed

constituents of a chemical compound cannot be separated mechanically

formation or decomposition of compounds involves energy changes

## Physical change

brings change in the physical state of matter under suitable conditions

| | |
|---|---|
| **Properties** | changes the interparticle forces or the interparticle spaces |




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## Physical change (cont)

no change in the composition of the substances

donot change their main charec-terisitcs

no new substance is formed

change is temporary and can be reversed by reversing the conditions which bring about the change

no energy change generally occurs during a physical change

## Chemical change

| | |
|---|---|
| brings a change in the chemical compos-ition of the matter | generally there is an exchange in constituents and new substances are formed |
| **Properties** | Physical state of the substance may or may not change |
| | always a change in the physical composition of the substances undergoing chemical changes |

## Chemical change (cont)

change in the characteristics of the substance involved

new substance is always formed

chemical changes are permanent in nature and cannot be easily changed

energy reactions always occur in chemical reactions respon-sible for these changes

## Chemical change

| | |
|---|---|
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| **Properties** | Physical state of the substance may or may not change |

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## Solutions

a homogenous mixture of two or more non reacting substances

**Types of solution:**

| | |
|---|---|
| *Solid solution* | solid acts as the solvent |
| *Liquid solution* | liquid acts as the solvent |
| *Gaseous solution* | gas acts as the solvent |

Only a mixture of miscible liquids is a solution. In case, they do not mix with each other and form separate layers they are known as emulsion

in the homogenous mixture, the particle size is 1nm in diameter

alloys are homogenous mixture of two or more metals or non metals

| | |
|---|---|
| **Examples of solution** | sugar in water |
| | iodine in alcohol |

## Solutions (cont)

aerated drinks

air

copper sulphate in water

dilute hydrochloric acid

brass

bronze

solder

## Properties of a solution

homogenous in nature

all components are present in the same phase

particles cannot be seen by naked eye or ordinary microscope

solution particles can pass through the fine pores of the filter paper

the components do not settle down if left undisturbed for a very long time. this shows that a solution is quite stable in nature

particles do not scatter a beam of light

a saturated solution becomes unsaturated upon heating

a solution in which water acts as the solvent it is known as aqueous solution while the solution in which the solvent is another liquid it is non aqueous solution



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## Saturated solution

a solution becomes saturated if the solute starts separating at the bottom of the container in which the solution is being prepared at a given temperature

a saturated solution becomes super saturated upon cooling

## Suspensions and Colloidal Solutions

a heterogenous mixture in which the solid particles are spread throughout the liquid without dissolving in it. they settle as precipitate of if the suspension is left undisturbed for a while

| | |
|---|---|
| **Properties** | heterogenous nature |
| | particle size is more than 100nm |
| | particles can be seen with naked eyes |
| | solid particles can be easily separated through ordinary filter papers |
| | particles are unstable as they settle down if the suspension is left undisturbed. this is known as precip-itate |

## Colloidal Solutions

heterogenous in nature but have smaller size of particles which are undistributed .It ranges between 1nm to 100nm

| | |
|---|---|
| **Properties** | appear to be homogenous but are hetero-genous |
| | are a two phase system |
| | particles pass through ordinary filter papers |
| | particles carry charge |
| | particles follow a zig-zag path |
| the scattering of the beam of light by the dispersed phase of particles is known as Tyndall effect | scatters the beam of light passing through it |
| | colloidal solutions in which only liquids participate are known as emulsions |

## Mixtures

the combination of two or more substances which are physically mixed and are not chemically combined with each other and may be also present in any proportions

| | | |
|---|---|---|
| **Homogenous Mixture** | the components are mixed uniformly mixed without any clear boundary of seperation | *sodium chloride and sugar in water . Air is a homogenous mixture of gases* |
| **Hetero-genous Mixture** | the components do not have uniform composition and also have visible boundaries of separation between the constituents | *sand and common salt. Oil and water* |



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