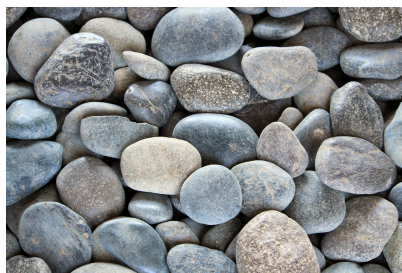


Chapter 4

Mixtures Or Pure Substances



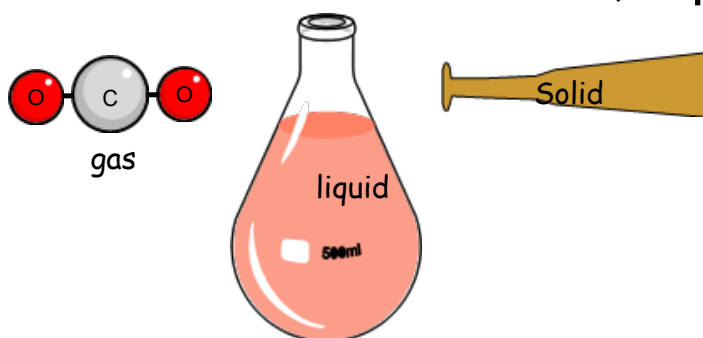
What are some observable characteristics that can tell one material above from each other?

What are some differences in color, transparency, heaviness, hardness, strength?

So to start we must look at what object are made up of.

Mixtures and Solutions

Matter: any material that takes up space and has a mass. This includes all solids, liquids and gasses.



Properties: Characteristics that are used to describe matter.

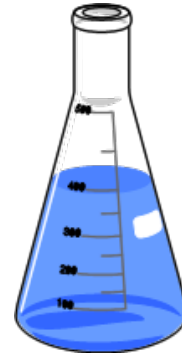


ex) Properties of water - is that it is clear, colorless, odorless, is a liquid, freezes at 0°C and boils at 100°C .

- Some materials can not be described by a single set of properties. Different materials have their own set of properties.

Mixtures

Whenever you see materials that has more than one set of properties, you know that it is a mixture.



Mixture: a material made up of several different types of materials (2 or more). In a mixture each material retains it's own properties.



Mixtures can be of the following type:

1) **Heterogeneous:** made up of parts or mixed that can be seen.

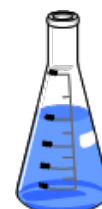


<https://www.youtube.com/watch?v=bKcGHO6b1So>

Homogenous: every part of the material is the same.

https://www.youtube.com/watch?v=-r_9QZXwT2c

<https://www.youtube.com/watch?v=veXy9PNwSSI>



Smog is a heterogeneous mixture of various particles suspended in the air. The dirty particles that make up the **smog** can be removed from the air and breathed into the lungs, making **smog** quite a problematic heterogeneous mixture.



Figure 4.3A Is the substance pictured here homogeneous or heterogeneous?

Figure 4.3B Is the air in this photograph homogeneous?

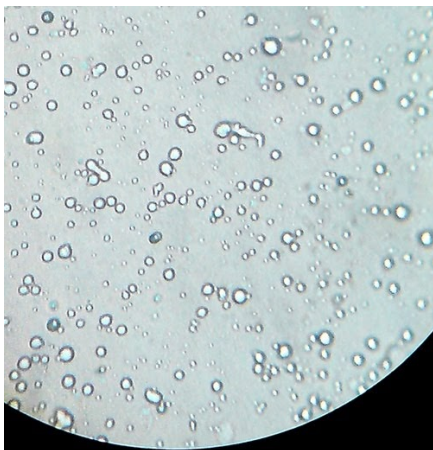
Any gas mixture is a solution, that is, a **HOMOGENEOUS mixture**. Of course, in practice air contain very small solid particles in suspension (dust, pollen) and thus it becomes heterogeneous. Since we can see the dust particles in the air so it is cleared that they are not dissolved in the air.

This is an image of milk



What do you notice?

under a microscope



What do you notice?

-These are fat globules.

Years ago they did not homogenized milk and this would cause for the fat to float to the top of the milk, leaving a layer of yellow cream.

Today's milk is homogenized

Homogenized- specially prepared so that the fat globules remain mixed with the rest of the liquids.

So milk appears homogenous with the naked eye but with the help of a microscope you can see it has other pieces.

What is a mixture?

307-1

Anything that is made of 2 or more materials and has at least 2 distinct sets of properties.



Mechanical Mixtures

Materials such as pizza, salad, and pop all have easily identifiable properties with the unaided eye.

When Mixtures can be identified this easily they are called **Mechanical Mixtures**

Properties means do they have the exact same color, texture, shininess in all parts of the mixture.

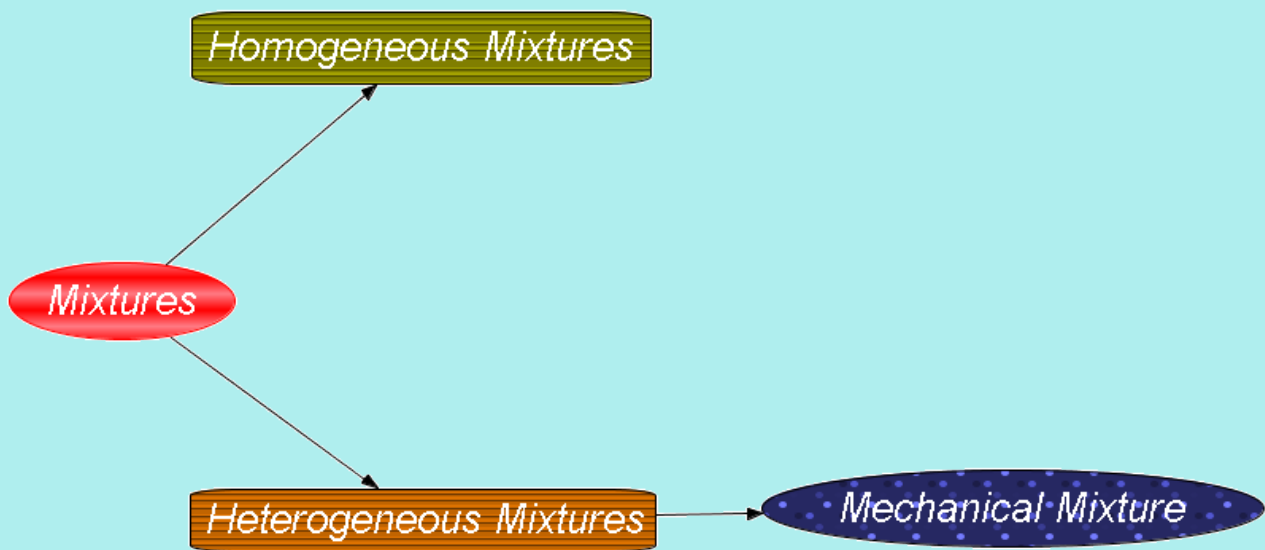
Suspensions

- Classified as Heterogeneous (particles are not evenly distributed or combined)
- The different substances that make up the mixture will not dissolve, they are suspended. Particles are so large that they settle out unless the mixture is constantly stirred or agitated .



So thus far we know

Classification of Mechanical Mixtures



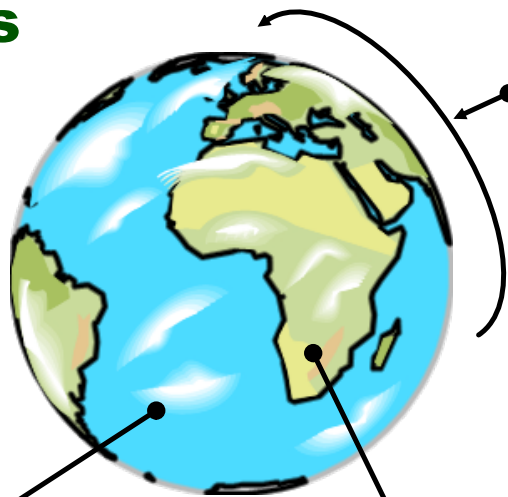
Homogenous Mixtures

A Homogenous mixtures is called a solution.

They are everywhere the earth is surrounded by them.

To be considered a solution the combination of materials must be the same.

Solutions of the Earth.

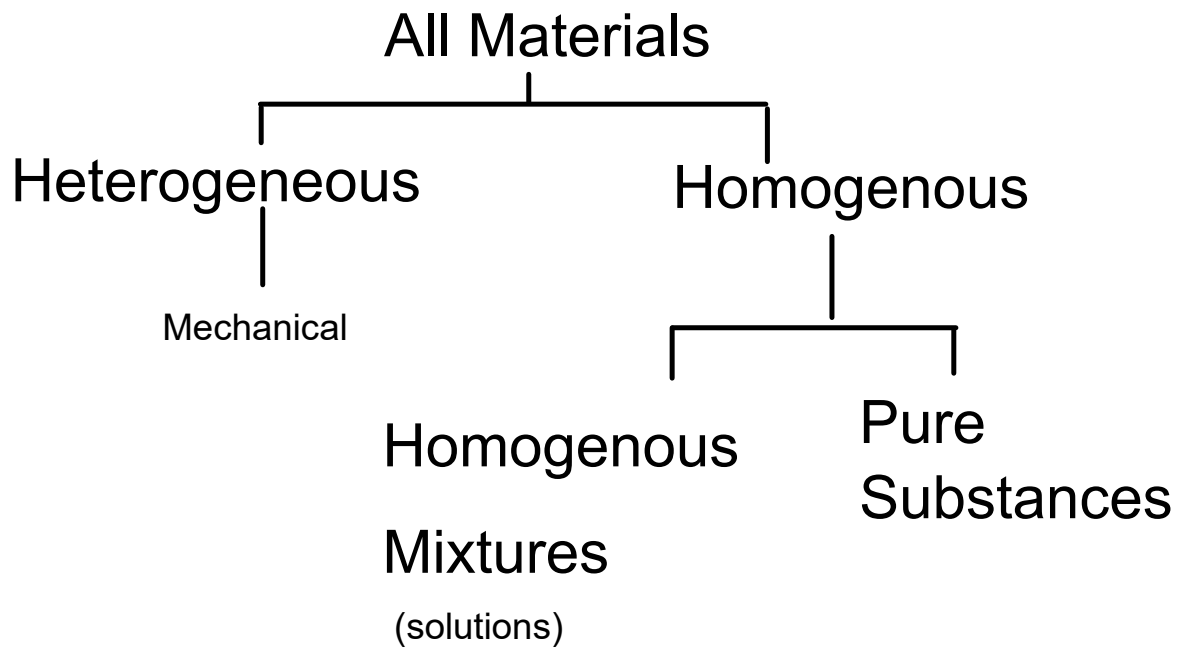


Earth is surrounded by a gas solution we call air. A homogenous mixture of oxygen, nitrogen and other gases.

two thirds of the earth is a liquid solution; salty water of oceans).

Solid solutions such as sterling silver which is a mixture of silver and copper.

All Matter Can be Classified



Recall

A Homogenous mixtures is called a solution.

Add to your notes

- Have properties that blend together. This depends on how much of one material and how much of the other material are in the mixture.

- ex) Salt in water will mix so that the salt will disappear and cannot be seen (As long as you have lots of water)

Explaining Mixtures and Pure Substances

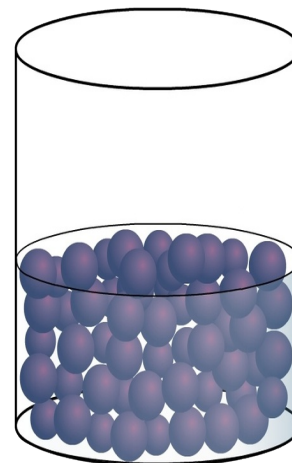
The Theory that scientist use to explain the properties of various mixtures and substances is called the **Particle Theory of Matter**

1) All matter is made up of extremely tiny particles with spaces between them

-Each pure substance has it's own type of pure particle, different from the particles of other pure substances.

2) Particles are always moving (More energy = faster moving)

3) Particles are attracted to each other (some more than others)



Pure Substances: is a material made up of only one kind of extremely small particle. Different from all other pure substance

Examples of pure substance are:

water, gold, copper, silver, silver and sugar.
Elements or compounds

Fun Note

There are 1.67 sextillion water molecules in a water drop. Now, the number of atoms in a droplet of water

1 670 000 000 000 000 000 000

on your test

Differences Between Pure Substance & Mixtures

Are NOT easy to observe. Scientist took hundreds of thousands of years of investigating to figure out if pure substance existed

- Must investigate the properties of material to find out that they are always the same. If they are the exact same in all parts of the material, no matter what part of the world the material comes from, then you say you have a pure substance.



This ring is gold and if you turned it over, you would expect to see the same properties on the reverse- the same colour, texture, and shininess.

Found naturally on earth



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Periodic Table of the Elements

Group	1	2											13	14	15	16	17	18	
	1A	2A											3A	4A	5A	6A	7A	8A	
1	H Hydrogen 1.0078																		He Helium 4.0026
2	Li Lithium 6.938	Be Beryllium 9.0122											B Boron 10.806	C Carbon 12.009	N Nitrogen 14.006	O Oxygen 15.999	F Fluorine 18.998	Ne Neon 20.180	
3	Na Sodium 22.990	Mg Magnesium 24.305												Al Aluminum 26.982	Si Silicon 28.084	P Phosphorus 30.974	S Sulfur 32.059	Cl Chlorine 35.446	Ar Argon 39.948
4	K Potassium 39.098	Ca Calcium 40.078	Sc Scandium 44.956	Ti Titanium 47.867	V Vanadium 50.942	Cr Chromium 51.996	Mn Manganese 54.938	Fe Iron 55.845	Co Cobalt 58.933	Ni Nickel 58.693	Cu Copper 63.546	Zn Zinc 65.38	Ga Gallium 69.723	Ge Germanium 72.63	As Arsenic 74.922	Se Selenium 78.96	Br Bromine 79.904	Kr Krypton 83.798	
5	Rb Rubidium 85.468	Sr Strontium 87.62	Y Yttrium 88.906	Zr Zirconium 91.224	Nb Niobium 92.906	Mo Molybdenum 95.96	Tc Technetium 98.9062	Ru Ruthenium 101.07	Rh Rhodium 102.91	Pd Palladium 106.42	Ag Silver 107.87	Cd Cadmium 112.41	In Indium 114.82	Sn Tin 118.71	Sb Antimony 121.76	Te Tellurium 127.60	I Iodine 126.90	Xe Xenon 131.29	
6	Cs Cesium 132.91	Ba Barium 137.33		Hf Hafnium 178.49	Ta Tantalum 180.95	W Tungsten 183.84	Re Rhenium 186.21	Os Osmium 190.23	Ir Iridium 192.22	Pt Platinum 195.08	Au Gold 196.97	Hg Mercury 200.59	Tl Thallium 204.38	Pb Lead 207.2	Bi Bismuth 208.98	Po Polonium (209)	At Astatine (210)	Rn Radon (222)	
7	Fr Francium (223)	Ra Radium (226)		Rf Rutherfordium (261)	Db Dubnium (262)	Sg Seaborgium (266)	Bh Bohrium (264)	Hs Hassium (269)	Mt Meitnerium (268)	Ds Darmstadtium (268)	Rg Roentgenium (268)	Cn Copernicium (268)	Uut Ununtrium (268)	Fl Flerovium (268)	Uup Ununpentium (268)	Lv Livermorium (268)	Uus Ununseptium (268)	Uuo Ununoctium (268)	
			Lanthanides	La Lanthanum 138.91	Ce Cerium 140.12	Pr Praseodymium 140.91	Nd Neodymium 144.24	Pm Promethium (145)	Sm Samarium 150.36	Eu Europium 151.96	Gd Gadolinium 157.25	Tb Terbium 158.93	Dy Dysprosium 162.50	Ho Holmium 164.93	Er Erbium 167.26	Tm Thulium 168.93	Yb Ytterbium 173.04	Lu Lutetium 174.97	
			Actinides	Ac Actinium (227)	Th Thorium 232.04	Pa Protactinium 231.04	U Uranium 238.03	Np Neptunium (237)	Pu Plutonium (244)	Am Americium (243)	Cm Curium (247)	Bk Berkelium (247)	Cf Californium (251)	Es Einsteinium (252)	Fm Fermium (257)	Md Mendelevium (258)	No Nobelium (259)	Lr Lawrencium (262)	

SOURCES: National Institute of Standards and Technology, International Union of Pure and Applied Chemistry

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