

MODULE: *Matter 1*

Activity Sheet 1.3: About atoms

Atoms

It's a word you hear quite often. It has found its way into our everyday language, where it's associated with

- breaking into small pieces
- energy and power
- tiny particles
- anything very small.

But in science it has a **specific** meaning. An atom is the basic unit of matter.

An atom is the smallest particle of matter that can exist on its own.



We can break an atom of a substance into smaller bits (see Activity Sheet 1.4) but doing this destroys the substance (that is, the particular type of matter made by the atom), and we don't know how to put that atom back together again.

As far as we know at the moment, atoms can only be made in the huge gravity field inside a star. Some of the heavier atoms, like silver or bromine, only got made when a star exploded in a supernova.

Types of atoms

H																He																											
1.008																4.003																											
Lithium Li		Beryllium Be														Boron B		Carbon C		Nitrogen N		Oxygen O		Fluorine F		Neon Ne																	
6.941		9.012														10.81		12.01		14.01		16.00		19.00		20.18																	
Sodium Na		Magnesium Mg														Aluminum Al		Silicon Si		Phosphorus P		Sulfur S		Chlorine Cl		Argon Ar																	
22.99		24.31														26.98		28.09		30.97		32.07		35.45		39.95																	
Potassium K		Calcium Ca		Scandium Sc		Titanium Ti		Vanadium V		Chromium Cr		Manganese Mn		Iron Fe		Cobalt Co		Nickel Ni		Copper Cu		Zinc Zn		Gallium Ga		Germanium Ge		Arsenic As		Selenium Se		Bromine Br		Krypton Kr									
39.10		40.08		44.96		47.87		50.94		52.00		54.94		55.85		58.93		58.69		63.55		65.39		69.72		72.63		74.92		78.96		83.80											
Rubidium Rb		Strontium Sr		Yttrium Y		Zirconium Zr		Niobium Nb		Molybdenum Mo		Technetium Tc		Ruthenium Ru		Rhodium Rh		Palladium Pd		Silver Ag		Cadmium Cd		Indium In		Tin Sn		Antimony Sb		Tellurium Te		Iodine I		Xenon Xe									
85.47		87.62		88.91		91.22		92.91		95.94		[98]		101.07		102.91		106.42		107.87		112.41		114.82		118.71		121.76		127.60		126.90											
Cesium Cs		Barium Ba		LANTHANIDES		Hafnium Hf		Tantalum Ta		Tungsten W		Rhenium Re		Osmium Os		Iridium Ir		Platinum Pt		Gold Au		Mercury Hg		Thallium Tl		Lead Pb		Bismuth Bi		Polonium Po		Astatine At		Radon Rn									
132.91		137.33				178.49		180.95		183.84		186.21		190.23		192.22		195.08		196.97		200.59		204.38		207.2		208.98		[209]		[210]											
Francium Fr		Radium Ra		ACTINIDES		Rutherfordium Rf		Dubnium Db		Seaborgium Sg		Berkelium Bk		Californium Cf		Einsteinium Es		Mendelevium Md		Nobelium No		Lawrencium Lr		Uut Uut		Fl Fl		Uup Uup		Lv Lv		Uus Uus		Uuo Uuo									
[223]		[226]				[261]		[262]		[266]		[267]		[287]		[287]		[288]		[289]		[289]		[290]		[291]		[294]		[294]		[294]											
Lanthanum La																Cerium Ce		Praseodymium Pr		Neodymium Nd		Promethium Pm		Samarium Sm		Europium Eu		Gadolinium Gd		Terbium Tb		Dysprosium Dy		Holmium Ho		Erbium Er		Thulium Tm		Ytterbium Yb		Lutetium Lu	
138.91																140.12		140.91		144.24		[145]		150.36		151.96		157.25		158.93		162.50		164.93		167.26		168.93		173.04		174.97	
Actinium Ac																Thorium Th		Protactinium Pa		Uranium U		Neptunium Np		Plutonium Pu		Americium Am		Curium Cm		Berkelium Bk		Californium Cf		Einsteinium Es		Fermium Fm		Mendelevium Md		Nobelium No		Lawrencium Lr	
[227]																232.04		231.04		238.03		[237]		[244]		[243]		[247]		[247]		[251]		[252]		[257]		[258]		[262]		[262]	

A substance that contains only one type of atom is called an element.

A list of all the elements, in order of the mass of their atoms, and arranged in columns according to their properties, was first drafted by a Russian scientist about 150 years ago. You will probably have seen it; it's the Periodic Table.

The Periodic Table now shows the 118 types of atom that we currently know about; of these only about 90 types occur naturally on the Earth (the others have been made in huge collider machines by atomic scientists).

In our everyday lives, we only use about 40 of the natural elements. These are mostly the lighter ones.

These are some common elements: oxygen, carbon, zinc, copper, aluminium, iron, sulphur, nitrogen, helium, hydrogen, neon.

Compounds, molecules and ions

Elements can be combined in many different ways, and a combination of elements is called a pure compound. Millions of different pure compounds can be made from the 40 everyday elements. To make a compound, atoms link together to make small groups called molecules, or giant three-dimensional arrays of atoms called Giant Structures.

Sometimes the atoms have an electrical positive or negative charge. These particles are called ions.

To become more stable, atoms join together in chemical reactions.

It's chemical bonds that hold the atoms in a compound together. Just like Lego, a small number of different units can be combined to make millions of different things.

Task:- Write a sentence with the word 'atom' in to answer each of these questions

1. What is an atom?
2. Where are atoms made?
3. What is an element?
4. Name five elements.
5. What is a molecule?
6. What is meant when we say a compound has a Giant Structure?
7. What is the difference between an atom and an ion?
8. Why are atoms like Lego bricks?

