

K20 Chemistry Elements

Group 14 Carbon



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Booker T & The MGs - Green Onions (1962)



Boots Randolph - Yakety Sax (1963)

Name the Six Elements of Group 13
Beginning with Boron

Periodic Table of the Elements



1 H Hydrogen 1.008																	2 He Helium 4.003
3 Li Lithium 6.941	4 Be Beryllium 9.012											5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
11 Na Sodium 22.990	12 Mg Magnesium 24.305											13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.066	17 Cl Chlorine 35.453	18 Ar Argon 39.948
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.867	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.631	33 As Arsenic 74.922	34 Se Selenium 78.971	35 Br Bromine 79.904	36 Kr Krypton 83.798
37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.95	43 Tc Technetium 98.907	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.414	49 In Indium 114.818	50 Sn Tin 118.711	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.904	54 Xe Xenon 131.293
55 Cs Cesium 132.905	56 Ba Barium 137.328	57-71	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.217	78 Pt Platinum 195.085	79 Au Gold 196.967	80 Hg Mercury 200.592	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [208.982]	85 At Astatine 209.987	86 Rn Radon 222.018
87 Fr Francium 223.020	88 Ra Radium 226.025	89-103	104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [266]	107 Bh Bohrium [264]	108 Hs Hassium [269]	109 Mt Meitnerium [278]	110 Ds Darmstadtium [281]	111 Rg Roentgenium [280]	112 Cn Copernicium [285]	113 Nh Nihonium [286]	114 Fl Flerovium [289]	115 Mc Moscovium [289]	116 Lv Livermorium [293]	117 Ts Tennessine [294]	118 Og Oganesson [294]

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Alkali Metal	Alkaline Earth	Transition Metal	Basic Metal	Metalloid	Nonmetal	Halogen	Noble Gas	Lanthanide	Actinide
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Carbon Group 14

- Carbon (6)
- Silicon (14)
- Germanium (32)
- Tin (50)
- Lead (82)
- Flerovium (114)

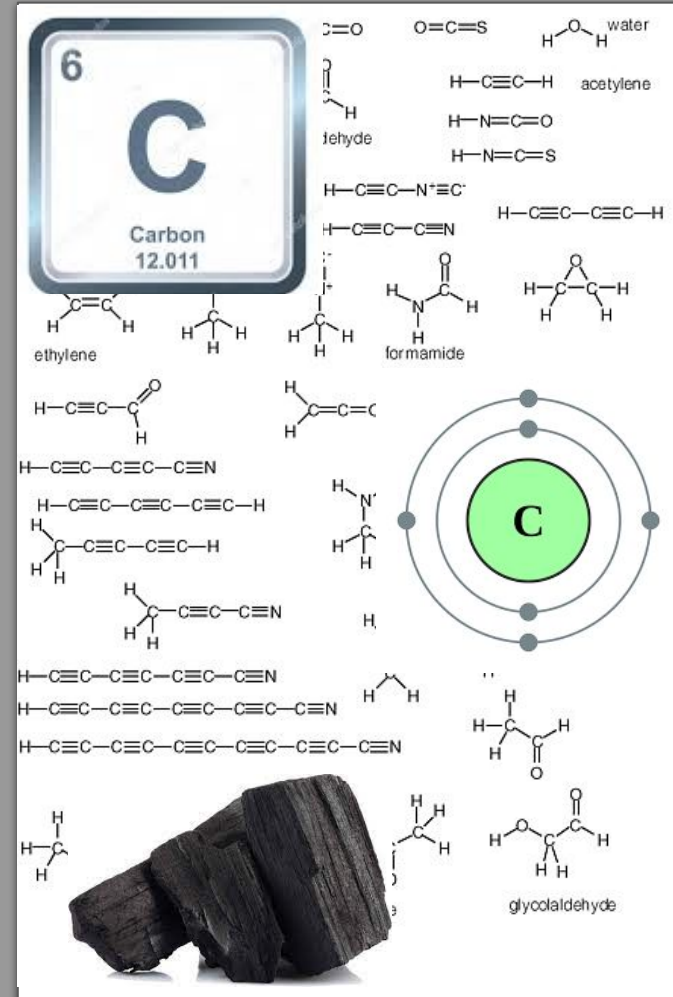
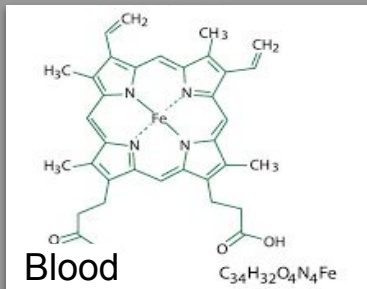
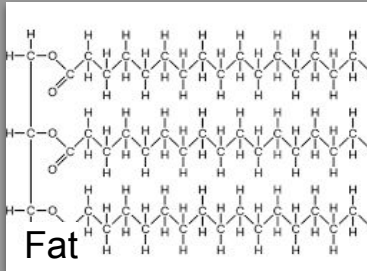
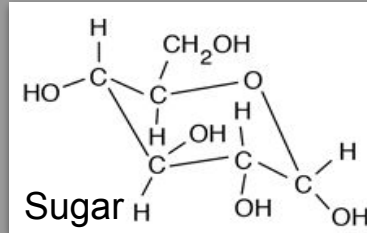
Carbon

Carbon Symbol C Atomic No. 6

All living things contain large amounts of carbon. In fact all life is carbon-based.

We call living things “organisms”. It’s where we get the word “organ” to describe things like the brain, heart, lungs, kidneys, liver, skin etc.

Sugar, fat, proteins, muscle tissue and even blood are carbon-based.

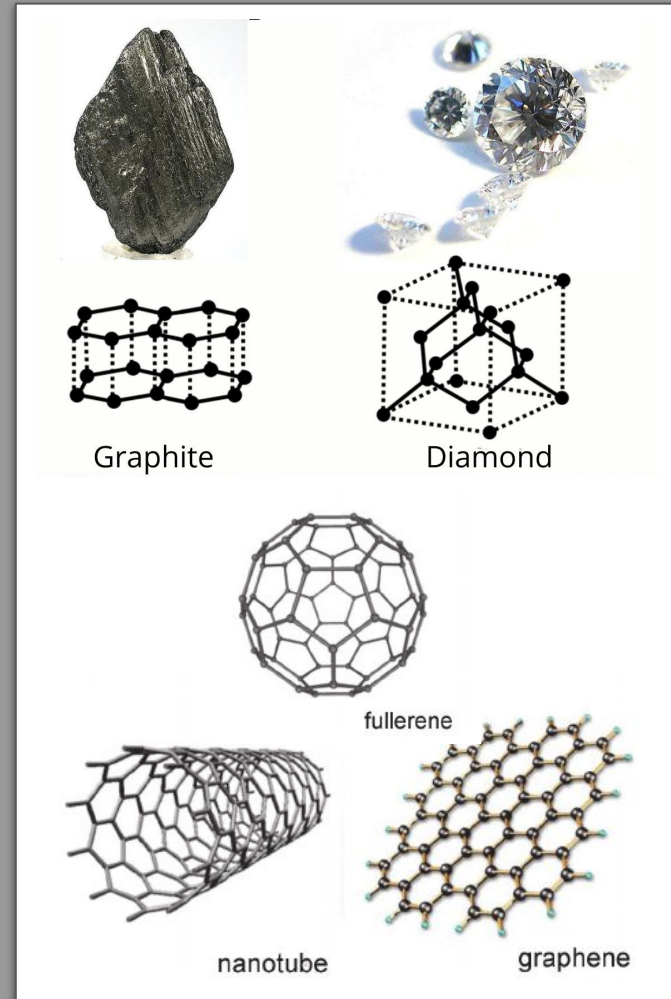


Carbon Allotropes

An “allotrope” is a different structural form of the same element. Many elements in their pure form construct different allotropes. Carbon is just a good example to show you what an allotrope is.

Pure graphite, used in pencils, is a basically layers of 6-sided (hexagonal) shaped groups of atoms. Graphite is not very strong, you can shear off layers easily.

A diamond however, is in a tetrahedral shape and is very strong. Diamond is the strongest known natural substance on Earth.



Radiocarbon Dating

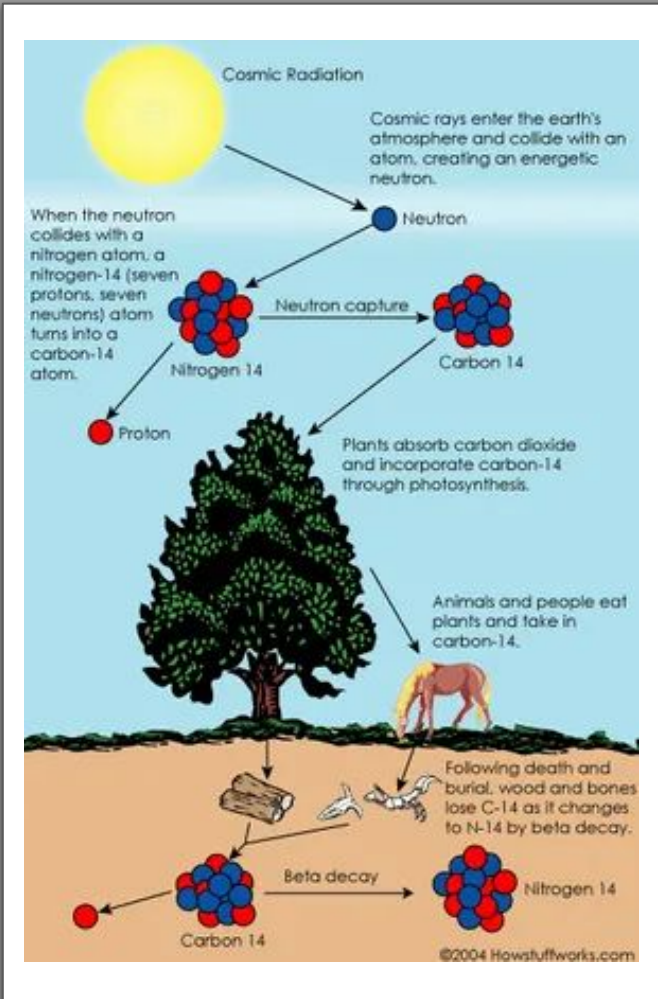


Carbon naturally occurs in both stable carbon-12 and unstable carbon-14 isotopes.

The ratio of C^{14} to C^{12} is constant amongst living things because they constantly absorb carbon based foods that contain C^{14} thus replacing any lost due to decay. However, when they die they stop absorbing carbon.

C^{14} decays with a half life of around 5,730 years.

We can measure the amount of C^{12} and C^{14} in a fossil to determine how long ago it stopped living.



HOW DOES RADIOCARBON DATING WORK?

A giraffe with brown and white spotted fur is standing in a savanna landscape. It is facing right, towards a large, leafy green tree. The ground is a flat, light brown color. In the background, there are rolling hills under a bright blue sky with a large, glowing yellow sun in the upper left corner.

Radiocarbon Dating

Carbon & Organic

Carbon-based life is also known as “organic”. A long chain carbon-based life-form, an organism, is organic.

However, this term has been adopted incorrectly by food companies to promote their products. Organic does not mean “chemical free”. Everything is made of chemicals, water is a chemical compound.

Coal is organic, it comes from dead trees. Plastic is organic, it comes from crude oil which is dead sea creatures. If it started out as a living thing then it's organic. Don't be fooled by the advertisers.



Which Are Organic



Banana



Chicken



Crude Oil



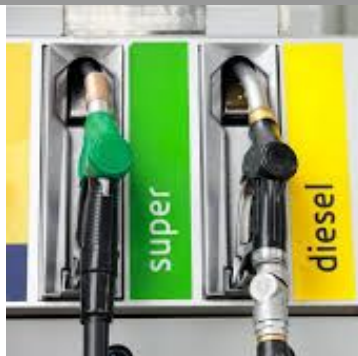
Crab



Straw



Nuts



Gasoline



Dead Fish



Plastic Bag



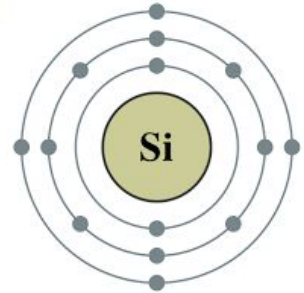
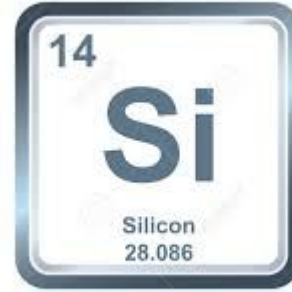
Dashboard

Silicon

Silicon Symbol **Si** Atomic No. 14

Because of its high chemical affinity for oxygen, it was not until 1823 that Jöns Jakob Berzelius was first able to prepare it in pure form. Its oxides form a family of anions known as silicates.

Silicon is the 8th most common element in the universe. It is widely distributed in space in cosmic dusts, planetoids and planets as silicates. More than 90% of the Earth's crust is composed of silicate minerals, making silicon the second most abundant element in the Earth's crust after oxygen, which is why the oceans and beaches are covered in silica sand, silicon dioxide, SiO_2 , a silicate.





HOW ARE MICROCHIPS MADE?

Silicon Chips

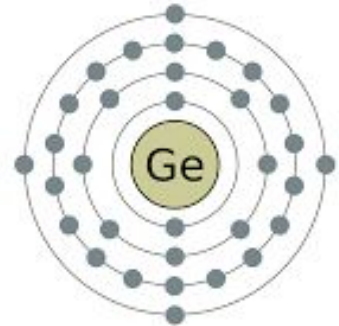
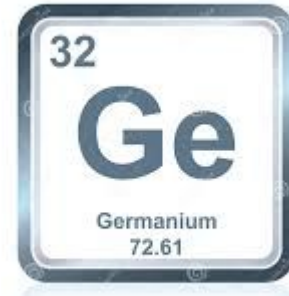
Germanium

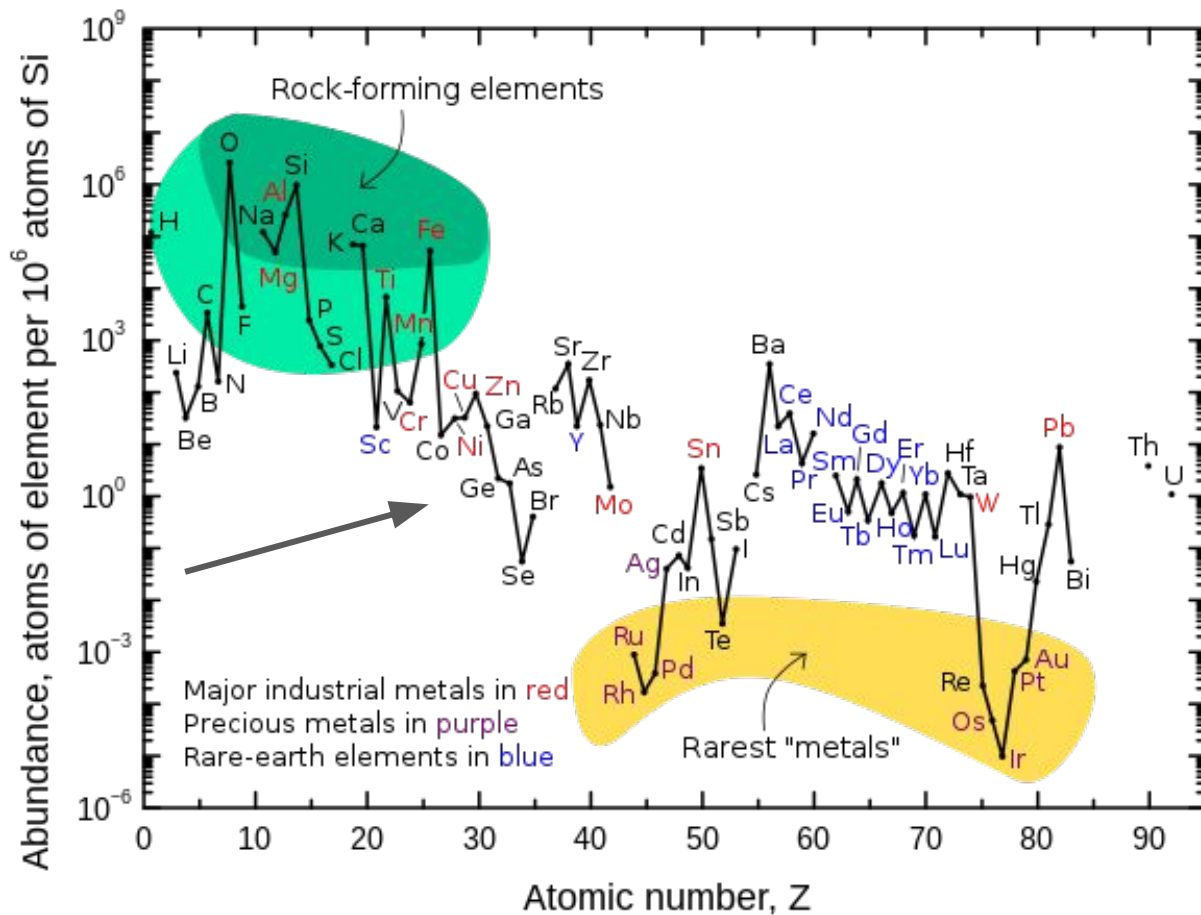
Germanium Symbol Ge Atomic No. 32

In 1886, Clemens Winkler at Freiberg University found the new element in a mineral, argyrodite, also containing silver and sulfur. He named the element after his country, Germany.

China produces most of the world's germanium, over 100 tonnes per year. It is mostly used in fibre optics, infrared optics and solar devices.

Germanium ranks near the 50th most abundant element on Earth, making it more common than gold or platinum but less common than many rare earth elements.





How many of these elements can you name?

There are 79 here.

Start with H and follow the lines.

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Tin

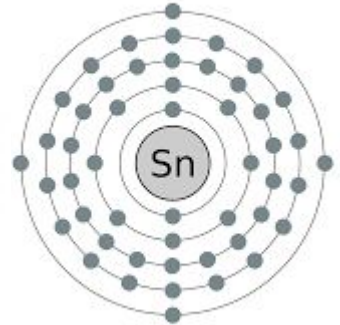
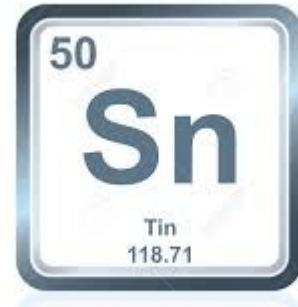
Tin Symbol Sn Atomic No. 50

Tin is created via a long process within medium sized stars, those with masses of 0.6 to 10 times that of the Sun. Latin for tin is “stannum”, symbol Sn.

Tin extraction and use can be dated to the beginnings of the Bronze Age around 3000 BC.

About 253,000 tonnes of tin were mined in 2011, mostly in China (110kt), Indonesia (51kt), Peru (35kt) and Bolivia (20kt).

About half of all tin is used in solder, the rest in tin plating, chemicals, brass and bronze alloys.





Soldering

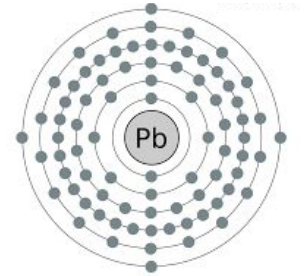
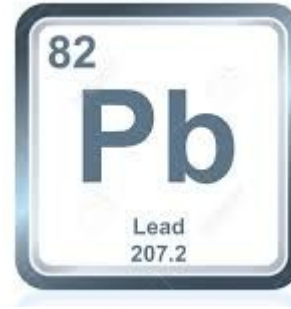
Lead

Lead Symbol Pb Atomic No. 82

Metallic lead beads dating back to 7000 BC. It is a heavy metal that is denser than most common materials. Lead is soft and malleable, with a relatively low melting point.

The name “lead” comes from an old English word. The ancient Latin name was “plumbum” which is where we get the symbol Pb.

Lead was used extensively for water pipes dating back to Roman times and even up until recently. However **lead is really toxic**, even in small amounts, especially to children. So we use copper for pipes now.



Things Made Using Lead



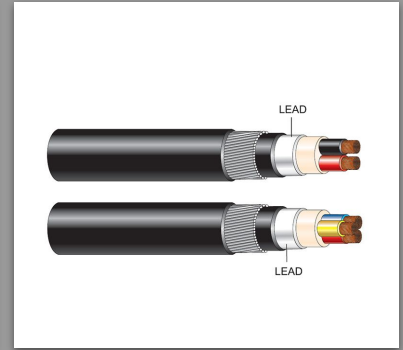
Lead Acid Batteries



Munitions



Diving Belts



Cable Sheathing



Fishing Sinkers



Lead Paints



Weights



Cosmetics

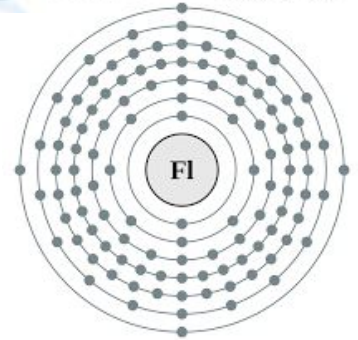
Flerovium

Flerovium Symbol Nh Atomic No. 114

Flerovium is a superheavy chemical element. It is an extremely radioactive synthetic element.

It is named after the Flerov Laboratory of Nuclear Reactions of the Joint Institute for Nuclear Research in Dubna, Russia, where the element was discovered in 1999. The lab's name, in turn, honours Russian physicist Georgy Flyorov.

About 90 flerovium atoms have been seen, they have a half-life of less than 2 seconds.



Name these Group 14 Carbon Elements



All living things are made of this. Related to organ, organism and organic. Graphite and diamonds.

Carbon



8th most common element in the Universe, 2nd most common in Earth's crust. Computer chips.

Silicon



Named after Germany where it was discovered in 1886 by Clemens Winkler. Used in fibre optics.

Germanium



Use dates back to 3,000 BC and bronze production. Latin name is "stannum". Sn.

Tin



Name come from an old English word. Atomic symbol comes from Latin word "plumbum". Pb.

Lead



Discovered 1999 in Russia at the Flerov Laboratory of Nuclear Reactions in Dubna.

Flerovium

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English with
2 Little Pigs

The End