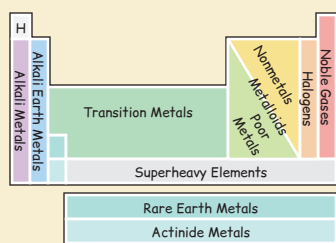


The Periodic Table of the Elements, in Pictures and Words

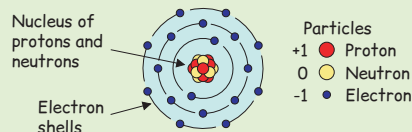


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- Solid** The color of the symbol is the color of the element in its most common pure form.
- Liquid**
- Gas** at room temperature
Examples metallic solid red liquid colorless gas
- Human Body** top ten elements by weight
- Earth's Crust** top eight elements by weight
- Magnetic** ferromagnetic at room temperature
- Noble Metals** corrosion-resistant
- Radioactive** all isotopes are radioactive
- Only Traces Found in Nature** less than a millionth percent of earth's crust
- Never Found in Nature** only made by people

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Atoms



An **atom** has a nucleus, made of protons and neutrons, surrounded by electrons orbiting in cloud-like shells. Smaller shells are surrounded by larger shells.

The **atomic number** is the number of protons in an atom. This determines the chemical properties of the atom.

Protons have positive **electric charge**, neutrons are neutral, and electrons are negative. Normally, an atom has equal numbers of protons and electrons. An **ion** is a charged atom with more or fewer electrons than protons.

The **atomic weight** of an element is the average number of protons plus neutrons. You can easily estimate the atomic weight: it is usually 2 to 2.5 times the atomic number.

An **element** is a substance made from one or more atoms of the same atomic number. A **compound** is a substance made from two or more elements chemically bonded.

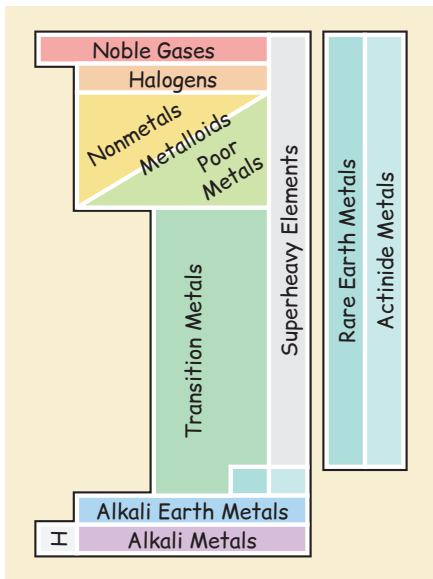
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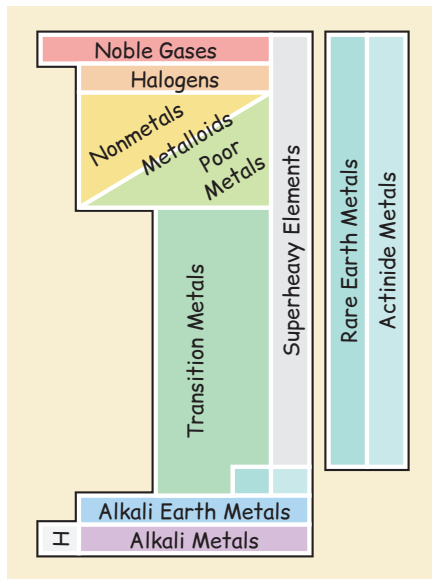
Hydrogen belongs to no definite group. It forms compounds by either donating an electron like an alkali metal or accepting an electron like a halogen.

Alkali Metals are very reactive and readily form compounds but are not found free in nature. They form salts and alkali (acid-neutralizing) compounds such as baking soda. In pure form, they are very soft metals which catch fire on contact with water.

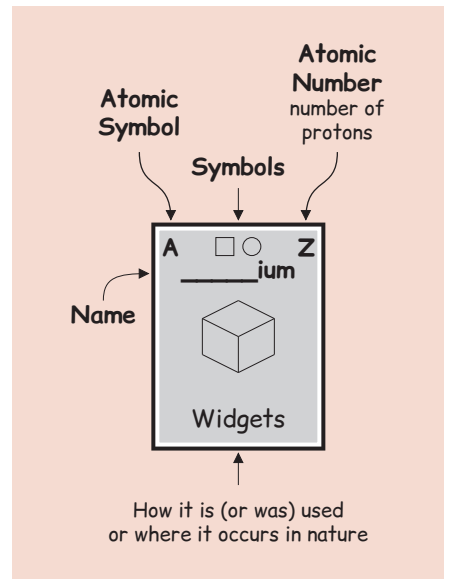
Alkali Earth Metals are reactive and readily form compounds but are not found free in nature. Their oxides are called alkali earths. In pure form, they are soft and somewhat brittle metals.



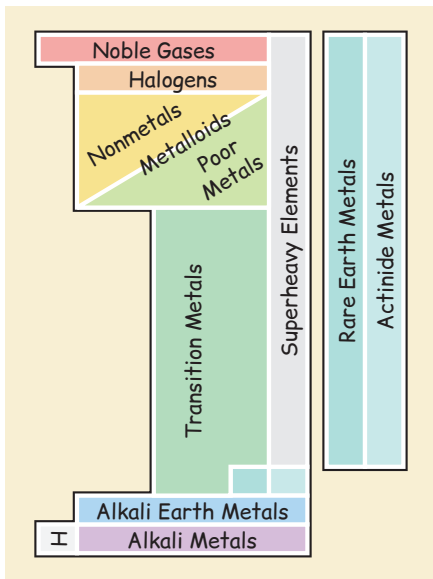
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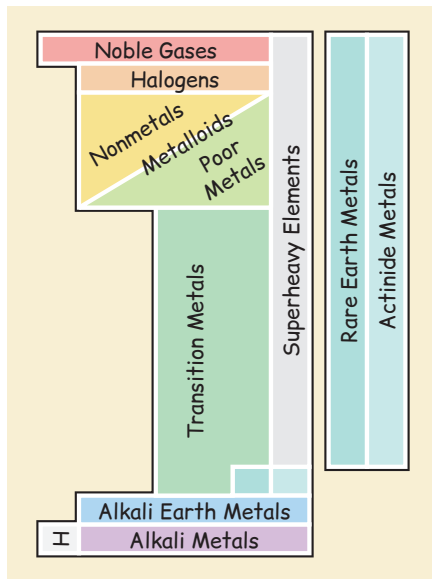
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Chemical Bonding

Atoms form molecules by bonding together. Atoms give, take, or share electrons to achieve full outer electron shells.

Ionic bond
One atom takes an electron from another atom and the oppositely charged ions attract.

Covalent bond
Atoms share their outer electrons.

Metallic bond
Shared outer electrons flow, conducting heat and electricity.

Groups
Elements in the same group, or column, are similar because they typically have the same number of outer electrons. This table shows some easy-to-remember common numbers for each group.

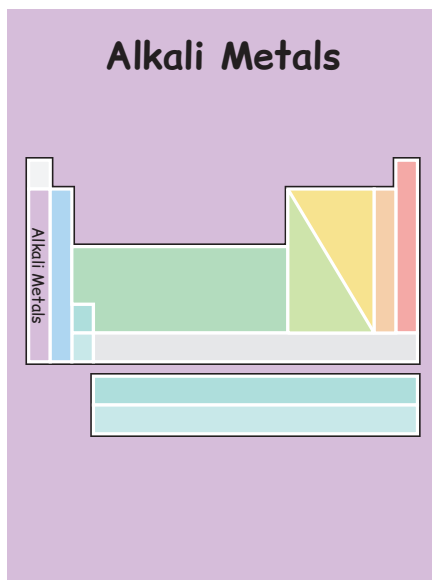
Group number	1	2	3-12	13	14	15	16	17	18
Outer electrons*	1	2	2	3	4	5	6	7	8
Valence number*	+1	+2	+2	+3	+4,-4	-3	-2	-1	0

* typical
The valence number is the number of electrons given (+) or taken (-) when bonding.

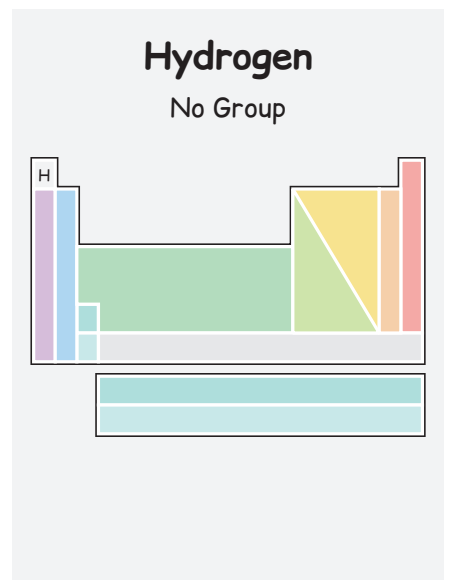
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Alkali Earth Metals are reactive and readily form compounds but are not found free in nature. Their oxides are called alkali earths. In pure form, they are soft and somewhat brittle metals.

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Halogens are reactive nonmetals and readily form compounds but are not found free in nature. They combine with alkali metals to form salts (halogen means salt-former).

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Noble Gases are inactive, or inert. Each atom has exactly the number of electrons it needs to have a full outer shell, so these atoms almost never bond with other atoms. That is why these are all gases.

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Transition Metals are typical metals: they are strong, shiny, malleable (they can be hammered into shape), flexible (in thin sheets or wires), and they conduct both heat and electricity.

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Poor Metals are usually soft and have low melting temperatures.

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Metalloids are partly like metals and partly like nonmetals. For example, they are semiconductors, which means they conduct electricity in some conditions.
B, Si, Ge, As, Sb, and Te are metalloids.

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Nonmetals, in their solid state, are usually brittle (they break rather than bend) and they are insulators of both heat and electricity.

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Rare Earth Metals are all soft metals. They are chemically similar to scandium and yttrium and are difficult to separate from each other.

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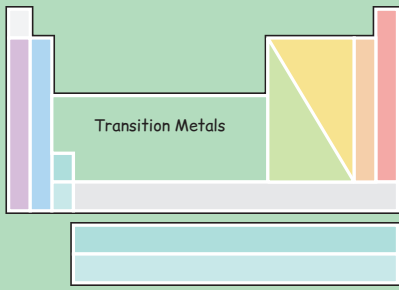
Actinide Metals are all radioactive heavy metals. They are used mainly for their radioactive properties.

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Superheavy Elements are all radioactive and short-lived. They are never found in nature and have no uses except atomic research.

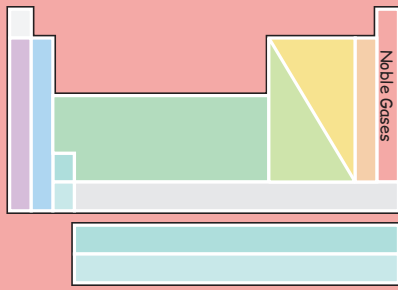
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Transition Metals



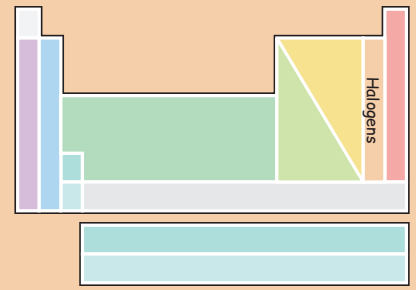
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Noble Gases



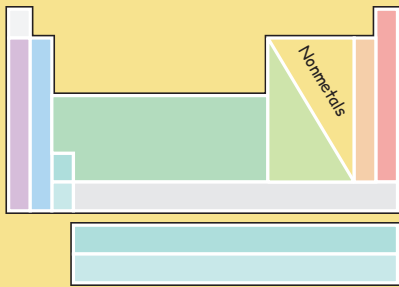
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Halogens



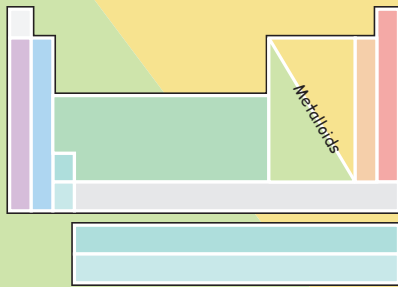
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Nonmetals



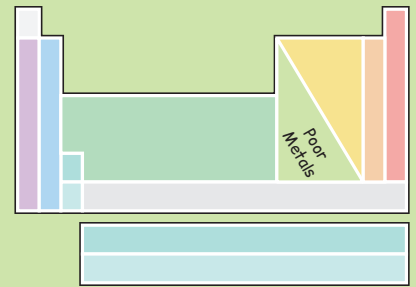
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Metalloids



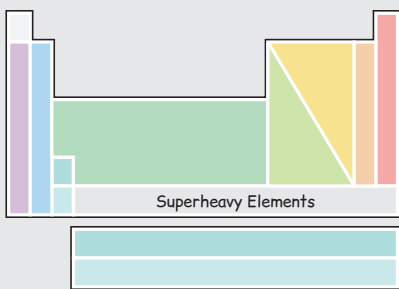
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Poor Metals



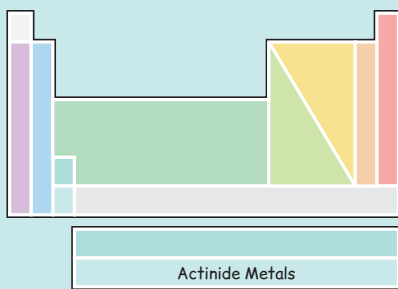
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Superheavy Elements



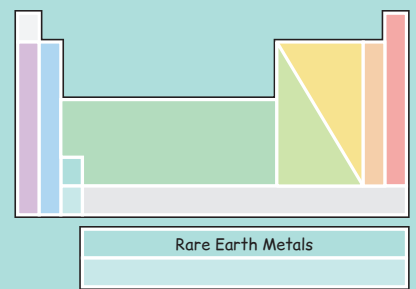
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Actinide Metals



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Rare Earth Metals



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H   1
Hydrogen



Sun and Stars

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He  2
Helium



Balloons

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Li  3
Lithium



Batteries

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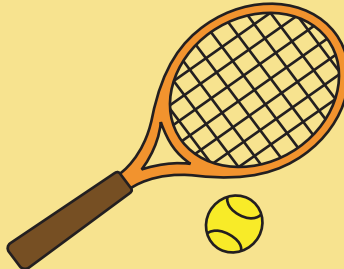
Be  4
Beryllium



Emeralds

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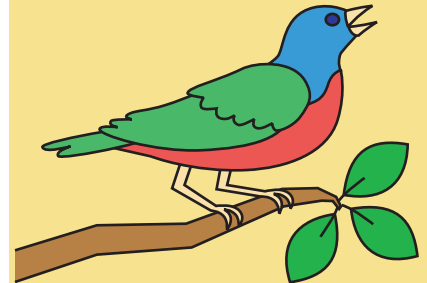
B  5
Boron



Sports Equipment

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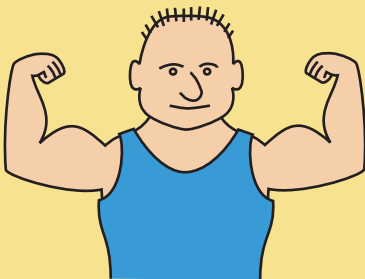
C   6
Carbon



Basis of Life's Molecules

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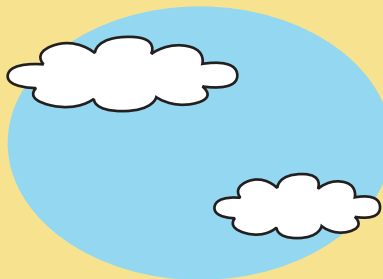
N   7
Nitrogen



Protein

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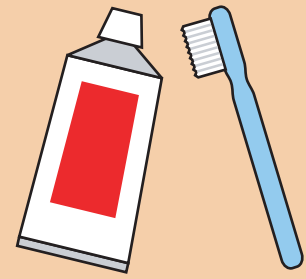
O    8
Oxygen



Air

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F  9
Fluorine



Toothpaste

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Li Lithium 3

lightest metal,
soft, reactive;
lightweight
aluminum alloys,
batteries,
impact-resistant
ceramic cookware,
mood stabilizer

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He Helium 2

inert gas, second
lightest element;
fuel for nuclear
fusion in sun
and stars,
balloons, lasers,
supercold
refrigerant

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H Hydrogen 1

explosive gas,
lightest element;
90% of atoms in
the universe,
sun and stars,
water (H₂O),
life's organic
molecules

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C Carbon 6

hard diamond,
soft graphite;
basis of life's
organic molecules,
animals, plants,
CO₂, wood, paper,
cloth, plastic,
coal, oil, gasoline

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B Boron 5

hard black solid;
borax soap,
fertilizer,
stiff fibers,
sports equipment,
heat-resistant
borosilicate glass,
semiconductors

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Be Beryllium 4

lightweight metal;
non-sparking
copper alloy tools,
aerospace,
X-ray windows,
beryl gems:
emeralds and
aquamarines

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F Fluorine 9

yellowish
poison gas,
most reactive
element;
glowing fluorite,
toothpaste,
nonstick cookware,
CFC refrigerants

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O Oxygen 8

colorless gas;
21% of air, H₂O,
65% of the body,
organic molecules,
blood, breathing,
fire, half of
Earth's crust,
minerals, oxides

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N Nitrogen 7

colorless gas;
78% of air,
organic molecules,
protein, muscles,
DNA, ammonia,
fertilizer,
explosives (TNT),
refrigerants

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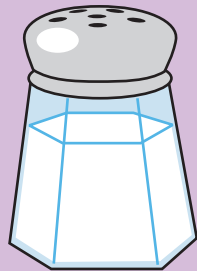
Ne  10
Neon



Advertising
Signs

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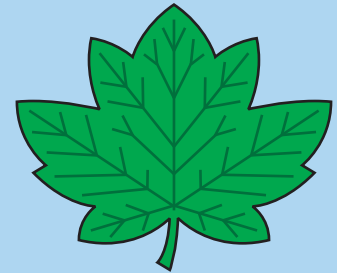
Na    11
Sodium



Salt

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Mg   12
Magnesium



Chlorophyll

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Al   13
Aluminum



Airplanes

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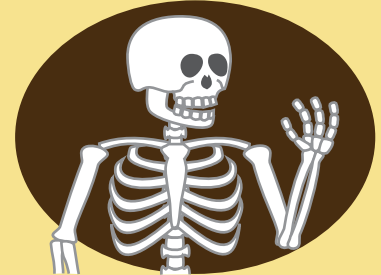
Si   14
Silicon



Stone, Sand,
and Soil

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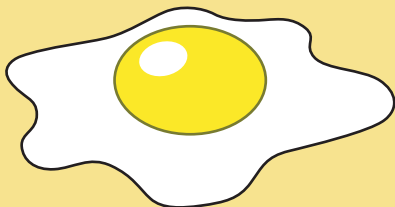
P   15
Phosphorus



Bones

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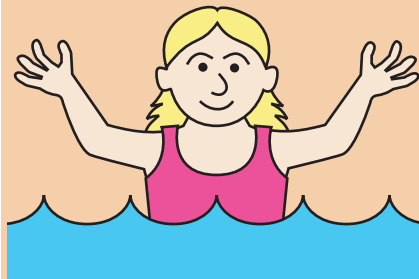
S   16
Sulfur



Egg Yolks

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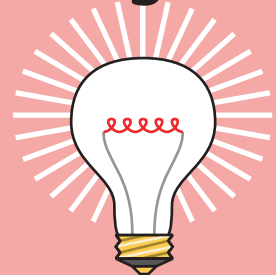
Cl   17
Chlorine



Swimming
Pools

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Ar  18
Argon



Light Bulbs

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Mg Magnesium 12
lightweight metal;
chlorophyll in
green plants,
talc, basalt,
aluminum alloys,
cars, planes, bikes,
flares, sparklers,
antacids

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Na Sodium 11
soft metal,
reactive;
salt (NaCl), nerves,
baking soda,
antacids, lye, soap,
soda ash, glass,
papermaking,
street lamps

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Ne Neon 10
inert gas;
orange-red
neon tubes for
advertising signs,
lasers,
supercold
refrigerant

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P Phosphorus 15
glowing white waxy
solid (also red
and black forms);
bones, DNA,
energy-storing
phosphates (ATP),
fertilizer, acids,
detergent, matches

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Si Silicon 14
hard metalloid;
quartz, granite,
sand, soil, clay,
ceramics, glass,
algae, diatoms,
semiconductors,
computer chips,
silicone rubber

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Al Aluminum 13
lightweight non-
corroding metal;
kitchenware, cans,
foil, machinery,
cars, planes, bikes,
feldspar, granite,
clay, ceramics,
corundum, gems

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Ar Argon 18
inert gas;
1% of air,
most abundant
inert gas,
light bulbs,
"neon" tubes,
lasers,
welding gas

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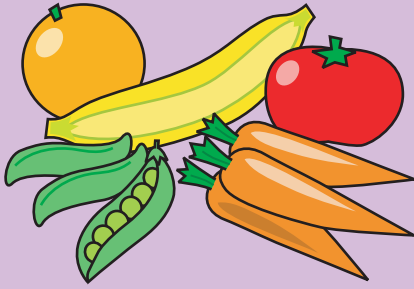
Cl Chlorine 17
greenish poison gas;
salt (NaCl), bleach,
stomach acid,
disinfectant,
drinking water,
swimming pools,
PVC plastic
pipes and bottles

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S Sulfur 16
brittle yellow solid;
skin, hair,
egg yolks, onions,
garlic, skunks,
hot springs,
volcanos, gypsum,
rubber, acids,
papermaking


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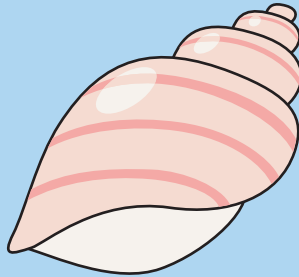
K    19
Potassium



Fruits and
Vegetables

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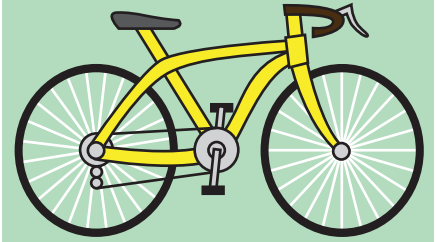
Ca    20
Calcium



Shells and
Bones

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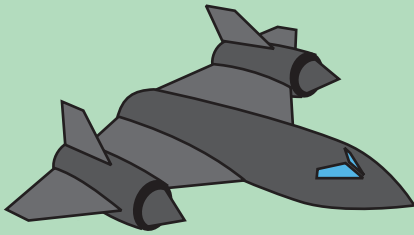
Sc  21
Scandium



Bicycles

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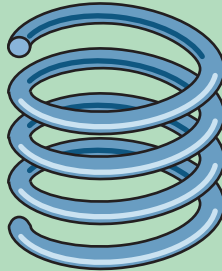
Ti  22
Titanium



Aerospace

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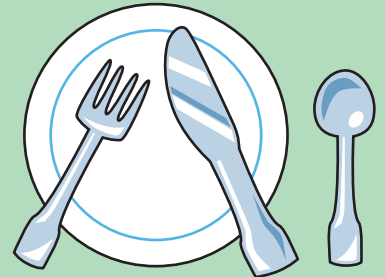
V  23
Vanadium



Springs

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Cr  24
Chromium



Stainless
Steel

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Mn  25
Manganese



Earthmovers

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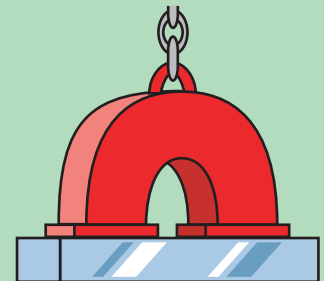
Fe    26
Iron



Steel
Structures

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Co   27
Cobalt



Magnets

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Sc Scandium 21
soft lightweight
metal;
aluminum alloys,
racing bikes,
stadium lamps,
furnace bricks,
aquamarines

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Ca Calcium 20
soft metal;
bones, teeth, milk,
leaves, vegetables,
shells, coral,
limestone, chalk,
gypsum, plaster,
mortar, cement,
marble, antacids

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K Potassium 19
soft metal,
reactive;
salts, nerves,
nutrients in fruits
and vegetables,
soap, fertilizer,
potash, matches,
gunpowder

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Cr Chromium 24
hard shiny metal;
stainless steel
(Fe-Cr-Ni),
kitchenware,
nichrome heaters,
car trim, paints,
recording tape,
emeralds & rubies

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V Vanadium 23
hard metal;
hard strong
resilient steel,
structures,
vehicles, springs,
driveshafts, tools,
aerospace,
violet sapphires

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Ti Titanium 22
strongest
lightweight metal,
heat-resistant;
aerospace,
racing bikes,
artificial joints,
white paint,
blue sapphires

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Co Cobalt 27
hard metal,
magnetic;
hard strong steel,
cutting tools,
turbines,
magnets (Al-Ni-Co),
blue glass, ceramics,
vitamin B-12

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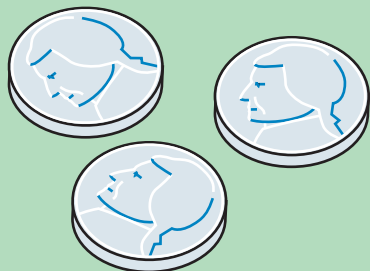
Fe Iron 26
medium-hard
metal, magnetic;
steel alloys
are mostly iron,
structures,
vehicles, magnets,
Earth's core,
red rocks, blood

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Mn Manganese 25
hard metal;
hard tough steel,
earthmovers,
rock crushers,
rails, plows, axes,
batteries,
fertilizer,
amethysts

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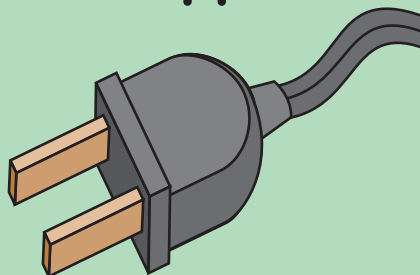
Ni   28
Nickel



Coins

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Cu  29
Copper



Electric
Wires

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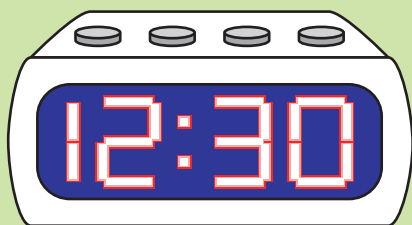
Zn  30
Zinc



Brass
Instruments

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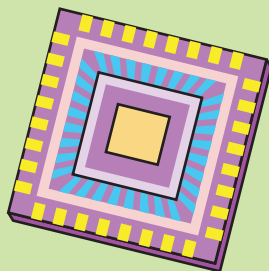
Ga  31
Gallium



Light-Emitting
Diodes (LEDs)

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Ge  32
Germanium



Semiconductor
Electronics

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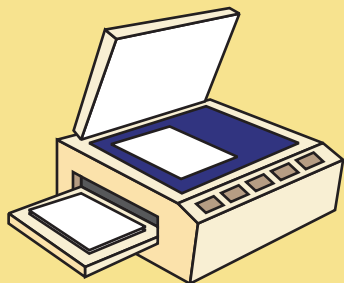
As  33
Arsenic



Poison

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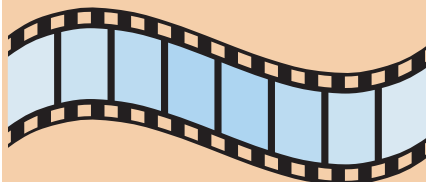
Se  34
Selenium



Copiers

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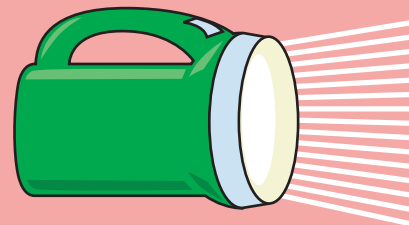
Br  35
Bromine



Photography
Film

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Kr  36
Krypton



Flashlights

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Zn Zinc 30
non-corroding
metal;
galvanized steel,
brass (Cu-Zn),
batteries, white
paint, phosphors
in TVs and lamps,
fertilizer

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Cu Copper 29
colored metal,
conducts heat and
electricity well;
wires, cookware,
brass (Cu-Zn),
bronze (Cu-Sn),
coins, pipes,
blue crab blood

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Ni Nickel 28
medium-hard
metal, magnetic;
stainless steel
(Fe-Cr-Ni),
kitchenware,
nichrome heaters,
nicad batteries,
coins, Earth's core

elements.wlonk.com

As Arsenic 33
brittle metalloid;
poisons,
semiconductors,
light-emitting
diodes (LEDs)
(GaAs),
signal lights,
tiny lasers

elements.wlonk.com

Ge Germanium 32
brittle metalloid;
semiconductors,
transistors,
rectifiers, diodes,
photocells,
lenses,
infrared windows

elements.wlonk.com

Ga Gallium 31
soft metal, melts
on a hot day;
semiconductors,
light-emitting
diodes (LEDs)
(GaAs),
signal lights,
tiny lasers

elements.wlonk.com

Kr Krypton 36
inert gas;
high-intensity
lamps, headlights,
flashlights,
lanterns,
"neon" tubes,
lasers

elements.wlonk.com

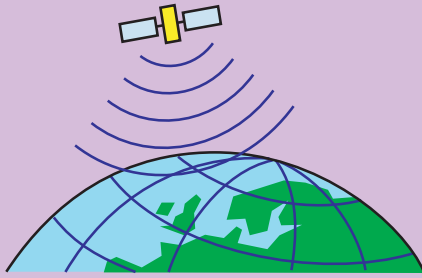
Br Bromine 35
dark red liquid;
disinfectant,
pools and spas,
photo film,
flame retardant,
leaded gasoline,
sedatives

elements.wlonk.com

Se Selenium 34
brittle gray solid;
photocopiers,
laser printers,
photocells,
red glass,
dandruff shampoo,
rubber

elements.wlonk.com

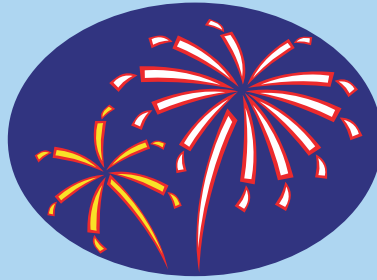
Rb  37
Rubidium



Global
Navigation

elements.wlonk.com

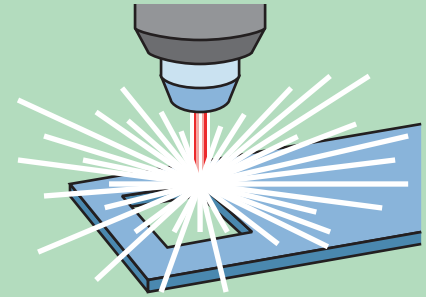
Sr  38
Strontium



Fireworks

elements.wlonk.com

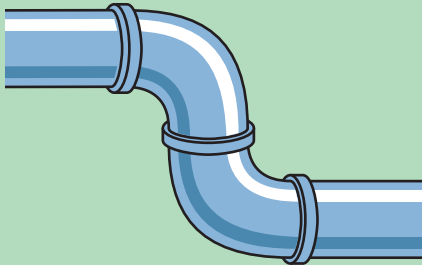
Y  39
Yttrium



Lasers

elements.wlonk.com

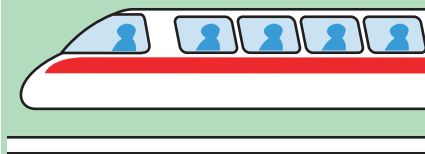
Zr  40
Zirconium



Chemical
Pipelines

elements.wlonk.com

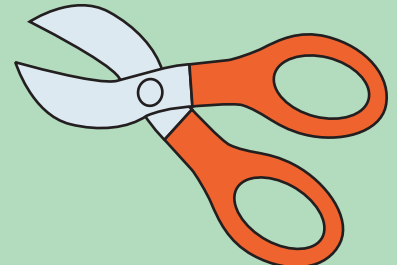
Nb  41
Niobium



Mag Lev
Trains

elements.wlonk.com

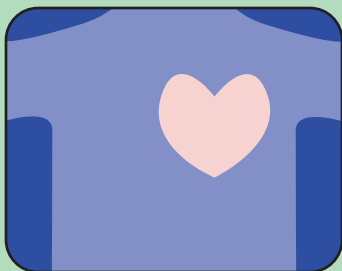
Mo  42
Molybdenum



Cutting
Tools

elements.wlonk.com

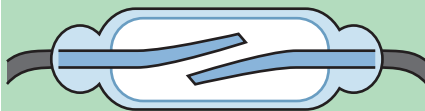
Tc    43
Technetium



Radioactive
Diagnosis

elements.wlonk.com

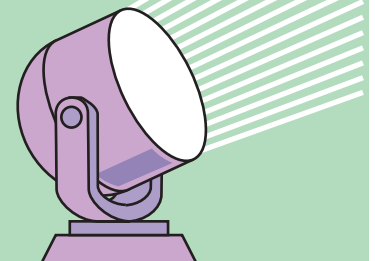
Ru   44
Ruthenium



Electric
Switches

elements.wlonk.com

Rh   45
Rhodium



Searchlight
Reflectors

elements.wlonk.com

Y Yttrium 39
soft metal;
phosphors in
color TVs,
lasers (YAG, YLF),
furnace bricks,
high-temperature
superconductors

elements.wlonk.com

Sr Strontium 38
soft metal;
red fireworks,
flares,
phosphors,
nuclear batteries,
medical
diagnostic tracer,
nuclear fallout

elements.wlonk.com

Rb Rubidium 37
soft metal,
reactive;
atomic clocks,
global navigation
(GPS),
vacuum tube
scavenger

elements.wlonk.com

Mo Molybdenum 42
high-melting-point
metal;
hard steel,
cutting tools,
drill bits,
armor plate,
gun barrels,
fertilizer

elements.wlonk.com

Nb Niobium 41
high-melting-point
non-corroding
metal;
chemical pipelines,
superconductors,
magnetic
levitation trains,
MRI magnets

elements.wlonk.com

Zr Zirconium 40
non-corroding
neutron-resistant
metal;
chemical pipelines,
nuclear reactors,
furnace bricks,
abrasives,
zircon gems

elements.wlonk.com

Rh Rhodium 45
non-corroding
hard shiny metal;
labware,
reflectors,
electric contacts,
thermocouples,
catalyst,
pollution control

elements.wlonk.com

Ru Ruthenium 44
non-corroding
hard metal;
electric contacts,
leaf switches,
pen tips.
catalyst,
hydrogen
production

elements.wlonk.com

Tc Technetium 43
radioactive,
long-lived;
first human-made
element, only
traces on Earth
but found in stars,
medical
diagnostic tracer

elements.wlonk.com

Pd   46
Palladium



Pollution
Control

elements.wlonk.com

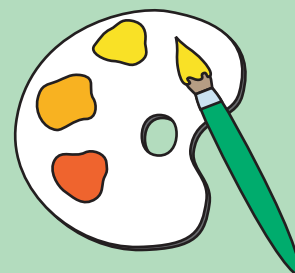
Ag   47
Silver



Jewelry

elements.wlonk.com

Cd  48
Cadmium



Paint

elements.wlonk.com

In  49
Indium



Liquid Crystal
Displays (LCDs)

elements.wlonk.com

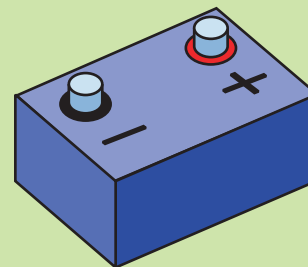
Sn  50
Tin



Plated
Food Cans

elements.wlonk.com

Sb  51
Antimony



Car
Batteries

elements.wlonk.com

Te  52
Tellurium



Thermoelectric
Coolers

elements.wlonk.com

I  53
Iodine



Disinfectant

elements.wlonk.com

Xe  54
Xenon



High-Intensity
Lamps

elements.wlonk.com

Cd Cadmium 48
non-corroding
soft metal, toxic;
electroplated
steel,
nicad batteries,
red and yellow
paints,
fire sprinklers

elements.wlonk.com

Ag Silver 47
soft shiny metal,
conducts
electricity best
of all elements;
jewelry,
silverware, coins,
dentistry,
photo film

elements.wlonk.com

Pd Palladium 46
non-corroding
hard metal,
absorbs hydrogen;
labware,
electric contacts,
dentistry,
catalyst,
pollution control

elements.wlonk.com

Sb Antimony 51
brittle metalloid;
solders,
lead hardener,
batteries, bullets,
semiconductors,
photocells,
matches,
flame retardant

elements.wlonk.com

Sn Tin 50
non-corroding
soft metal;
solders,
plated food cans,
bronze (Cu-Sn),
pewter cups,
glassmaking,
fire sprinklers

elements.wlonk.com

In Indium 49
soft metal;
solders,
glass seals,
glass coatings,
liquid crystal
displays (LCDs),
semiconductors,
diodes, photocells

elements.wlonk.com

Xe Xenon 54
inert gas;
high-intensity
lamps, headlights,
stadium lamps,
projectors,
strobes, lasers,
spacecraft
ion engines

elements.wlonk.com

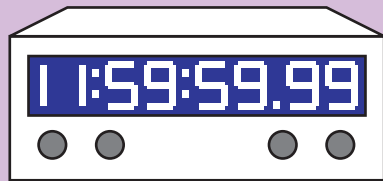
I Iodine 53
violet-black solid;
disinfectant for
wounds and
drinking water,
added to salt
to prevent
thyroid disease,
photo film

elements.wlonk.com

Te Tellurium 52
brittle metalloid;
alloys,
semiconductors,
photocopiers,
computer disks,
thermo-electric
coolers and
generators

elements.wlonk.com

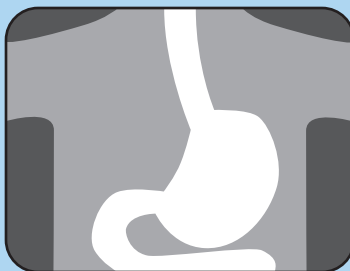
Cs  55
Cesium



Atomic
Clocks

elements.wlonk.com

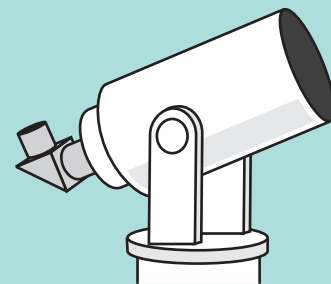
Ba  56
Barium



X-Ray
Diagnosis

elements.wlonk.com

La  57
Lanthanum



Telescope
Lenses

elements.wlonk.com

Ce  58
Cerium



Lighter
Flints

elements.wlonk.com

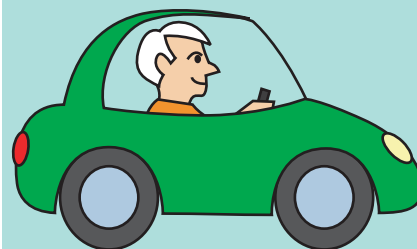
Pr  59
Praseodymium



Torchworkers'
Eyeglasses


elements.wlonk.com

Nd  60
Neodymium



Electric Motor
Magnets

elements.wlonk.com

Pm    61
Promethium



Luminous
Dials

elements.wlonk.com

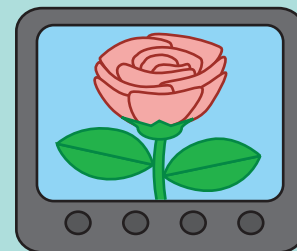
Sm  62
Samarium



Electric Motor
Magnets

elements.wlonk.com

Eu  63
Europium



Color
Televisions

elements.wlonk.com

La Lanthanum 57

soft metal;
optical glass,
telescope
eyepieces,
camera lenses,
lighter flints,
arc lamps

elements.wlonk.com

Ba Barium 56

soft metal,
absorbs X-rays;
stomach X-ray
contrast enhancer,
green fireworks,
whitener and filler
for paper, plastic,
and rubber

elements.wlonk.com

Cs Cesium 55

soft metal, melts
on a hot day,
reactive, largest
stable atoms;
atomic clocks,
global navigation
(GPS), vacuum
tube scavenger

elements.wlonk.com

Nd Neodymium 60

soft metal;
strong magnets
(Nd-Fe-B),
electric motors,
speakers and
headphones,
lasers,
lighter flints

elements.wlonk.com

Pr Praseodymium 59

soft metal;
torchworkers'
didymium eye-
glasses (Pr-Nd),
lighter flints,
arc lamps,
magnets,
yellow glass

elements.wlonk.com

Ce Cerium 58

soft metal;
most abundant
rare earth metal,
lighter flints,
gas lamp mantles,
self-cleaning
ovens,
glass polishing

elements.wlonk.com

Eu Europium 63

soft metal;
phosphors in
color TVs and
trichromatic lamps,
luminous paint,
lasers

elements.wlonk.com

Sm Samarium 62

soft metal;
magnets (Sm-Co),
electric motors,
speakers and
headphones,
infrared sensors,
infrared-absorbing
glass

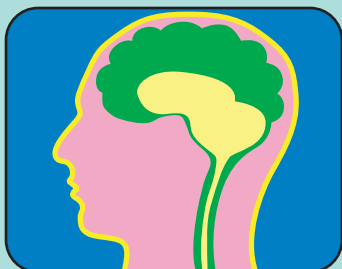
elements.wlonk.com

Pm Promethium 61

radioactive,
long-lived;
human-made,
small traces
in nature,
luminous dials,
sheet thickness
gauges

elements.wlonk.com

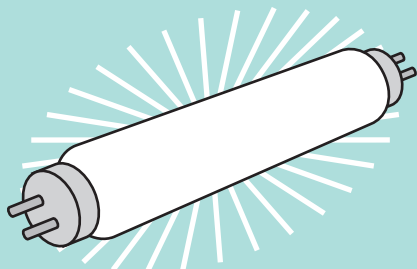
Gd 64
Gadolinium



MRI
Diagnosis

elements.wlonk.com

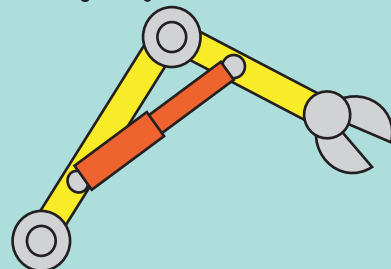
Tb 65
Terbium



Fluorescent
Lamps

elements.wlonk.com

Dy 66
Dysprosium



Smart Material
Actuators

elements.wlonk.com

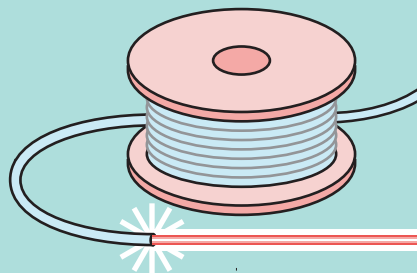
Ho 67
Holmium



Laser
Surgery

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Er 68
Erbium



Optical Fiber
Communications

elements.wlonk.com

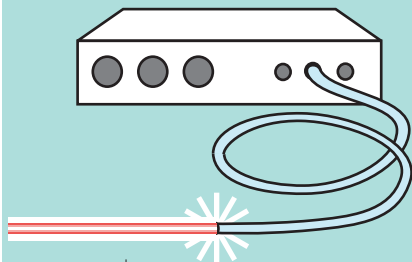
Tm 69
Thulium



Laser
Surgery

elements.wlonk.com

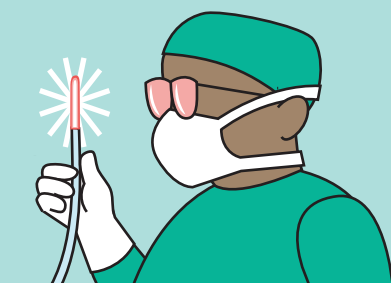
Yb 70
Ytterbium



Scientific
Fiber Lasers

elements.wlonk.com

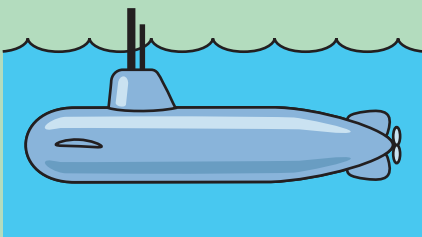
Lu 71
Lutetium



Photodynamic
Medicine

elements.wlonk.com

Hf 72
Hafnium



Nuclear
Submarines

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Dy Dysprosium 66
soft metal;
nuclear
control rods,
MRI phosphors,
computer disks,
magnetostrictive
smart materials
(Terfenol-D®)

elements.wlonk.com

Tb Terbium 65
soft metal;
phosphors in
color TVs and
trichromatic lamps,
computer disks,
magnetostrictive
smart materials
(Terfenol-D®)

elements.wlonk.com

Gd Gadolinium 64
soft metal, best
neutron absorber,
magnetic;
magnetic resonance
imaging (MRI)
contrast enhancer,
phosphors, neutron
radiography

elements.wlonk.com

Tm Thulium 69
soft metal;
rarest stable
rare earth metal,
infrared lasers,
laser surgery,
phosphors

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Er Erbium 68
soft metal;
fiber optic
signal amplifiers,
infrared lasers,
laser surgery,
pink glass,
sunglasses,
vanadium alloys

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Ho Holmium 67
soft metal;
infrared lasers,
laser surgery,
eye-safe laser
rangefinders,
computer disks,
yellow glass filters

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Hf Hafnium 72
non-corroding
metal,
absorbs neutrons;
nuclear reactor
control rods in
submarines,
plasma torch
electrodes

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Lu Lutetium 71
soft metal,
densest and
hardest
rare earth metal;
cancer-fighting
photodynamic
(light-activated)
medicine

elements.wlonk.com

Yb Ytterbium 70
soft metal;
fiber optic
signal amplifiers,
infrared
fiber lasers,
stainless steel
alloys

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Ta  73
Tantalum



Mobile
Phones

elements.wlonk.com

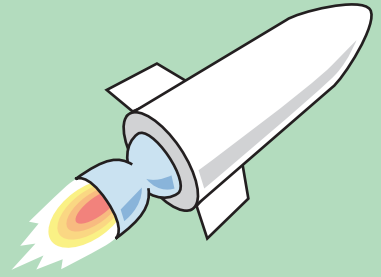
W  74
Tungsten



Lamp
Filaments

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Re  75
Rhenium



Rocket
Engines

elements.wlonk.com

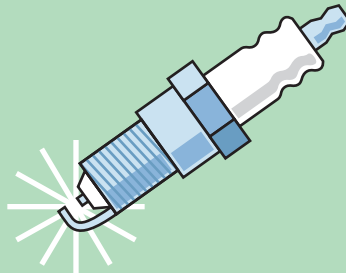
Os   76
Osmium



Pen Points

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Ir   77
Iridium



Spark Plugs

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Pt   78
Platinum



Labware

elements.wlonk.com

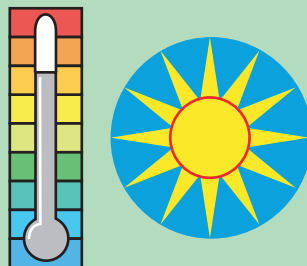
Au   79
Gold



Jewelry

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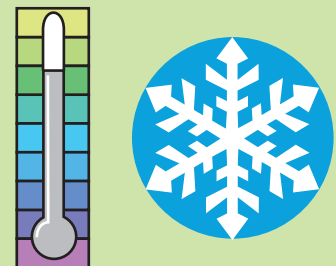
Hg  80
Mercury



Thermometers

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Tl  81
Thallium



Low-Temperature
Thermometers

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Re Rhenium 75
high-melting-point
dense metal;
rocket engines,
heater coils,
lab filaments,
electric contacts,
thermocouples,
catalyst

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W Tungsten 74
highest-melting-
point metal, dense;
filaments in
lamps and TVs,
cutting tools,
abrasives,
thermocouples

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Ta Tantalum 73
high-melting-point
non-corroding
metal;
labware,
surgical tools,
artificial joints,
capacitors,
mobile phones

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Pt Platinum 78
non-corroding
dense metal;
labware,
spark plugs,
catalyst,
pollution control,
petroleum cracking,
processing fats

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Ir Iridium 77
non-corroding
hard metal,
densest element
(same as osmium);
labware,
spark plugs,
pen tips, needles

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Os Osmium 76
non-corroding
high-melting-point
hard metal,
densest element
(same as iridium);
electric contacts,
pen tips, needles,
fingerprint powder

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Tl Thallium 81
soft metal,
toxic;
low-melting-point
mercury alloys,
low-temperature
thermometers,
undersea lamps,
photocells

elements.wlonk.com

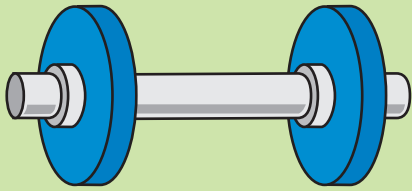
Hg Mercury 80
liquid metal,
toxic;
thermometers,
barometers,
thermostats,
street lamps,
fluorescent lamps,
dentistry

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Au Gold 79
most malleable
element, dense
non-tarnishing
colored metal;
jewelry, coins,
ultra-thin
gold leaf,
electric contacts

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Pb  82
Lead



Weights


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Bi  83
Bismuth



Fire
Sprinklers

elements.wlonk.com

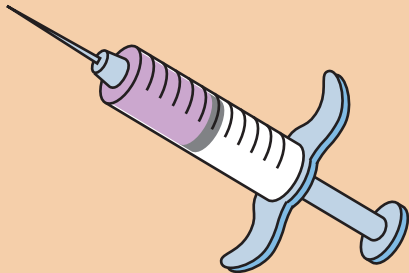
Po    84
Polonium



Anti-Static
Brushes

elements.wlonk.com

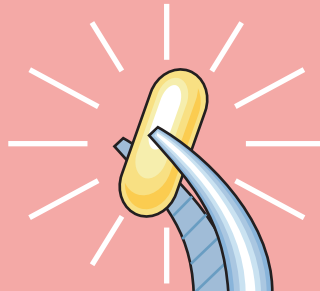
At    85
Astatine



Radioactive
Medicine

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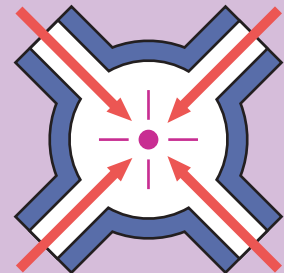
Rn   86
Radon



Surgical
Implants

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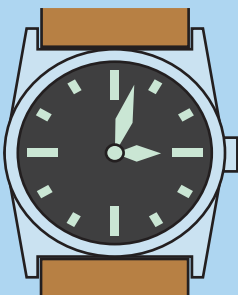
Fr    87
Francium



Laser
Atom Traps

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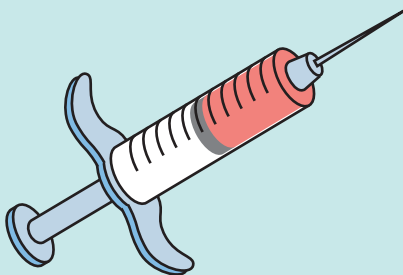
Ra    88
Radium



Luminous
Watches

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Ac    89
Actinium



Radioactive
Medicine

elements.wlonk.com

Th   90
Thorium



Gas Lamp
Mantles

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Po Polonium 84
radioactive,
long-lived;
first radioactive
element found,
small traces
in nature,
anti-static brushes,
tobacco

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Bi Bismuth 83
low-melting-point
brittle metal;
solders, fuses,
fire sprinklers
(plugs melt
when hot),
cosmetics pigment

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Pb Lead 82
dense, soft,
non-corroding
metal, toxic;
weights, solders,
batteries, bullets,
crystal glass,
old plumbing,
radiation shield

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Fr Francium 87
radioactive,
short-lived
atoms larger
than cesium;
small traces
in nature,
studied in
laser atom traps

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Rn Radon 86
radioactive gas,
short-lived;
environmental
hazard,
surgical implants
for cancer
treatment

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At Astatine 85
radioactive,
short-lived;
small traces
in nature,
cancer medicine

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Th Thorium 90
radioactive,
long-lived;
most abundant
radioactive element,
nuclear
reactor fuel,
gas lamp mantles,
tungsten filaments

elements.wlonk.com

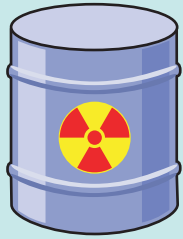
Ac Actinium 89
radioactive,
long-lived;
small traces
in nature,
cancer medicine,
neutron source,
radwaste

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Ra Radium 88
radioactive,
long-lived;
luminous watches
(now banned),
medical radon
production,
radiography,
radwaste

elements.wlonk.com

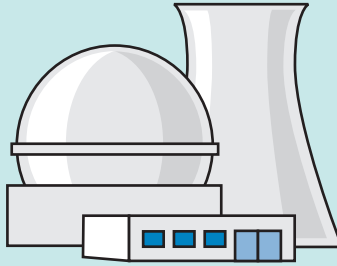
Pa  91
Protactinium



Radioactive
Waste

elements.wlonk.com

U  92
Uranium



Nuclear
Power

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Np  93
Neptunium



Radioactive
Waste

elements.wlonk.com

Pu  94
Plutonium



Nuclear
Weapons

elements.wlonk.com

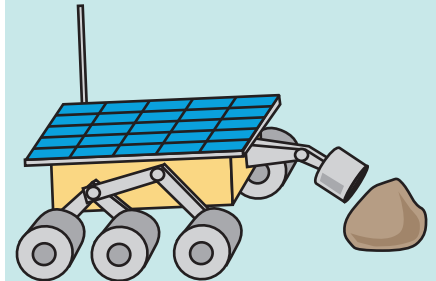
Am  95
Americium



Smoke
Detectors

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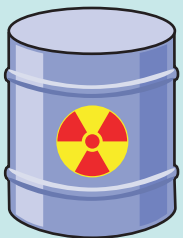
Cm  96
Curium



Mineral
Analyzers

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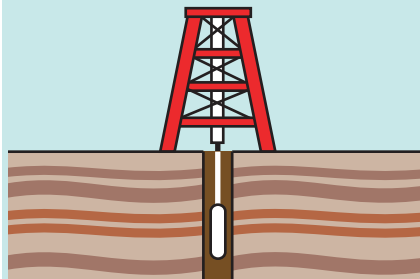
Bk  97
Berkelium



Radioactive
Waste

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Cf  98
Californium



Mineral
Analyzers

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Es  99
Einsteinium

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Np Neptunium 93
radioactive,
long-lived;
small traces
in nature,
neutron detectors,
dosimeters,
nuclear weapons,
radwaste

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U Uranium 92
radioactive,
long-lived, dense;
nuclear
reactor fuel,
nuclear weapons,
counterweights,
armor piercing
bullets

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Pa Protactinium 91
radioactive,
long-lived;
small traces
in nature,
no uses,
radwaste

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Cm Curium 96
radioactive,
long-lived;
never found
in nature,
scientific
instruments,
mineral analyzers,
radwaste

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Am Americium 95
radioactive,
long-lived;
never found
in nature,
smoke detectors,
sheet thickness
gauges,
radwaste

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Pu Plutonium 94
radioactive,
long-lived;
small traces
in nature,
nuclear
reactor fuel,
spacecraft power,
nuclear weapons

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Es Einsteinium 99
radioactive,
short-lived;
never found
in nature,
no uses

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Cf Californium 98
radioactive,
long-lived;
never found
in nature,
scientific
instruments,
mineral analyzers,
radwaste

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Bk Berkelium 97
radioactive,
long-lived;
never found
in nature,
no uses,
radwaste

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Fm   X 100
Fermium

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Md   X 101
Mendelevium

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No   X 102
Nobelium

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Lr   X 103
Lawrencium

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Rf  X 104
Rutherfordium

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Db  X 105
Dubnium

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Sg  X 106
Seaborgium

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Bh  X 107
Bohrium

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Hs  X 108
Hassium

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No 102
Nobelium

radioactive,
short-lived;
never found
in nature,
no uses

elements.wlonk.com

Md 101
Mendelevium

radioactive,
short-lived;
never found
in nature,
no uses

elements.wlonk.com

Fm 100
Fermium

radioactive,
short-lived;
never found
in nature,
no uses

elements.wlonk.com

Db 105
Dubnium

radioactive,
short-lived;
never found
in nature,
no uses

elements.wlonk.com

Rf 104
Rutherfordium

radioactive,
short-lived;
never found
in nature,
no uses

elements.wlonk.com

Lr 103
Lawrencium

radioactive,
short-lived;
never found
in nature,
no uses

elements.wlonk.com

Hs 108
Hassium

radioactive,
short-lived;
never found
in nature,
no uses

elements.wlonk.com

Bh 107
Bohrium

radioactive,
short-lived;
never found
in nature,
no uses

elements.wlonk.com

Sg 106
Seaborgium

radioactive,
short-lived;
never found
in nature,
no uses

elements.wlonk.com

Mt  **X 109**
Meitnerium

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Ds  **X 110**
Darmstadtium

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Rg  **X 111**
Roentgenium

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Cn  **X 112**
Copernicium

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Nh  **X 113**
Nihonium

elements.wlonk.com

Fl  **X 114**
Flerovium

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Mc  **X 115**
Moscovium

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Lv  **X 116**
Livermorium

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Ts  **X 117**
Tennessee

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Rg 111
Roentgenium

radioactive,
short-lived;
never found
in nature,
no uses

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Ds 110
Darmstadtium

radioactive,
short-lived;
never found
in nature,
no uses

elements.wlonk.com

Mt 109
Meitnerium

radioactive,
short-lived;
never found
in nature,
no uses

elements.wlonk.com

Fl 114
Flerovium

radioactive,
short-lived;
never found
in nature,
no uses

elements.wlonk.com

Nh 113
Nihonium

radioactive,
short-lived;
never found
in nature,
no uses

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Cn 112
Copernicium

radioactive,
short-lived;
never found
in nature,
no uses

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Ts 117
Tennesine

radioactive,
short-lived;
never found
in nature,
no uses

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Lv 116
Livermorium

radioactive,
short-lived;
never found
in nature,
no uses

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Mc 115
Moscovium

radioactive,
short-lived;
never found
in nature,
no uses

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Og  X 118
Oganesson

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Og

118

Oganesson

radioactive,
short-lived;
never found
in nature,
no uses

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