



# Bioelements

You will:

describe the role of micro- and macroelements in the life of organisms

- **Element** - is a substance that cannot be divided into other substances by chemical reactions

H 1																			He 2
Li 3	Be 4											B 5	C 6	N 7	O 8	F 9	Ne 10		
Na 11	Mg 12											Al 13	Si 14	P 15	S 16	Cl 17	Ar 18		
K 19	Ca 20	Sc 21	Ti 22	V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28	Cu 29	Zn 30	Ga 31	Ge 32	As 33	Se 34	Br 35	Kr 36		
Rb 37	Sr 38	Y 39	Zr 40	Nb 41	Mo 42	Tc 43	Ru 44	Rh 45	Pd 46	Ag 47	Cd 48	In 49	Sn 50	Sb 51	Te 52	I 53	Xe 54		
Cs 55	Ba 56		Hf 72	Ta 73	W 74	Re 75	Os 76	Ir 77	Pt 78	Au 79	Hg 80	Tl 81	Pb 82	Bi 83	Po 84	At 85	Rn 86		
Fr 87	Ra 88																		
			La 57	Ce 58	Pr 59	Nd 60	Pm 61	Sm 62	Eu 63	Gd 64	Tb 65	Dy 66	Ho 67	Er 68	Tm 69	Yb 70	Lu 71		
			Ac 89	Th 90	Pa 91	U 92	Np 93	Pu 94	Am 95	Cm 96	Bk 97	Cf 98	Es 99	Fm 100	Md 101	No 102	Lr 103		

Big Bang fusion

Dying low-mass stars

Exploding massive stars

Human synthesis  
No stable isotopes

Cosmic ray fission

Merging neutron stars

Exploding white dwarfs

Elements in the human body		
Major elements		
Element	Symbol	Approximate %
Oxygen	O	65.0
Carbon	C	18.5
Hydrogen	H	9.5
Nitrogen	N	3.3
Calcium	Ca	1.5
Phosphorus	P	1.0
Potassium	K	0.4
Sulfur	S	0.3
Sodium	Na	0.2
Chlorine	Cl	0.2
Magnesium	Mg	0.1
Trace elements		
Chromium	Cr	Together less than 0.1 %
Cobalt	Co	
Copper	Cu	
Fluorine	F	
Iodine	I	
Iron	Fe	
Manganese	Mn	
Zinc	Zn	
Molybdenum	Mo	
Silicon	Si	
Tin	Sn	
Vanadium	V	
Selenium	Se	

- Elements that we need in high amounts are called **macroelements**.
- Elements that we need in low amounts are called **microelements** or **trace elements**.

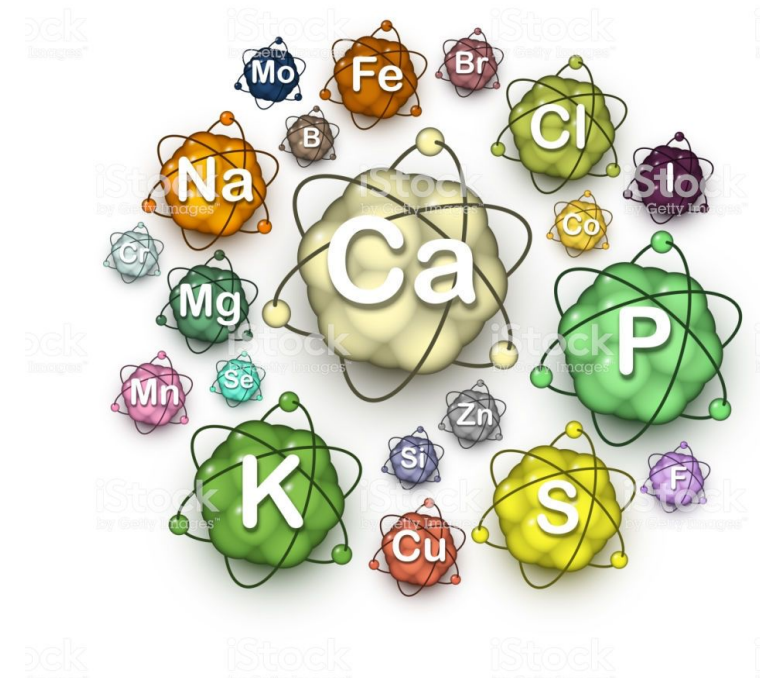


Element	% by mole
Hydrogen	63.0
Oxygen	26.0
Carbon	9.0
Nitrogen	1.25
Calcium	0.25
Phosphorus	0.19
Potassium	0.06
Sulfur	0.06
Sodium	0.04
Chlorine	0.025
Magnesium	0.013
Iron	0.00004
Iodine	0.000002

99% of atoms in a human body come from these 4 elements

# Macroelements

- Oxygen (O) is a compound of water and most organic molecules.
- Carbon (C) is a backbone of organic molecules.
- Hydrogen (H) is a compound of water and organic molecules.
- Nitrogen (N) is a compound of proteins and nucleic acids.
- Potassium (K) is important in nerve function.
- Phosphorus (P) is a component of bones and teeth.





# Microelements

- Iron (Fe) is part of important proteins such as hemoglobin involved in oxygen transport
- Iodine (I) is necessary for the production of thyroid hormone.
- Fluoride (F) is part of the tooth enamel and bone.
- Cobalt (Co) is a part of a vitamin.

26 55,847 <b>Fe</b> Iron	27 58,933 <b>Co</b> Cobalt	29 63,546 <b>Cu</b> Cooper
25 54,938 <b>Mn</b> Manganese	5 79,904 <b>B</b> Boron	53 126,905 <b>I</b> Iodine
30 65,39 <b>Zn</b> Zinc	42 95,94 <b>Mo</b> Molybdenum	34 78,96 <b>Se</b> Selenium