

The periodic table of food, elements, ions and compounds

# **KITCHEN ELEMENTS**

Chapter	1:	Science	of	Cooking
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	Th of	e Sc Coc	ienc kinį	e g	(	Can you spell your name in P.T. symbols?											53	Sulfur	Titanium	Ne
hy	trogen 1 H		-							Nobelium	Li	Nitrogen								
1           	11 10079	beryllium 4 Be 9.0122 magnesium 12	There are a lot of elements hereare they ALL in food?														oxygen 8 0 15.999 sulfur 16	fluorine 9 F 18.998 chiorine 17	10 10 10 20,180 argon 18	
	<b>la</b> 2.990 assium	Mg 24.305 calcium		scandium	titanium	vanadium	chromium	Si 28.086 germanium	P 30.974 arsenic	S 32.065 selenium	CI 35.453 bromine	Ar 39.948 krypton								
3	19 K 9.098	20 Ca 40.078		21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.39	31 Ga 69.723	32 Ge 72.61	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83,80	
F	37 <b>Rb</b>	38 Sr		39 Y	<sup>zireonium</sup> 40 <b>Zr</b>	41 Nb	42 Mo	43 TC	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53	54 Xe	
8 Ca	5.468 esium 55	87.62 barium 56 Ba	57-70 ★	88,906 Iutetium 71	91.224 hafnlum 72 Hf	92.906 tantalum 73 Ta	95.94 tungsten 74 W	<sup>[98]</sup> 75 <b>Re</b>	101.07 osmium 76 <b>OS</b>	102.91 Iridium 77	106.42 platinum 78 Pt	107.87 gold 79	112.41 mercury 80	114.82 thailium 81 <b>T</b>	118.71 lead 82 Pb	121.76 bismuth 83 Bi	127.60 polonium 84 PO	astatine 85 At	131.29 radon 86 <b>Rn</b>	
1 fra	32.91 Inclum 87	137.33 radium 88	89-102	174.97 lawrencium 103	178.49 rutherfordium 104	180.95 dubnium 105	183.84 seaborgium 106	186.21 bohrium 107	190.23 hassium 108	192.22 meitnerium 109	195.08 ununnillum 110	196.97 unununium 111	200.59 ununbium 112	204.38	207.2 ununquadium 114	208.98	[209]	[210]	[222]	
	223	<b>Ka</b> [226]	* *	[262]	[261]	[262]	3 <b>g</b> [266]	<b>DN</b> [264]	<b>ΠS</b> [269]	1 <b>VI U</b> [268]	[271]	[272]	[277]		1289 [289]					

*Lanthanida sarias	lanthanum 57	cerium 58	praseodymium 59	neodymium 60	promethium 61	samarium 62	europium 63	gadolinium 64	terbium 65	dysprosium 66	holmium 67	erbium 68	thulium 69	ytterbium 70
Lanthanide Series	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
	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
	actinium	thorium	protactinium	uranium	neptunium	plutonium	americium	curium	berkelium	californium	einsteinium	fermium	mendelevium	nobelium
* * Actinide series	89	90	91	92	93	94	95	96	97	98	99	100	101	102
	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No
	[227]	232.04	231.04	238.03	[237]	[244]	[243]	[247]	[247]	[251]	[252]	[257]	[258]	[259]

Fig. 1-4

https://www.chemspeller.com/



### Food = chemistry

#### • Elements

- The periodic table...of food
- Compounds and molecules
  - Covalent molecules
    - Bonding
    - Electrons
  - Ionic compounds
    - Cations
    - Anions

#### • Elemental exceptions



Examples of food molecules from the major classes: fat, carbohydrate and protein.

What elements do we find the major classes of food macronutrients most often?

Туре	Specific example	Molecular formula
Fat	Linolenic acid <sup>1</sup>	C <sub>18</sub> H <sub>30</sub> O <sub>2</sub>
Fat	Oleic Acid <sup>2</sup>	C <sub>18</sub> H <sub>34</sub> O <sub>2</sub>
Carbohydrate	Glucose (i.e. dextrose)	C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>
Carbohydrate	maltose	C <sub>12</sub> H <sub>22</sub> O <sub>11</sub>
Protein	Alanine	C <sub>3</sub> H <sub>7</sub> NO <sub>2</sub>
Protein	Glutamate <sup>3</sup>	C <sub>5</sub> H <sub>9</sub> NO <sub>4</sub>

<sup>&</sup>lt;sup>[1]</sup> An omega-3 fatty acid found in green leaves and some seed oils.

<sup>&</sup>lt;sup>[2]</sup> The primary fatty acid found in olive oil

<sup>&</sup>lt;sup>[3]</sup> Alanine and glutamate are components of protein

	The				The Periodic Tableof Food																	
	of	Cook	ing 🗢	Ту	ре		Example							Food is made up of many types of compounds								
				Fa	Fat				<sub>34</sub> O <sub>2</sub>													
	Group IA	Group IIA		Ca	rboh	ydra	te (	$C_{6}H_{12}$	0 <sub>6</sub>				Group IIIB	Group IVB	Group VB	Group VIB	Group VIIB	Group 0				
Period 1	1 H hydrogen			Pr	otein	)	C <sub>3</sub> H <sub>7</sub> NO <sub>2</sub>											2				
Period 2	3	4		A co	тро	und is	s mad	e of i	multi		5 B	6 C	7 N	8 <b>O</b>	9 <b>F</b>	10						
Period 3	<sup>11</sup> Na	<sup>12</sup> Mg	E	eleme	ents t	hat a	re che	етіса	ally jo	ined			13 <b>AI</b>	14 <b>Si</b>	15 <b>P</b>	16 <b>S</b>	17 <b>CI</b>	18				
Period 4	19 K potassium	20 Ca calcium	21	22	23 V vanadium	24 Cr chromium	25 Mn manganese	26 Fe	27 Co cobalt	28 <b>Ni</b> nickel	29 Cu copper	30 Zn zinc	31 Ga gallium	32	33 AS arsenic	34 Se selenium	35 Br bromine	36				
Period 5						42 Mo molybdenum						48 Cd cadmium					53 I iodine					
Period 6						74 W tungsten																
Period 7										11 Thi	s Periodic T	able comes	from Concep	ts in Bioche	mistry by Re	odney Boye	r (published	by Wiley)				



## The Periodic Table...of Food

**RED** = typically these elements will form **covalent bonds** to make molecules with other red atoms. Sometimes a red atom can make an ion.



[1] This Periodic Table comes from Concepts in Biochemistry by Rodney Boyer (published by Wiley)

Group VIIB

9

F

17

CI

hlorin

35

Br

53

I

iodine

8

Group 0

2

10

18

36