

# Chemistry

Periodic Table  
of the Elements

# Periodic Table of the Elements

1A																	2											
1	1																	2										
	H																	He										
2	3	4															5	6	7	8	9	10						
	Li	Be															B	C	N	O	F	Ne						
3	11	12	13	14	15	16	17	18									19	20	21	22	23	24	25	26	27	28	29	30
	Na	Mg	Al	Si	P	S	Cl	Ar									K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36										
	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr										
5	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54										
	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe										
6	55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86										
	Cs	Ba	*La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn										
7	87	88	89	104	105	106	107	108	109	110	111	112																
	Fr	Ra	+Ac	Rf	Ha	Sg	Ns	Hs	Mt	110	111	112																

\* Lanthanide  
Series

+ Actinide  
Series

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

*The sub-atomic particles:  
protons, neutrons, electrons*

*Элементарные частицы: протоны,  
нейтроны, электроны*

## *New terms and definitions:*

Atomic structure	Строение атома
The sub-atomic particles	Элементарные частицы
Proton	Протон
Neutron	Нейтрон
Electron	Электрон
The nucleus	Ядра
Nucleon	Нуклон
Atomic number	Порядковый номер

# *Atomic Structure*

## Learning Objectives:

### Do I know ..

- The structure of an atom?
- About the relative size of the nucleus?
- That atoms of a given element have the same number of protons in the nucleus?
- The meaning of the terms 'atomic number' and 'mass number'?

# *Elements one of the 100+ pure substances*

*that make up everything in the universe*

1																												18							
1 H 1.0079		2																										2 He 4.0026							
3 Li 6.941		4 Be 9.0122																		5 B 10.811		6 C 12.011		7 N 14.007		8 O 15.999		9 F 18.998		10 Ne 20.180					
11 Na 22.990		12 Mg 24.305																		13 Al 26.982		14 Si 28.086		15 P 30.974		16 S 32.065		17 Cl 35.453		18 Ar 39.948					
19 K 39.098		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 65.409		31 Ga 69.723		32 Ge 72.64		33 As 74.922		34 Se 78.96		35 Br 79.904		36 Kr 83.798	
37 Rb 85.468		38 Sr 87.62		39 Y 88.906		40 Zr 91.224		41 Nb 92.906		42 Mo 95.94		43 Tc (98)		44 Ru 101.07		45 Rh 102.91		46 Pd 106.42		47 Ag 107.87		48 Cd 112.41		49 In 114.82		50 Sn 118.71		51 Sb 121.76		52 Te 127.60		53 I 126.90		54 Xe 131.29	
55 Cs 132.91		56 Ba 137.33		57-71 *		72 Hf 178.49		73 Ta 180.95		74 W 183.84		75 Re 186.21		76 Os 190.23		77 Ir 192.22		78 Pt 195.08		79 Au 196.97		80 Hg 200.59		81 Tl 204.38		82 Pb 207.2		83 Bi 208.98		84 Po (209)		85 At (210)		86 Rn (222)	
87 Fr (223)		88 Ra (226)		89-103 #		104 Rf (261)		105 Db (262)		106 Sg (263)		107 Bh (264)		108 Hs (265)		109 Mt (268)		110 Uun (281)		111 Uuu (272)		112 Uub (285)				114 Uuq (289)									
* Lanthanide series				57 La 138.91		58 Ce 140.12		59 Pr 140.91		60 Nd 144.24		61 Pm (145)		62 Sm 150.36		63 Eu 151.96		64 Gd 157.25		65 Tb 158.93		66 Dy 162.50		67 Ho 164.93		68 Er 167.26		69 Tm 168.93		70 Yb 173.04		71 Lu 174.97			
# Actinide series				89 Ac (227)		90 Th 232.04		91 Pa 231.04		92 U 238.03		93 Np (237)		94 Pu (244)		95 Am (243)		96 Cm (247)		97 Bk (247)		98 Cf (251)		99 Es (252)		100 Fm (257)		101 Md (258)		102 No (259)		103 Lr (262)			

# *Examples of Elements*



***C = Carbon***

***Na = Sodium***

***O = Oxygen***

***Ca = Calcium***

***H = Hydrogen***

***K = Potassium***

***N = Nitrogen***

***I = Iodine***

***S = Sulfur***

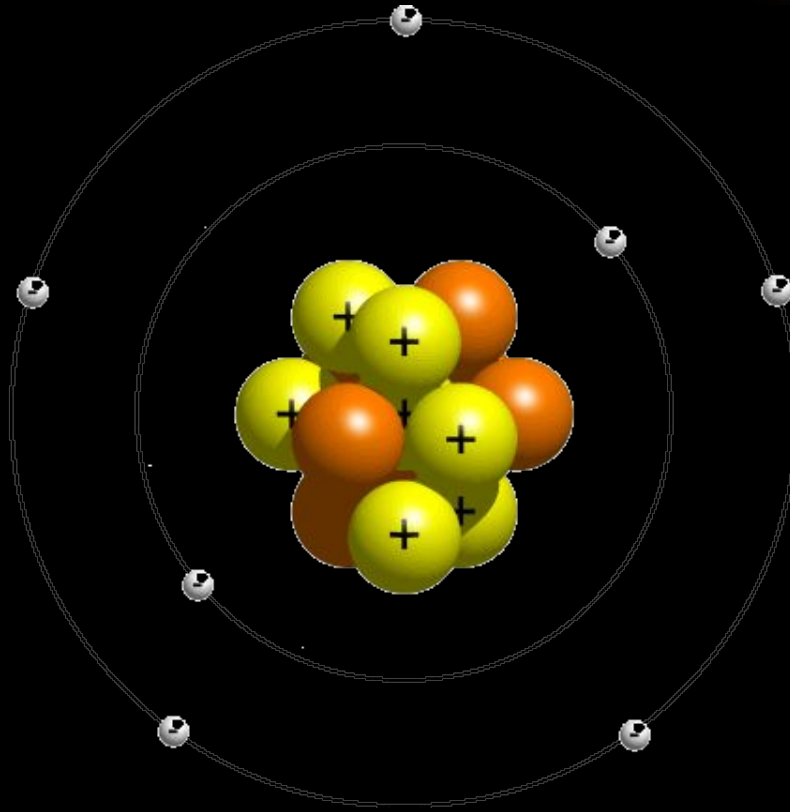
***Cl = Chlorine***

***P = Phosphorus***

*Working in pairs complete the following:*

- Draw an atom
  - It must include all the subatomic particles, their charges and locations.
  - Try to answer the following questions
- *The structure of an atom?*
- *About the relative size of the nucleus?*
- *That atoms of a given element have the same number of protons in the nucleus?*
- *The meaning of the terms 'atomic number' and 'mass number'?*

*Atom* the smallest particle making up elements



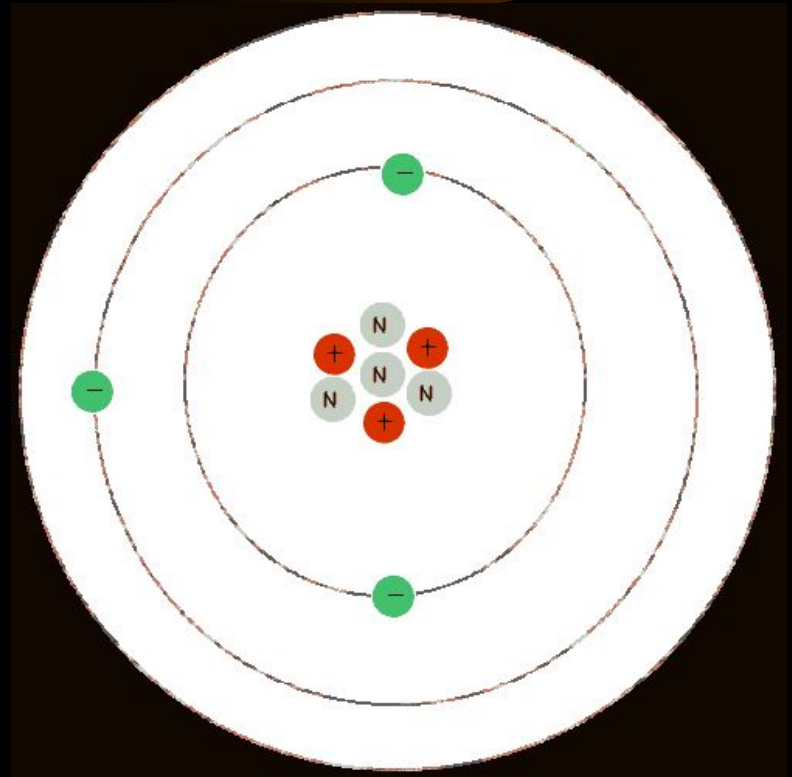


# *Sub-atomic Particles*

*Protons  $p^+$  - positive charge, in nucleus*

*Neutrons  $n^0$  - no charge, in nucleus*

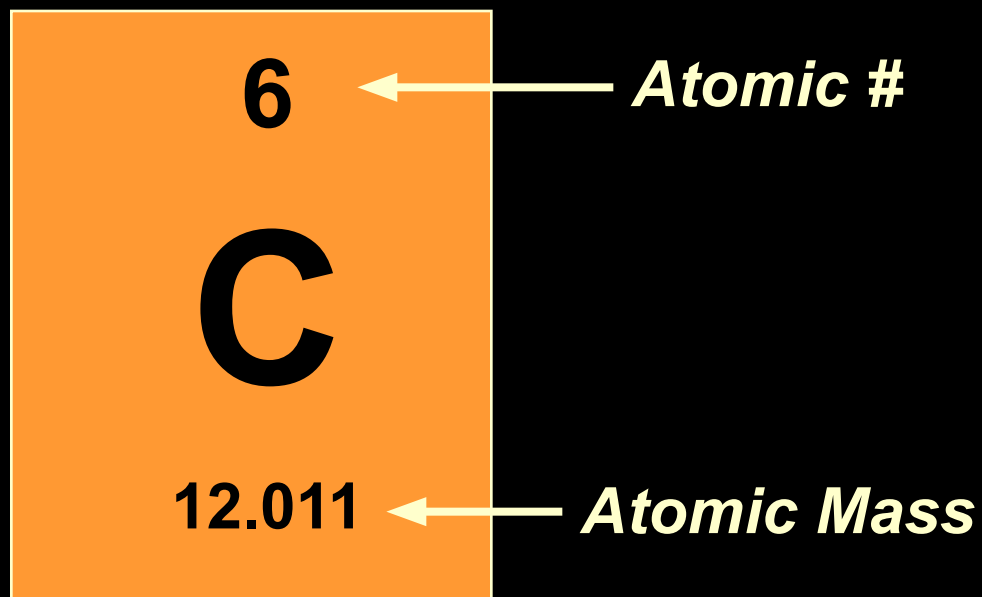
*Electrons -  $e^-$  negative charge, orbiting nucleus*






<http://www.pil-network.com/resources/tools>

# *Drawing an Atom of Carbon*



# *Drawing an Atom of Carbon*



6
C
12.011

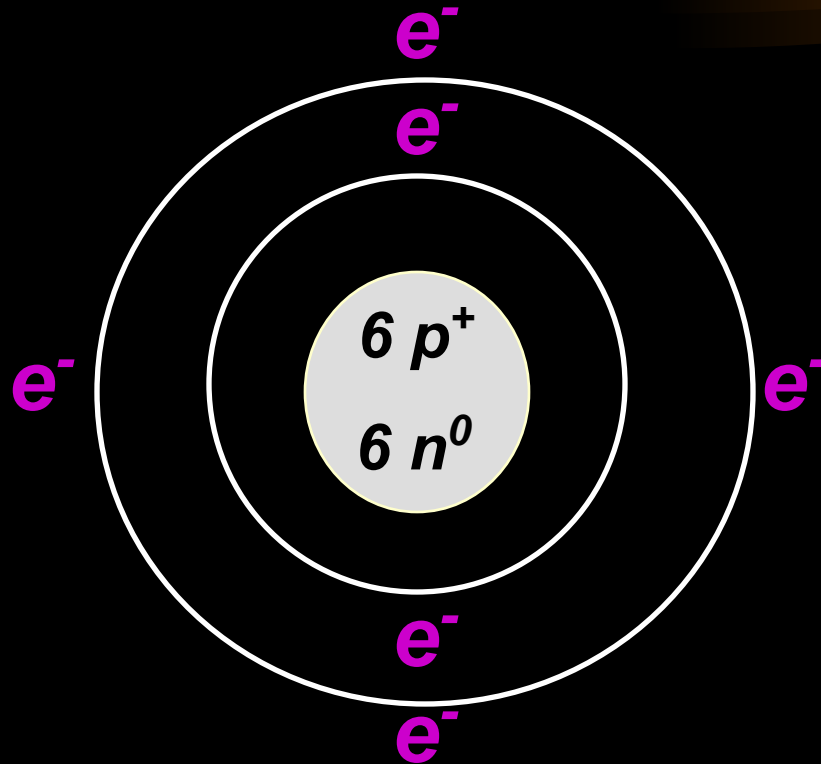
*Atomic # = # of  $p^+$  and # of  $e^-$*

*Carbon has 6  $p^+$  and 6  $e^-$*

*Atomic Mass minus Atomic # = # of  $n^0$*

*Carbon has 6  $n^0$*

# *Drawing an Atom of Carbon*



## *exercises*

- Task 1. Determine the number of protons and electrons in the atoms of iron and mercury

## *exercises*

- Task 2. An atom of an element has 10 neutrons in the nucleus of an atom and the atomic weight of 19. Determine what is an element?



*Complete the  
handout in pairs*




# *Assessment for learning....*




- Using the mini white board answer the following questions individually



*How many protons does  
Silicon have?*




*What makes up the  
atomic weight of an  
atom?*



*How many electrons  
does a neutral Calcium  
atom have?*



*What element has one  
less proton than Boron?*



*What is the atomic  
number and Atomic mass  
of Argon?*

# *Chemistry*



*Diga, diga, diga, diga,  
that's all folks!*

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