

## Science: GCSE Atomic Structure and the Periodic Table

1. 3	1. Structure of the atom									
	Кеу	word	Definition							
1	1 Atom		The smallest possible piece of an element. Has a radius of 0.1nm (or 1x10-10m).							
2	Nucl	eus	The	The centre of an atom. Contains protons and neutrons.						
3	Prot	on	Аp	ositively cha	ged particle found in the nucleus.					
4	Neut	tron	A n	A neutral particle found in the nucleus. Has no charge.						
5	Elect			A negatively charged particle found in energy levels (shells) around the nucleus.						
6	6 Shell		Energy levels surrounding the nucleus of the atom.							
ato	ub- omic ticle	Relative atomic mass		Charge	4 6					
Pro	oton	1		+1						
Neu	itron	1		0	3					
Elec	Electron			-1	3					

2. Key Words						
Atomic number	Number of protons in the nucleus of an atom.					
Atomic mass	Total number of protons <b>and</b> neutrons in the nucleus of an atom.					
Isotope	Different forms of the same element with the same number of protons, but different numbers of neutrons.					
lon	A charged atom that forms when electrons are lost or gained.					

	Model		Discovery	/						
1	Solid sphere			Dalton stated that the atom was the smallest particle and it could not be broken up further.						
2	Plum Pudding Discovery of the el	lectron	JJ Thompso positive ch	on stated th arge with r	nat the aton	n was a cloud of harged electrons				
3	Nuclear model Discovery of a pos charged nucleus	itively	Rutherford that proved charged nu	Rutherford conducted experiments with gold foil that proved that the atom contained a positively charged nucleus with the electrons randomly around the outside of the nucleus.						
4	Planetary Model (I Discovery that electronic orbit the nucleus of levels called 'shells	ctrons on energy	nucleus like	e planets a		d around the un and that there in different				
5	Quantum Model Discovered that el are found in cloud probability called o	s of	nucleus bu	t move aro	at electrons ound in wave ne exact loca					
6	Modern Atomic M Discovery of the n	odel	0			n in the nucleus nic mass of an				
1	2	3	4	5		6 ••••••••••••••••••••••••••••••••••••				

4. Properties of metals and non-metals								
Metals	Non-Metals							
	Low density, brittle, dull, poor conductors of heat and electricity.							



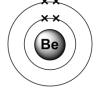
# Science: GCSE Atomic Structure and the Periodic Table

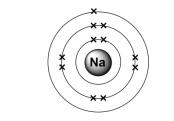
#### 5. Electron configuration diagrams

- Rules 1. Do not draw protons and neutrons in the nucleus.
  - 2. Use small x's to show electrons.
  - 3. Only 2 electrons can fit on the  $1^{st}$  shell, then 8 on  $2^{nd}$ , 8 on  $3^{rd}$ .
  - 4. Draw the electrons from the nucleus outward.



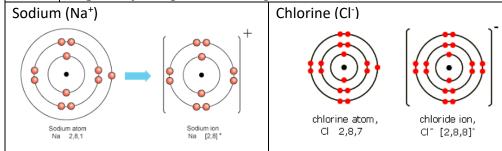
Sodium





### 6. Forming ions

RulesPositively charged ions have lost electrons from the outer shell.Negatively charged ions have gained electrons from the outer shell.



### 7. The Periodic Table

Developed by Mendeleev, who arranged the elements in order of atomic **weight**. He left **gaps** for undiscovered elements and **predicted** their properties. When these predictions **proved correct**, Mendeleev's periodic table was widely accepted.

1	2											3	-	5	0		0
				Key			1 H hydrogen 1										4 He helium 2
7 Li	9 <b>Be</b>	]		ve atomi omic sy		]						11 B	12 C	14 N	16 <b>O</b>	19 F	20 Ne
lithium 3	beryllium 4		atomic	(proton	) numbe	r						boron 5	carbon 6	nitrogen 7	oxygen 8	fluorine 9	neon 10
23 Na	24 Mg	1										27 Al	28 Si	31 P phosphorus	32 S	35.5 CI	40 Ar argon
11	12											13	14	15	16	17	18
39	40	45	48	51	52	55	56	59	59	63.5	65	70	73	75	79	80	84
K	Ca	<b>Sc</b>	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	<b>Zn</b>	Ga	Ge	As	<b>Se</b>	Br	Kr
potassium	calcium	scandium	Etanium	vanadium	chromium	manganese	iron	cobalt	nickel	copper	zinc	gallium	germanium	arsenic	selenium	bromine	krypton
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
85	88	89	91	93	96	[98]	101	103	106	108	112	115	119	122	128	127	131
Rb	Sr	<b>Y</b>	<b>Zr</b>	Nb	<b>Mo</b>	Tc	Ru	Rh	<b>Pd</b>	Ag	Cd	In	<b>Sn</b>	Sb	Te	I	Xe
rubidium	strontium	yttrium	zirconium	niobium	molybdenum	technetium	ruthenium	modium	palladium	silver	cadmium	indium	50	antimony	tellurium	iodine	xenon
37	38	39	40	41	42	43	44	45	46	47	48	49		51	52	53	54
133	137	139	178	181	184	186	190	192	195	197	201	204	207	209	[209]	[210]	[222]
Cs	Ba	La*	Hf	Ta	W	<b>Re</b>	<b>Os</b>	Ir	Pt	Au	Hg	TI	Pb	Bi	Po	At	Rn
caesium	barium	lanthanum	hafnium	tantalum	tungsten	rhenium	osmium	iridium	platinum	gold	mercury	thallium	lead	bismuth	polonium	astatine	radon
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
[223]	[226]	[227]	[261]	[262]	[266]	[264]	[277]	[268]	[271]	[272]	[285]	[286]	[289]	[289]	[293]	[294]	[294]
Fr	Ra	Ac*	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og
francium	radium	actinium	rutherfordium	dubnium	seaborgium	bohrium	hassium	meitnerium	darmstadtium	roentgenium	copernidum	nihonium	flerovium	moscovium	Ivermorium	tennessine	oganesso
87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118

Arrangement	Elements are placed in order based on atomic number.					
Groups	The columns downwards: Elements in each group have similar					
	properties and electronic configurations.					
Periods	The rows across: Elements in the same period have the same					
	number of shells.					
Transition	Highlighted in yellow are the transition metals of the periodic					
metals	table. These elements can form more than one type of ion.					

8. Patterns in the periodic table									
Group	Name	Elements	Key feature	Patterns					
	Alkali	Li, Na, K,	Contains 1 electron	Reactivity increases					
1	Metals	Rb, Cs, Fr	on the outer shell.	down the group and					
				atom gets bigger.					
	Halogens	F, Cl, I, Br	Contain 7 electrons	Reactivity decreases					
7			on the outer shell.	down the group and					
				atom gets bigger.					
	Noble	He, Ne,	All atoms have a full	Unreactive elements					
0	Gases	Ar, Kr,	outer shell.	(inert).					
		Xe, Rn							