## Atoms and the periodic table

## Lesson sequence

- 1. Structure of atoms
- 2. Detailed structure of atoms
- 3. Isotopes
- 4. Mendeleev's periodic table
- 5. The modern periodic table
- 6. Electron configuration

1. Structure of atoms						
*Particle	The tiny pieces that all matter is					
	made from.					
*Atom	The smallest independent particle.					
	Everything is made of atoms.					
**Size of	About 1 x 10 <sup>-10</sup> m in diameter.					
atoms						
**Dalton's	- Tiny hard spheres					
model of	- Can't be broken down					
atoms	- Can't be created or destroyed					
	- Atoms of an element are identical					
	- Different elements have different					
	atoms					
*Subatomic	Smaller particles that atoms are					
particles	made from.					
*Proton	Mass = 1					
	Charge = +1					
	Location = nucleus					
*Neutron	Mass = 1					
	Charge = 0					
	Location = nucleus					
*Electron	Mass = 1/1835 (negligible)					
	Charge = -1					
	Location = shells orbiting nucleus					
*Nucleus	Central part of an atom, 100,000					
	times smaller than the overall atom					

2. Detailed structure of atoms					
**Alpha	Small positively charged particle				
particle	made of two protons and two				
	neutrons.				
**Scattering	When particles bounce back or				
	change direction.				
**Rutherford's	Fired alpha particles at gold leaf,				
experiment	used a phosphor-coated screen				
	to track where they went.				

**Rutherford's	Most alpha particles went
results	through, some scattered
	(changed direction).
**Rutherford's	Scattered particles hit a solid
explanation	nucleus. Most did not hit it,
	therefore nucleus is small
*Atomic	The bottom number on the
number	periodic table, gives the number
	of protons and electrons.
*Atomic mass	The top number on the periodic
	table, gives the total protons
	and neutrons together.
*Number of	The atomic number.
protons	
*Number of	The atomic number.
electrons	
*Number of	Atomic mass minus atomic
neutrons	number.
*Number of	Equal, because each negative
protons and	electron is attracted to a
electrons	positive proton in the nucleus.

3. Mendeleev's periodic table						
*Dmitri	Russian chemist, developed the					
Mendeleev	periodic table.					
*Mendeleev's	Ordered by increasing A <sub>r</sub> , some					
periodic table	elements switched according to					
	their properties.					
*Chemical	Includes reaction with acid and					
properties	formula of oxide.					
*Physical	Includes melting point and					
properties	density.					
**Gaps in	Mendeleev left gaps where no					
Mendeleev's	known element fitted and					
periodic table	predicted these would be filled					
	with newly discovered elements.					
**Eka-	An element that Mendeleev					
aluminium	thought would fill a gap. He					
	predicted its properties, which					
	matched gallium when					
	discovered.					

4. The modern periodic table					
*Noble	Gases that do not react: He, Ne,				
gases	Ar, Kr.				

**Moseley's	Fired electrons at samples of
experiment	elements and measured X-rays
	produced.
**Moseley's	Energy of x-rays produced
results	proportional to the positive charge
	of the element.
**Conc.	The atomic number must be the
from	number of protons in the atoms.
Moseley's	
work	

*Outer shell	The last shell with any electrons					
	in it.					
**Groups	Columns in the periodic table, tel					
	you the number of electrons in					
	the outer shell.					
**Periods	Rows in the periodic table, tell					
	you the number of electron					
	shells.					

1	2			Key			1 H hydrogen 1					3	4	5	6	7	0 4 He helum 2
7 Li Ithium 3	9 Be beryllum 4		ato	ve atomic omic symi name (proton) r	bol							11 <b>B</b> boron 5	12 C carbon 6	14 N ritrigen 7	16 O cxygen 8	19 F fluorine 9	20 <b>Ne</b> 10
23 Na sodiam 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silcon 14	31 P phosphorus 15	32 <b>S</b> sufur 16	35.5 CI chlorine 17	40 <b>Ar</b> argen 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti ttanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe im 26	59 Co cobelt 27	59 Ni rickel 28	63.5 Cu copper 29	65 <b>Zn</b> zno 30	70 <b>Ga</b> gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb natidum 37	88 Sr strontum 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb nictrium 41	96 Mo motybdenum 42	[98] Tc technetium 43	101 Ru nuthenium 44	103 Rh modum 45	106 Pd palladium 46	108 Ag siter 47	112 Cd cadmium 48	115 In indium 49	119 Sn in 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 <b>Xe</b> ×mon 54
133 Cs caesium 55	137 Ba berlum 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tentalum 73	184 W urgsten 74	186 Re merium 75	190 Os osmium 76	192 Ir Irdium 77	195 Pt platinum 78	197 <b>Au</b> gold 79	201 Hg mercury 80	204 TI thallum 81	207 <b>Pb</b> lead 82	209 Bi bismuth 83	[209] Po polorium 84	[210] At assatire 85	[222] Rn radon 86
[223] Fr funcium 87	[226] Ra radium 88	[227] Ac* actrium 89	[261] Rf otherbrise 104	[262] <b>Db</b> dubrium 105	[266] Sg seatorgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt metherium 109	[271] Ds damestadium 110	[272] Rg roontgonium 111	Elen	nents with at		s 112-116 ha	ave been rep	orted but not	fully

	07 00 00 101 100 100
	ciements (like Ar and K) that are
reversals	not in order of increasing mass.
**Explaining	It means elements should be order
pair	elements by increasing atomic
reversals	number instead.

6. Electron configuration					
*Shells	Electrons orbit atoms in shells.				
*First shell	Holds up to two electrons.				
*Second	Holds up to eight electrons.				
shell					
*Third shell	Holds up to eight electrons.				
*Number of	Given by the atomic number.				
electrons					
*Filling shells	Fill shells from the first shell out.				
	Move up a shell when current one				
	is full.				
*Electron	The number of electrons in each				
configuration	shell (e.g. Al is 2.8.3).				