1.1 1.2	a) Explain how **Mendeleev** arranged the **elements** in his **periodic table** (3) b) Explain why **Mendeleev's** periodic table was accepted by other scientists. (1) • Describe how to use the position of an **element** in the **periodic table** to identify an **element** as a **metal** or **non metal** (1)	a) In **mass number** order (1) with **elements** having similar **properties** grouped together (1) left gaps for undiscovered **elements** (1) b) Used his table to predict the **properties** of undiscovered **elements**, his predictions were proved correct (1) • **Metals** are on the left and centre of the **periodic table**.
1.3 1.4 1.6	• Describe the structure of an atom, including the 3 **sub atomic particles** and their positions • Describe the relative size of an atom compared to its **nucleus** • Recall the mass and charge of the 3 **sub atomic particles** (3)	• **Protons** and **neutrons** are in the **nucleus** (1), **electrons** orbit the **nucleus** in **shells** (energy levels) (1) • The **nucleus** is very small compared to the **atom** (like a pea compared to Wembley stadium) • **Proton** is **positive**, mass is 1 **Neutron** is **neutral**, mass is 1 **Electron** is **negative**, mass of 0
1.5 1.7 1.8	• Describe what **atoms** of a given **element** all have in common. (1) • Explain why atoms are **neutral** (2) • Explain the meaning of the terms a) **atomic number** (1) b) **mass number** (1) c) **relative atomic mass** (2)	• Same number of **protons** (1) • Same number of **positive protons** as **negative electrons** (1), charges cancel out (1) a) Number of **protons** in the **nucleus** of an **atom** (1) b) Number of **protons** and **neutrons** in the **nucleus** of an **atom** (1) c) Average mass of all the **isotopes** of an **element** (1) compared to the **carbon 12 isotope** (1)
1.9	a) Explain how to calculate the number of **protons, neutrons** and **electrons** in an **atom** by using the **atomic number** and **mass number**. (4) Eg: sodium atomic number = 11, mass number = 23 b) Describe how elements are arranged in the modern periodic table	**a) Protons = atomic number** (1) **Neutrons = Mass number - atomic number** (1) Electrons = atomic number (1) Eg Na has 11 protons and electrons and 23-11 = 12 neutrons (1) b) In order of **atomic number** in rows called **periods** (1) and in **groups** with **elements** having similar **properties**(1

1.10 *1.11*	• <u>Explain</u> why **chlorine** and some other elements have relative atomic mass numbers that aren't whole numbers (Cl = 35.5) • <u>Calculate</u> the relative atomic mass of copper which exists as two main isotopes. Copper mass number 63 has abundance 70% and copper 65 abundance 30%	• Some elements exist as different isotopes, having the same number of protons but a different number of neutrons. (Some chlorine atoms have a mass number of 35 and others a mass number of 37) • (63 x 70/100) + (65 x 30/100)
1.12 1.13	a) <u>Explain</u> how to work out the **electron configuration** of an **element** from its **atomic number** (1) b) Sodium has **atomic number** 11 what is its **electron configuration?** (1) a) <u>Describe</u> the connection between the position of an **element** in the **periodic table** and its **electron structure**. (2) b) <u>Explain</u> how to use the position of fluorine in the **periodic table** to work out its **electron configuration**. (2)	a) **Electron shells** fill up from the inside out. The inner **shell** holds up to 2 **electrons**, the 2nd and 3rd shell hold up to 8 **electrons**. (1) b) Sodium's **electron configuration** is 2.8.1 (1) a) **Group number** is equal to the number of **electrons** in the outer shell (1), **period number** is equal to the number of **shells of electrons** (1 *b)* **Fluorine** is in **group 7**, so has 7 **electrons** in the outer shell (1) it is in period 2 so has two shells. **Electron configuration** is 2.7

4.1 <u>Identify</u> where the following are on the periodic table below

a) **alkali metals** (1)
b) **halogens** (1)
c) **noble gases** (1)
d) **transition metals** (1)

1 H 1.0079																	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 (266)	107 Bh (264)	108 Hs (270)	109 Mt (268)	110 Ds (281)	111 Rg (272)	112 Uub (285)	113 Uut (284)	114 Uuq (289)	115 Uup (288)	116 Uuh (291)		118 Uuo (294)

* 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)

a) First column: Li, Na, K,
b) 2nd column from right hand side: F, Cl, Br, I
c) Last column: He, Ne, Ar, Kr, X
d) Central block: Sc→ Zn & 3 rows below this

4.3	a) State two examples of properties of metals (2) b) Use your knowledge of the structure of metals to explain why **metals** are **malleable** (2) c) and why they **conduct electricity** (2)	a) **Conduct heat** (1) **conduct electricity** (1) **malleable**- hammered into shape (1) high **melting point** (1) **shiny** when scratched (1) b) Layers of **positive ions** can slide past each other (1) **delocalised electrons** hold the structure together (1) c) **Delocalised electrons** are free to move through out the structure (1) movement of **electrons** creates **electric current** (1)
4.2 4.4 4.6	• Describe the structure of **metals** (2) • Recall two properties common to **transition metals** (2) • Recall two properties common to **alkali metals** (2)	• A regular arrangement of **positive ions** (1) surrounded by a **sea of delocalised electrons** (1) • High melting point (1) colourful **compounds** (1) • Soft metals (1)low melting point (1) white compounds (1)
4.7 4.8	a) Describe the reactions of **alkali metals** with water (2) b) include the names of products formed (2) a) Describe how the **reactivity** changes as you go down **group 1** b) Explain why potassium is more reactive than sodium (3)	a) **Metal** floats on the surface (1) fizzes- gives of gas (1) b) Hydrogen gas(1) metal hydroxide(1) eg: Sodium → Sodium hydroxide + water + hydrogen a) Reactivity increases as go down group 1 (1) b) Outer electron is further from nucleus (1) held by weaker electrostatic force of attraction (1) takes less energy to remove the electron (1)
4.9	Recall the colour and state of the **halogens** at room temperature **a) Fluorine** **b) Chlorine** **c) Bromine** d) **Iodine**	a) **Fluorine** is a yellow gas b) **Chlorine** is a green gas c) **Bromine** is a brown liquid d) **Iodine** is a grey solid
4.10	a) Name the **product** formed when a **metal** reacts with a **halide** (1) b) Write word equations for: calcium reacting with chlorine Sodium reacting with iodine.	Metal halide (1) Calcium + chlorine→ calcium chloride(1) Sodium + iodine → sodium iodide (1)

4.11	a) Recall the **product** formed when a **halogen** reacts with hydrogen b) Recall a chemical property of **hydrogen halides**	a) **Hydrogen halide** (1) For example Hydrogen +chlorine→ hydrogen chloride **b) Acidic**
4.12	a) Name the type of reaction taking place when a more reactive **halogen** reacts with a solution containing a less reactive **halide ion solution**. **b)** Predict the **product** formed when a **halogen** reacts with a **halide ion solution** • chlorine + sodium bromide → • chlorine + sodium fluoride →	**a) Displacement reaction** b) A more reactive **halogen displaces** a less reactive halogen from a **compound**. For example • Chlorine + → sodium chloride sodium bromide + bromine • Chlorine + → NO REACTION sodium fluoride
4.13	**a)** Describe how the reactivity changes as you go down **group 7** the **halogens** b) Explain why **chlorine** is less reactive than **fluorine**	a) Less reactive as go down group 7 b) Outer **electrons** are further from the **nucleus** (1) weaker **electrostatic force of attraction** (1) harder to attract an electron(1)
4.14	a) Name two **noble gases** (2) b) Describe a **chemical property** of the **noble gases** (1) c) Use electron structure to explain why the **noble gases** are so **unreactive** (3)	a) Any 2 from: Helium, neon, argon, xenon b) **Unreactive (inert)** (1) c) All **atoms** have **full outer shells of electrons** (1) this is a **stable electron structure** (1) so **atoms** do not react with other **atoms** (1)
4.15	a) Describe the **observation** that led to the **hypothesis** that the **noble gases** existed (1) b) Describe how the **hypothesis** was tested	a) The **density** of nitrogen obtained from experiments was different to that of nitrogen in the air (1) nitrogen in air is a mixture of different gases (1) b) **Fractional distillation** of nitrogen from the air separated a new gas- **argon** was discovered.
4.16	• Explain why **helium** is used to fill balloons and **argon** for welding (2).	• **Helium** has low **density** (1) so the balloon floats. Both gases are **inert** and **non flammable** (1)
4.17a	a) Describe the pattern in the boiling point of the **noble gases** as you go down **group 0** (1).	a) The boiling point increases from: He → Ne → Ar → Xe
4.17b	b) Describe the pattern in the **density** of the **noble gases** as you go down **group 0**.	b) The **density** increases from: He → Ne → Ar → Xe