

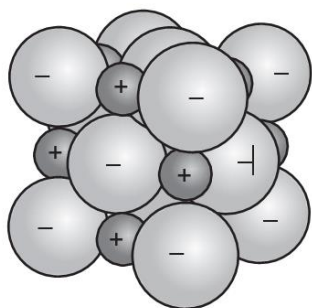
**GCSE Chemistry A (Gateway Science)**  
**J248/03 C1-C3 and C7 Higher (Higher Tier)**

**Question Set 9**

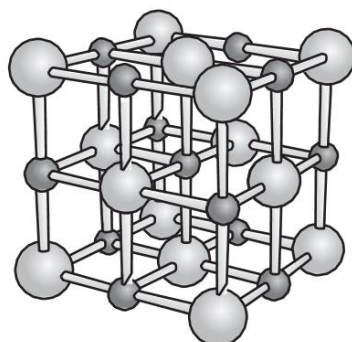
1 Sodium chloride,  $\text{NaCl}$ , is an ionic compound.

Sodium chloride forms a giant ionic lattice that can be represented using different models.

Look at the diagrams. They show two models of sodium chloride.



Space-filling model



Ball-and-stick model

- (a) (i) A scientist thinks the ball-and-stick model should be used to model ionic compounds.

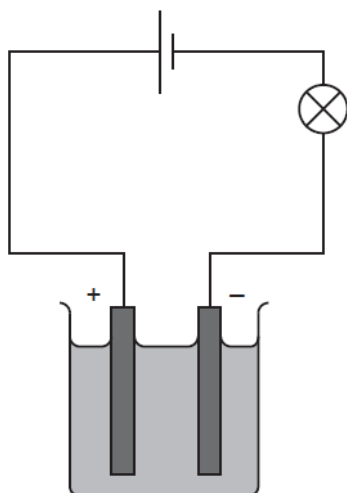
Describe **two limitations** of using the ball-and-stick model for ionic compounds. [2]

*The relative size of atom and bond is not accurately represented.  
Using sticks for bonds is misleading because forces of attraction between ions actually in all directions.*

- (ii) Ionic compounds can also be modelled using a dot-and-cross diagram.

Draw a dot and cross diagram to show the ions in sodium chloride. [2]

- (b)\* A student investigates the electrolysis of potassium bromide solution.



He notices that different products are formed at each electrode.

Explain the formation of the products during the electrolysis of potassium bromide solution. [6]

**Total Marks for Question Set 9: 10**

*answers on the last page!*

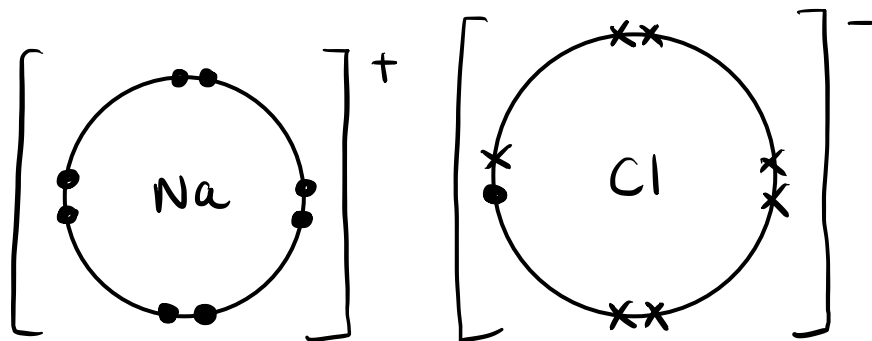


# The Periodic Table of the Elements

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(0)										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H hydrogen 1.0	2 He helium 4.0	3 Li lithium 6.9	4 Be beryllium 9.0	5 B boron 10.8	6 C carbon 12.0	7 N nitrogen 14.0	8 O oxygen 16.0	9 F fluorine 19.0	10 Ne neon 20.2	11 Na sodium 23.0	12 Mg magnesium 24.3	13 Al aluminum 27.0	14 Si silicon 28.1	15 P phosphorus 31.0	16 S sulfur 32.1	17 Cl chlorine 35.5	18 Ar argon 39.9
19 K potassium 39.1	20 Ca calcium 40.1	21 Sc scandium 45.0	22 Ti titanium 47.9	23 V vanadium 50.9	24 Cr chromium 52.0	25 Mn manganese 54.9	26 Fe iron 55.8	27 Co cobalt 58.9	28 Ni nickel 58.7	29 Cu copper 63.5	30 Zn zinc 65.4	31 Ga gallium 69.7	32 Ge germanium 72.6	33 As arsenic 74.9	34 Se selenium 79.0	35 Br bromine 79.9	36 Kr krypton 83.8
37 Rb rubidium 85.5	38 Sr strontium 87.6	39 Y yttrium 88.9	40 Zr zirconium 91.2	41 Nb niobium 92.9	42 Mo molybdenum 95.9	43 Tc technetium	44 Ru ruthenium 101.1	45 Rh rhodium 102.9	46 Pd palladium 106.4	47 Ag silver 107.9	48 Cd cadmium 112.4	49 In indium 114.8	50 Sn tin 118.7	51 Sb antimony 121.8	52 Te tellurium 127.6	53 I iodine 126.9	54 Xe xenon 131.3
55 Cs caesium 132.9	56 Ba barium 137.3	57-71 lanthanoids	72 Hf hafnium 178.5	73 Ta tantalum 180.9	74 W tungsten 183.8	75 Re rhenium 186.2	76 Os osmium 190.2	77 Ir iridium 192.2	78 Pt platinum 195.1	79 Au gold 197.0	80 Hg mercury 200.6	81 Tl thallium 204.4	82 Pb lead 207.2	83 Bi bismuth 209.0	84 Po polonium	85 At astatine	86 Rn radon
87 Fr francium	88 Ra radium	89-103 actinoids	104 Rf rutherfordium	105 Db dubnium	106 Sg seaborgium	107 Bh bohrium	108 Hs hassium	109 Mt meitnerium	110 Ds darmstadtium	111 Rg roentgenium	112 Cn copernicium	114 Fl flerovium	116 Lv livermorium				

Key  
atomic number  
Symbol  
name  
relative atomic mass

a) ii)



b) Anode is positive thus attracts negative ions whilst cathode is negative thus attracts positive ions.

$\text{Br}^-$  is negative thus move towards a positive electrode, anode. It loses one electron. As a result, bromine gas is released.  $2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{e}^-$

$\text{Br}^-$  is from potassium bromide.

$\text{H}^+$  is attracted to cathode and gains the electron from  $\text{Br}^-$ . As a result, hydrogen gas is released.  $2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$

$\text{H}^+$  is from water molecules.

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