

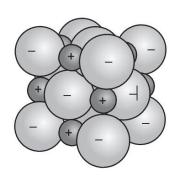
GCSE Chemistry A (Gateway Science) J248/03 C1-C3 and C7 Higher (Higher Tier)

Question Set 9

1 Sodium chloride, 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.

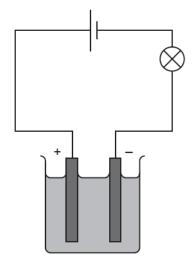
> [2] Describe **two limitations** of using the ball-and-stick model for ionic compounds. The relative size of atom and bond is not accurately represented. Using sticks for bonds is misleading because forces of attraction between ions actually in all directions.
>
> Ionic compounds can also be modelled using a dot-and-cross diagram.

(ii)

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.

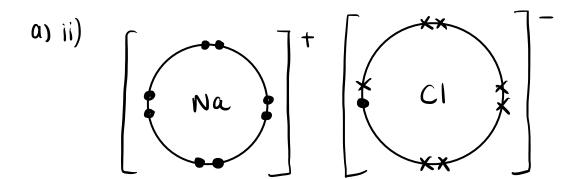
Total Marks for Question Set 9: 10

answers on the last page!

[6]

The Periodic Table of the Elements

13	0)	18	2 He	4.0	10	Ne	neon 20.2	18	Ar	argon 39.9	36	찻	krypton 83.8	54	Xe	xenon 131.3	98	ೱ	radon			
13	(2)	'		17	6	ш	fluorine 19.0	17	10	chlorine 35.5	35	Ŗ	bromine 79.9	53	-	lodine 126.9	82	Αt	astatine			
13 14 15 15 14 15 14 15 14 15 14 15 15	(9)			16	8	0	oxygen 16.0	16	S	sulfur 32.1	34	Se	selenium 79.0	52	Te	tellurium 127.6	84	Po	polonium	116	۲	livermorium
13 13 14 15 15 15 15 15 15 15	(2)			15	7	z	nitrogen 14.0	15	۵	phosphorus 31.0	33	As	arsenic 74.9	51	Sb	anfmony 121.8	83	Ξ	bismuth 209.0			
9 10 11 12 27 28 29 30 Co Ni Cu Zn cobalt copper zinc 58.9 58.7 63.5 65.4 45 46 47 48 Rh Pd Ag Ag Cd rhodium paliadum silver cadmium 102.9 106.4 107.9 112.4 77 78 79 80 Ir Pt Au Hg indum platinum gold mercury 192.2 195.1 197.0 200.6 109 110 111 112 Mt Ds Rg Cn melitrerfurm desmisactum rosent/genlum copernicium	(4)			14	9	ပ	carbon 12.0	14	S	silicon 28.1	32	g	germanium 72.6	20	Sn	tin 118.7	82	Pb	lead 207.2	114	F1	flerovium
9 10 11 27 28 29 Co Ni Cu oobalt Oopper 58.9 58.7 63.5 45 46 47 Rh Pdd Ag hodium paladum salver 102.9 106.4 107.9 77 78 78 79 Ir Pt Au indum platinum gold 192.2 195.1 197.0 109 110 111 Mt Ds Rg methentum demresserium roentgenium e	(3)			13	2	Ф	boron 10.8	13	PΙ	aluminium 27.0	31	Ga	gallium 69.7	49	딤	indium 114.8	81	11	thallium 204.4			
9 10 27 28 Co Ni cobalt Cobalt Incised 58.9 58.7 45 46 Pd nhodum paladum 102.9 106.4 77 7 7 7 7 8 Ir platinum 192.2 195.1 109 110 Mt Ds methoritum descrete discussion.										12	30	Zu	zino 65.4	48	ၓ	cadmium 112.4	80	Hg	mercury 200.6	112	ວົ	copernicium
9 27 Co Cobalt 58.9 45 Rh hodgum 102.9 77 Ir indum 192.2 109 Mt methrerium										1	29	చె	ооррег 63.5	47	Ag	silver 107.9	79	Αn	gold 197.0	111	Rg	roentgenium
										10	28	Z	nickel 58.7	46	Pd	palladium 106.4	28	ፚ	platinum 195.1	110	Ds	darmsta dfium
										6	27	ပိ	oobalt 58.9	45	몺	modium 102.9	77	ī	iiidium 192.2	109	ğ	meitnerium
8 26 Fe Fe For I have been 100.2 For Os Marken										80	56	Fe	lron 55.8	4	R	ruthenium 101.1	9/	os	08mium 190.2	108	£	hassium
7 25 Mn manganese 54.9 43 Tc technetium 75 Re thenium 186.2 107 Bh bohrium										7	25	Mn	manganese 54.9	43	ည	technetium	75	Re	menium 186.2	107	뮵	bohrium
6 24 Cr crr consum 52.0 Mo molybdenum 95.9 95.9 74 W lungsten 183.8 106 Sg seaborgium			oer.	mass						9	24	ပ်	chromium 52.0	42	Mo	molybdenum 95.9	74	>	tungsten 183.8	106	Sg	seaborgium
Key atomic number Symbol		Key	Symbol	ve atomic						2	23	>	vanadium 50.9	41	qN	niobium 92.9	73	Тa	tantalum 180.9	105	<u>ප</u>	dubnium
att relatiin #47.9 40 22 Tri stankum 47.9 40 27 27 72 Hf hafinkum 91.2 72 Hf hafinkum 178.5 104 Rf retherfordkum			atc	relativ						4	22	F	ttanium 47.9	40	Zr	zirconium 91.2	72	Ξ	hafinium 178.5	104	≵	rufherfordium
3 21 Sc scandium 45.0 39 Y Y yttium 88.9 67-71 Isrnthanoids actinoids actinoids	•									က	21	Sc	scandium 45.0	39	>	yttrium 88.9		57-71	lanthanoids		89–103	actinolds
(2) 2 4 4 4 Be beryllum 9:0 12 Mg magnesium 24.3 20 Ca calctum 40.1 38 Sr strontium 87.6 56 Ba bertum 137.3 88 Ra Ra Ra	(2)			2	4	Be	beryllium 9.0	12	Mg	magneslum 24.3	20	င္မ	calcium 40.1	38	s	strontium 87.6	26	Ba	barium 137.3	88	Ra	radium
(1) 1 H hydrogen 1.0 3 Li Li lithkum 6.9 6.9 6.9 11 Na sodium 23.0 19 K potasskum 39.1 37 Rb unbdikum 85.5 Cs Cs Cs Cs Gseestum 132.9	Ð	-	- I	1.0	3	J	lithium 6.9	11	Na	sodium 23.0	19	¥	potassium 39.1	37	S S	rubidium 85.5	22	S	caesium 132.9	87	Ŧ	francium



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

Br is negative thus move towards a positive electrode, anode. It loses one electron. As a result, bromine gas is released. $2Br \longrightarrow Br_2 + 2e^-$ Br is from potassium bromide.

Ht is attracted to costhode and gains the electron from Br. As a result, hydrogen gas is released. $2H^+ + 2e^- \rightarrow H_2$ Ht is from water molecules.



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