



Year 9 Assessment  
Double Award Chemistry  
May 2021

Name: .....

Teacher: .....

Teaching Group: .....

Time allowed: 45 minutes

Total number of pages in the examination: 13

**Instructions:** Answer ALL questions in the spaces provided. Show all the steps in any calculations and state the units.

**Equipment:** Calculator, ruler, Use black or blue ink or ball-point pen

Total Marks available	/ 45	Teacher comment:
	%	
(I)GCSE Grade		

Student reflection –

Time finished the exam (If you finish early note down when you finished) -

# THE PERIODIC TABLE

Group 1 2 3 4 5 6 7 0

Period

4	He	2
Helium		

1	H	1
Hydrogen		

7	Li	3	9	Be	4	11	B	5	12	C	6	14	N	7	16	O	8	19	F	9	20	Ne	10	
23	Na	11	24	Mg	12	27	Al	13	28	Si	14	31	P	15	32	S	16	35.5	Cl	17	40	Ar	18	
39	K	19	40	Ca	20	70	Al	13	73	Ge	32	75	As	33	79	Se	34	80	Br	35	84	Kr	36	
86	Rb	37	88	Sr	38	115	In	49	119	Sn	50	122	Sb	51	128	Te	52	127	I	53	131	Xe	54	
133	Cs	55	137	Ba	56	204	Tl	81	207	Pb	82	209	Bi	83	210	Po	84	210	At	85	222	Rn	86	
223	Fr	87	226	Ra	88	201	Hg	80	197	Au	79	195	Pt	78	192	Ir	77	197	Au	79	201	Hg	80	
						65	Zn	30	63.5	Cu	29	59	Ni	28	58.5	Co	27	59	Co	27	59	56	Fe	26
						112	Cd	48	108	Ag	47	106	Pd	46	106	Rh	45	103	Rh	45	103	101	Ru	44
						201	Hg	80	197	Au	79	195	Pt	78	192	Ir	77	192	Ir	77	186	Os	76	
						55	Mn	25	55	Mn	25	55	Mn	25	55	Mn	25	55	Mn	25	55	55	Mn	25
						52	Cr	24	52	Cr	24	52	Cr	24	52	Cr	24	52	Cr	24	52	52	Cr	24
						51	V	23	51	V	23	51	V	23	51	V	23	51	V	23	51	51	V	23
						48	Ti	22	48	Ti	22	48	Ti	22	48	Ti	22	48	Ti	22	48	48	Ti	22
						45	Sc	21	45	Sc	21	45	Sc	21	45	Sc	21	45	Sc	21	45	45	Sc	21
						89	Y	39	89	Y	39	89	Y	39	89	Y	39	89	Y	39	89	89	Y	39
						179	Hf	72	179	Hf	72	179	Hf	72	179	Hf	72	179	Hf	72	179	179	Hf	72
						181	Ta	73	181	Ta	73	181	Ta	73	181	Ta	73	181	Ta	73	181	181	Ta	73
						184	W	74	184	W	74	184	W	74	184	W	74	184	W	74	184	184	W	74
						186	Re	75	186	Re	75	186	Re	75	186	Re	75	186	Re	75	186	186	Re	75
						190	Os	76	190	Os	76	190	Os	76	190	Os	76	190	Os	76	190	190	Os	76
						192	Ir	77	192	Ir	77	192	Ir	77	192	Ir	77	192	Ir	77	192	192	Ir	77
						195	Pt	78	195	Pt	78	195	Pt	78	195	Pt	78	195	Pt	78	195	195	Pt	78
						201	Hg	80	201	Hg	80	201	Hg	80	201	Hg	80	201	Hg	80	201	201	Hg	80
						204	Tl	81	204	Tl	81	204	Tl	81	204	Tl	81	204	Tl	81	204	204	Tl	81
						207	Pb	82	207	Pb	82	207	Pb	82	207	Pb	82	207	Pb	82	207	207	Pb	82
						209	Bi	83	209	Bi	83	209	Bi	83	209	Bi	83	209	Bi	83	209	209	Bi	83
						210	Po	84	210	Po	84	210	Po	84	210	Po	84	210	Po	84	210	210	Po	84
						210	At	85	210	At	85	210	At	85	210	At	85	210	At	85	210	210	At	85
						222	Rn	86	222	Rn	86	222	Rn	86	222	Rn	86	222	Rn	86	222	222	Rn	86
						226	Ra	88	226	Ra	88	226	Ra	88	226	Ra	88	226	Ra	88	226	226	Ra	88
						227	Ac	89	227	Ac	89	227	Ac	89	227	Ac	89	227	Ac	89	227	227	Ac	89

Key

Relative atomic mass
Symbol
Name
Atomic number

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P 5 3 2 7 4 A 0 2 3 2

**Answer ALL questions.**

- 1 The three states of matter are solid, liquid and gas.  
 (a) Substances can be changed from one state to another.

The box lists some words relating to changes of state.

condensing	cooling	evaporation
heating	melting	sublimation

Complete the table by giving the correct word from the box for each change of state.

Each word may be used once, more than once, or not at all.

(3)

Change of state	Name of change
from solid to liquid	
from liquid to gas	
from solid to gas	

- (b) The particles in a solid are closely packed, arranged in a regular pattern and vibrate about a fixed position.

Describe the arrangement and movement of the particles in a gas.

(3)

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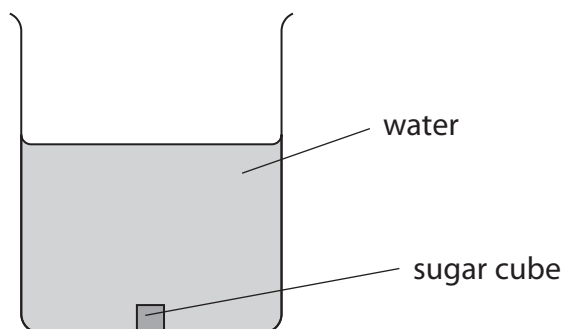
**(Total for Question 1 = 6 marks)**



2 A sugar cube is placed in a beaker containing water.

The beaker is left until the sugar cube disappears and a sugar solution forms.

The concentration of the solution is the same at the bottom and top of the beaker.



(a) Use the particle theory to explain what happens to the sugar cube to make the concentration of the solution the same at the bottom and top of the beaker.

(3)

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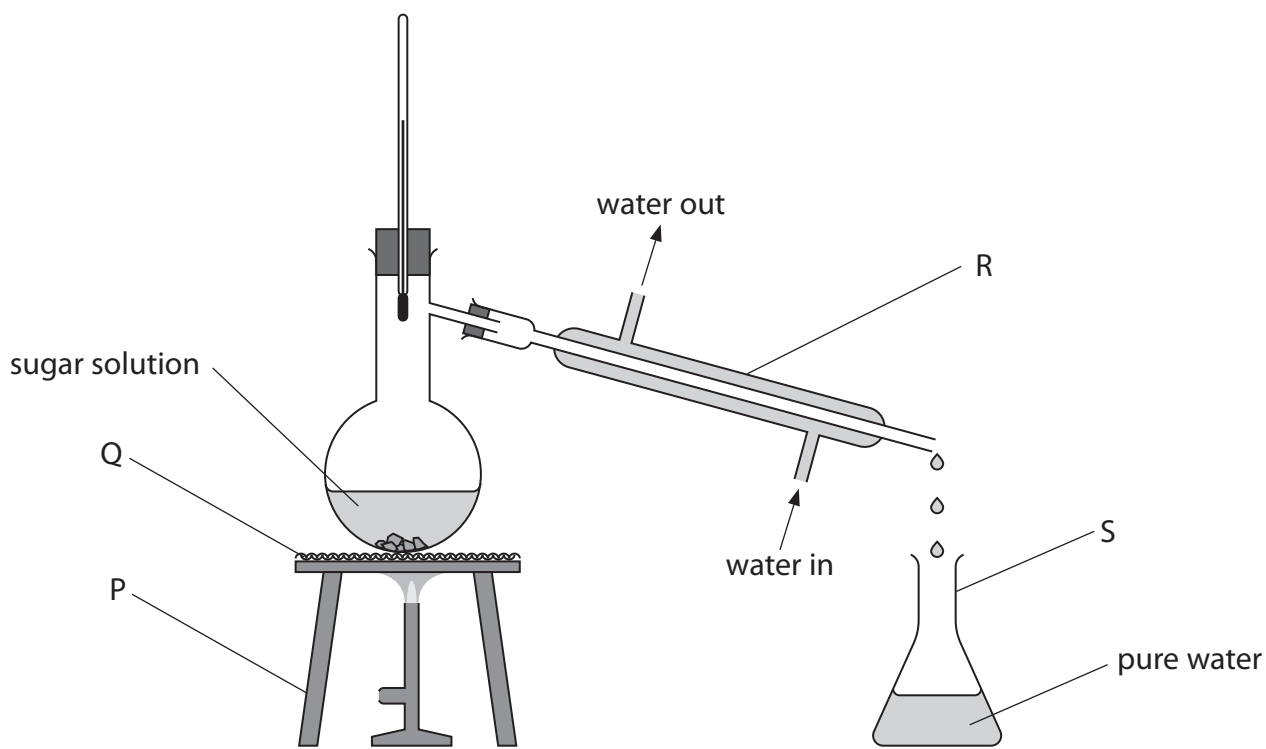
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(b) This apparatus is used to obtain pure water from the sugar solution.



(i) What is the name of the process shown in the diagram? (1)

- A crystallisation
- B distillation
- C filtration
- D sublimation

(ii) Give the name of each piece of apparatus. (4)

P .....

Q .....

R .....

S .....

(Total for Question 2 = 8 marks)



3 (a) Table 1 lists three subatomic particles.

Complete table 1 by giving the relative mass and relative charge of each subatomic particle. (3)

Subatomic particle	Relative mass	Relative charge
proton		
neutron		
electron		

Table 1

(b) Table 2 shows the number of protons, neutrons and electrons in particles P, Q, R, S and T.

Particle	Number of protons	Number of neutrons	Number of electrons
P	11	12	10
Q	8	8	10
R	10	10	10
S	9	10	9
T	12	12	12

Table 2

Use table 2 to answer these questions.

Each particle, P, Q, R, S and T, may be used once, more than once or not at all.

(i) State which particle has the highest mass number. (1)

(ii) State which particle contains two electrons in its outer shell. (1)



(iii) State which particle is a negative ion.

(1)

(iv) State which particle is an atom of an element in Group 7 of the Periodic Table.

(1)

(c) Which of these statements is correct for isotopes of the same element?

(1)

- A they have a different atomic number
- B they have a different number of electrons
- C they have the same number of neutrons
- D they have the same number of protons

**(Total for Question 3 = 8 marks)**

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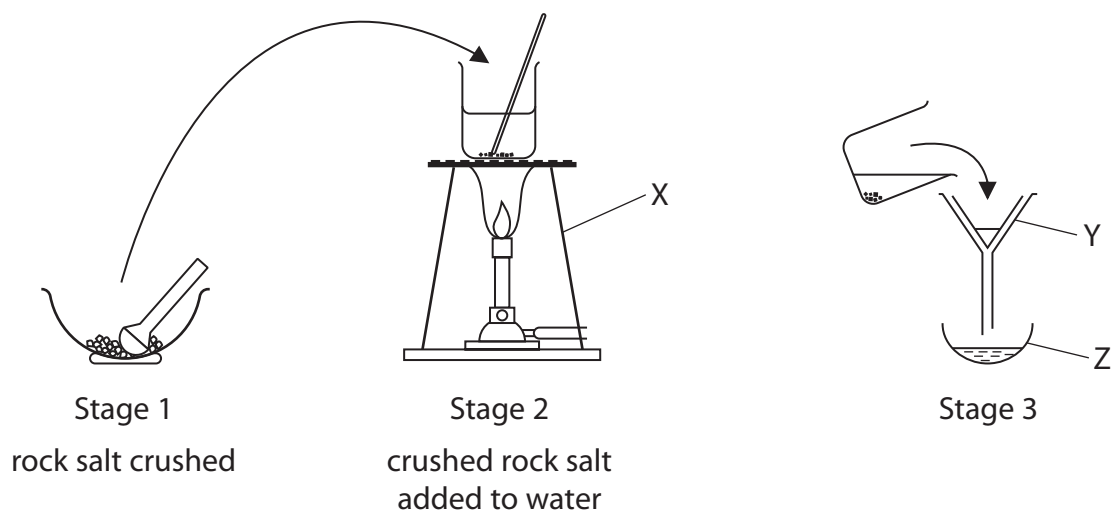
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4 Rock salt is a mixture of the soluble salt, sodium chloride, and some insoluble impurities.

The diagram shows the first three stages of a method used to obtain pure sodium chloride from rock salt.



(a) Name the pieces of apparatus labelled X, Y and Z

(3)

X .....

Y .....

Z .....

(b) (i) State why the mixture of rock salt and water is warmed and stirred in stage 2.

(2)

.....

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.....

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(ii) What is water in stage 2?

(1)

- A a residue
- B a solute
- C a solution
- D a solvent





(c) (i) Explain what happens to the impurities in stage 3.

(2)

.....

.....

.....

.....

(ii) What is the liquid collected at the end of stage 3?

(1)

- A a residue
- B a solute
- C a solution
- D a solvent

**(Total for Question 4 = 9 marks)**



5 In the Periodic Table, the vertical columns of elements are called groups.

(a) The table gives some information about the first four elements in Group 0.

Element	Relative atomic mass ( $A_r$ )	Boiling point in $^{\circ}\text{C}$
helium	4	-269
neon	20	-246
argon	40	-186
krypton	84	-153

(i) State the relationship between the relative atomic mass and the boiling point of these elements.

(1)

(ii) State why the elements in Group 0 are unreactive.

(1)

(b) The elements in Group 7 of the Periodic Table are called halogens.

State why the halogens have similar chemical properties.

Refer to electronic configurations in your answer.

(1)



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(c) The order of reactivity of the halogens can be shown by using displacement reactions.

(i) When chlorine is added to sodium bromide solution, chlorine displaces bromine.

Write a chemical equation for this reaction. (1)

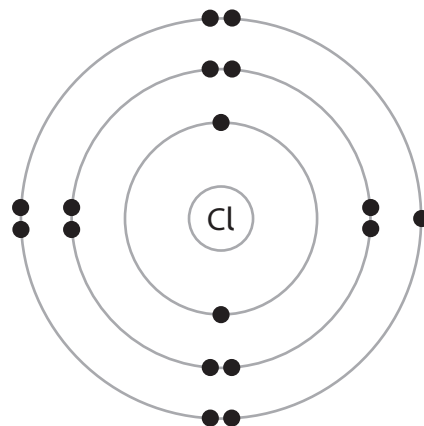
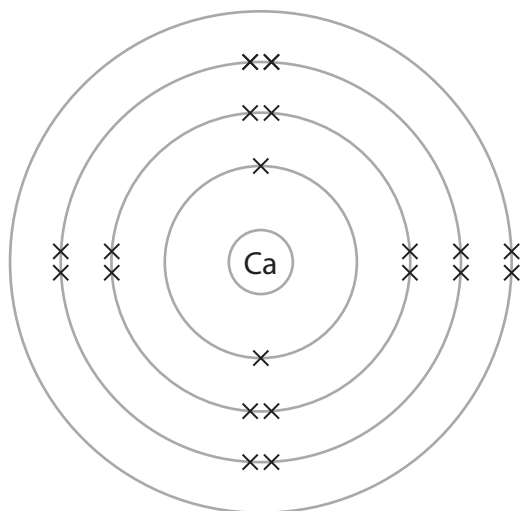
(ii) State the colour of the solution formed in this reaction. (1)

(iii) Explain whether or not a reaction takes place when bromine water is added to sodium chloride solution. (2)

**(Total for Question 5 = 7 marks)**



- 6 (a) The diagram shows the arrangement of electrons in an atom of calcium and in an atom of chlorine.



Describe, in terms of electrons, what happens when calcium reacts with chlorine to form the ionic compound calcium chloride,  $\text{CaCl}_2$

(3)

(Total for Question 6 = 3 marks)



7 This question is about carbon and its compounds.

- (a) (i) Draw a dot-and-cross diagram to show the outer shell electrons in a molecule of carbon dioxide,  $\text{CO}_2$

(2)

- (ii) The atoms in carbon dioxide are held together by covalent bonds.

Describe the forces of attraction in a covalent bond.

(2)

(Total for Question 7 = 4 marks)

