DULWICH COLLEGE | SINGAPORE |

Year 9 Assessment

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

Period	1	2											3	4	5	6	7	0
	Group																	
1	1 H Hydrogen 1																	4 He Helium 2
2	7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
3	23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
4	39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	63.5 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
5	86 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	99 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
6	133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	179 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86
7	223 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89															

Key

Relative atomic mass
Symbol
Name
Atomic number

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.

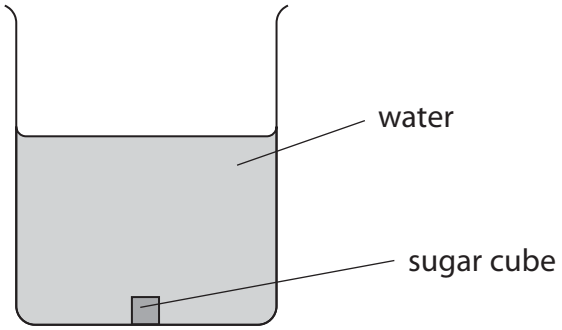
(3)

(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.

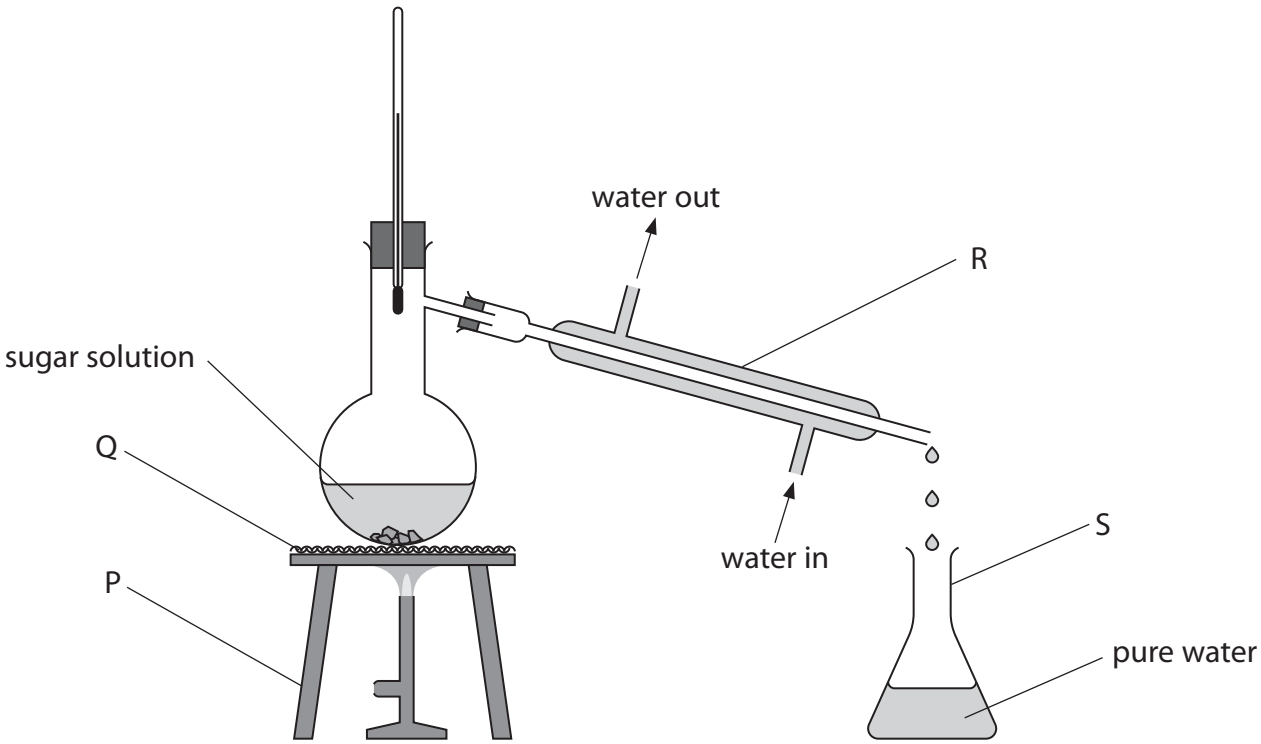
The concentration of the solution is the same at the bottom and top of the beaker.



(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)

(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

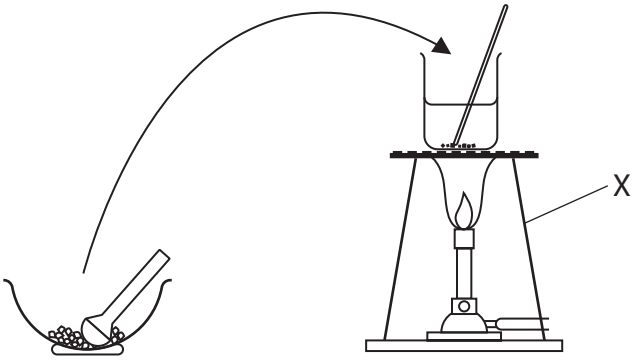
☒ **C** they have the same number of neutrons

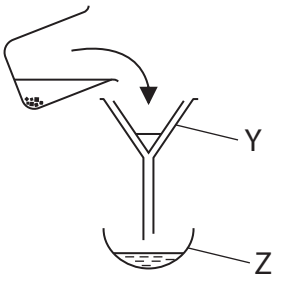
☒ **D** they have the same number of protons

(Total for Question 3 = 8 marks)

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.





Stage 1
rock salt crushed

Stage 2
crushed rock salt added to water

Stage 3

(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)

.....

.....

.....

.....

(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 °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)

.....

.....

(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)

.....

.....

.....

.....

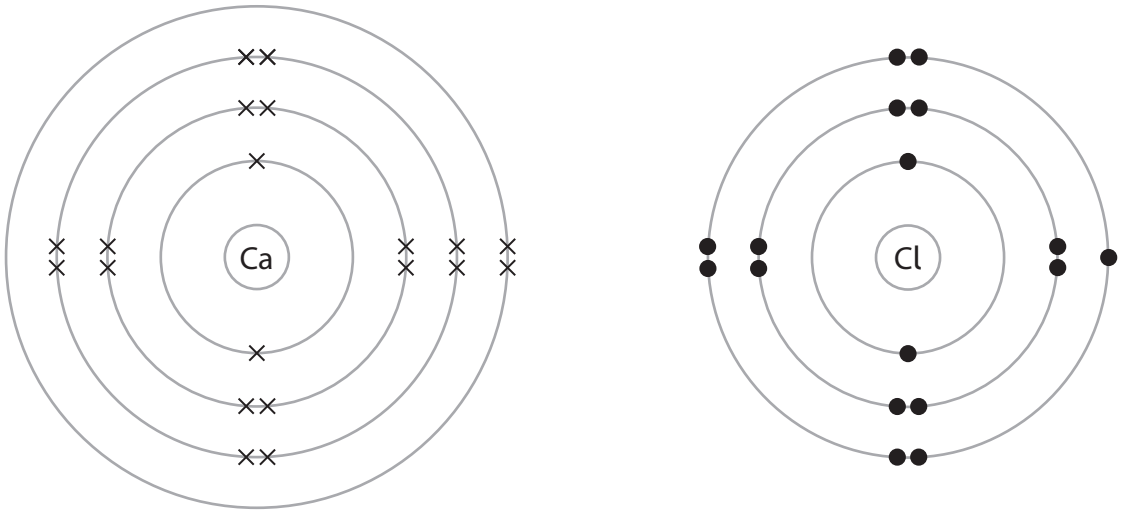
(Total for Question 5 = 7 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

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, $CaCl_2$

(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, 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)