



Rewarding Learning

General Certificate of Secondary Education
2018–2019

Centre Number

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Candidate Number

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Single Award Science Chemistry

Unit 2
Foundation Tier

[GSA21]

THURSDAY 8 NOVEMBER 2018, MORNING



GSA21

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.
Answer **all eleven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

A Data Leaflet, which includes a Periodic Table of the elements, is provided.

Quality of written communication will be assessed in Question **10(a)**.

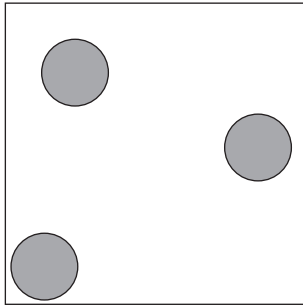
For Examiner's
use only

Question Number	Marks
1	
2	
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8	
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10	
11	

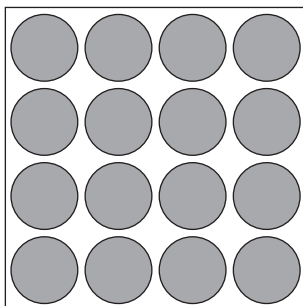
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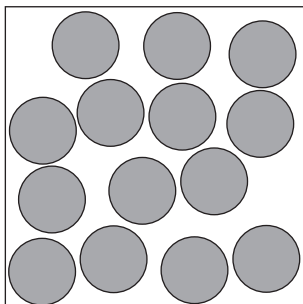
State of matter



solid



liquid



gas

[2]

(b) Complete the following sentences to describe a change of state.

Choose from:

heated

melting

When a substance changes state from a solid to a liquid the process is called _____. The solid needs to be _____ for this to happen. [

[2]

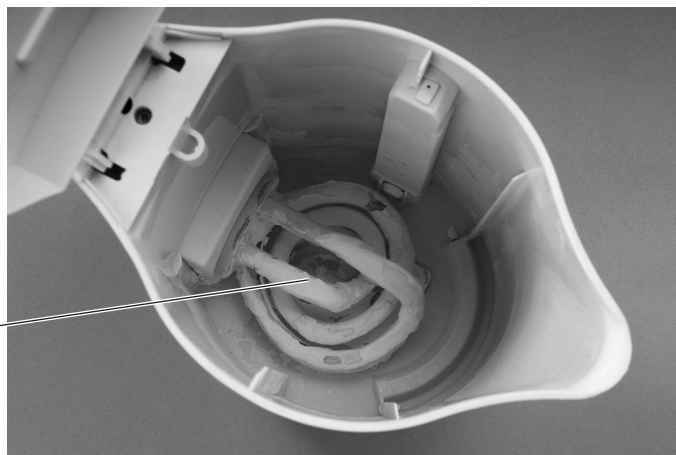
Examiner Only	
Marks	Remark

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-
-
-
- [2]

11668



(b) The heating element is made from metal. Suggest two **properties** that the metal must have to be used in the heating element.

2. _____ [2]

 [1]

[Turn over

- 3 (a) Tropical fish can only live in water with a suitable temperature and pH.



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The table below gives the most suitable temperatures and pH ranges for some tropical fish.

Fish	Temperature/°C	pH
reed fish	22–28	6.5–7.5
dinosaur birchir	25–29	7.0–8.2
emerald catfish	21–28	6.5–6.8
rose catfish	22–26	6.0–7.0
disk tetra	23–27	5.0–7.0
ornate birchir	26–28	6.0–8.0

- (i) Name a piece of apparatus that could have been used to measure the pH.

_____ [1]

- (ii) What is the highest alkaline pH value shown in the table?

_____ [1]

- (iii) Name the fish that can live in the widest temperature range.

_____ [1]



(b) Explain why the baseline should be drawn in pencil.

(c) What did the student find out about the black food colouring from this experiment?

(d) Which dye from the black food colouring was the most soluble?

(e) Red food colouring does **not** contain any other coloured dyes. Describe the result a student would expect if red food colouring was tested in the same way.

8

[1]

A target diagram consisting of a central black bullseye surrounded by three concentric white rings, all enclosed within a black circular border.

[1]

[1]

(i) How many elements are represented by the formula CFCl_3 ?

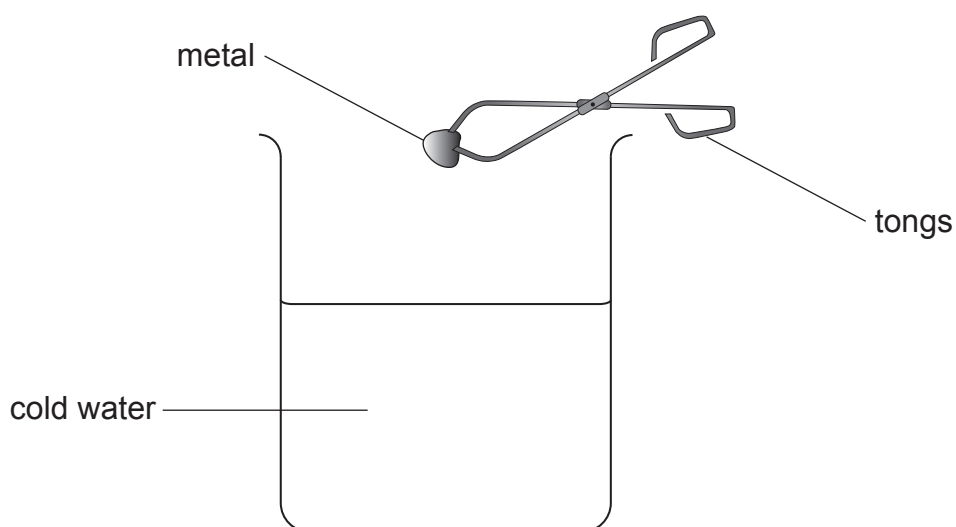
 [1]

(ii) How many atoms are represented by the formula CFCl_3 ?

 [1]

Examiner Only	
Marks	Remark

- 6 Four metals magnesium, calcium, potassium and copper were added to cold water to investigate their reactivity.



- (a) Which metal magnesium, calcium, potassium or copper when added to water:

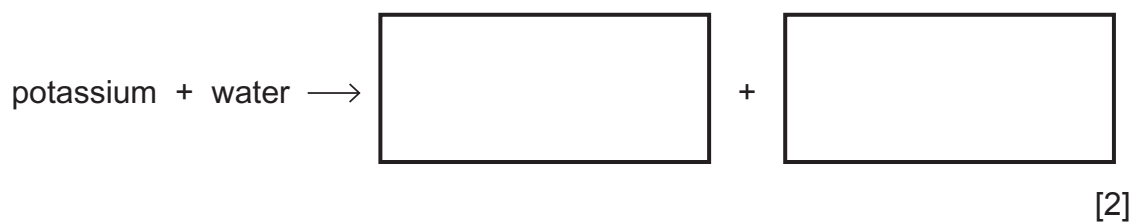
(i) sinks and does **not** react?

_____ [1]

(ii) burns with a lilac flame?

_____ [1]

- (b) Complete the **word** equation for the reaction of potassium with water.



Examiner Only	
Marks	Remark

- (c) Using your knowledge of the reactivity series put these four metals in order of reactivity.
Put the **most** reactive first.

_____	(most reactive)	
_____	↓	

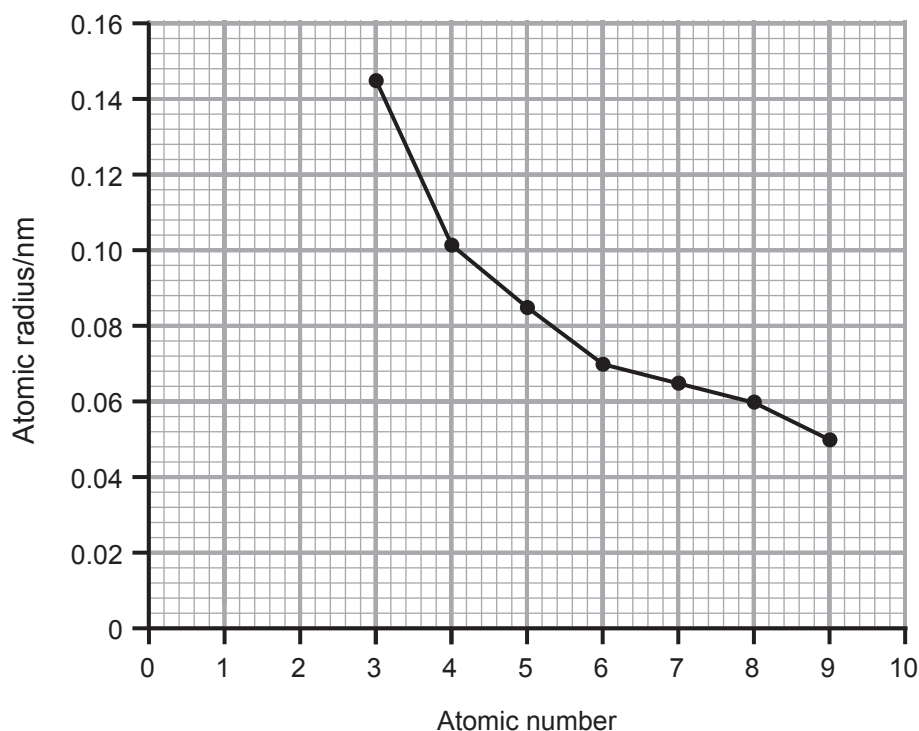
_____	(least reactive)	[2]

- (d) Name **one** metal used in the investigation that is in the same period of the Periodic Table as calcium.

_____	[1]
-------	-----

Examiner Only	
Marks	Remark

- 7 The graph below shows the atomic radius (size) of some elements in Period 2 of the Periodic Table.



- (a) What is meant by the term **atomic number**?

_____ [1]

- (b) (i) State the trend shown by the information in the graph.

_____ [1]

- (ii) Predict the atomic radius of the element with an atomic number of 10.

_____ nm [1]

- (iii) Name an element that is in the same group as the element with atomic number 10.

You may find your Data Leaflet helpful.

_____ [1]

Examiner Only	
Marks	Remark

- (c) Name the element shown in the graph that has the largest atomic radius.

You may find your Data Leaflet helpful.

_____ [1]

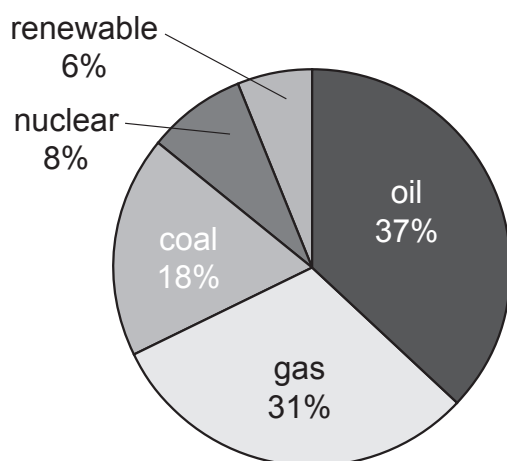
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Marks	Remark

The main element in coal is _____.

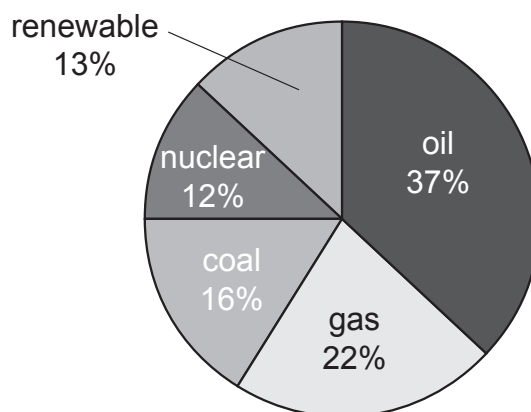
_____ and _____.

A molecule containing only the two elements found in CH_4 can be described as a _____.

(b) The pie charts below show the percentage of different energy sources used in the USA and in Europe.



USA



Europe

(i) Calculate the total percentage of coal, oil and gas used in **Europe**.

_____ % [1]

(ii) State **one** similarity and **one** difference in the energy sources used in the USA and in Europe as shown in the pie charts above.

Similarity _____

Difference

[2]

Examiner Only	
Marks	Remark

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[2]

	Temperature at which colour changes/°C			
Plastic	Red	Green	Blue	Black
P	20	21	25	41
Q	36	39	41	45
R	25	70	100	105
S	34	36	38	40

 [1]16

- 10 (a)** Describe how fingerprints are collected at a crime scene and why they are useful in helping to solve a crime.

Your answer should include:

- how powder is used to collect a fingerprint from a white surface
- an alternative to powder that can be used to reveal fingerprints.

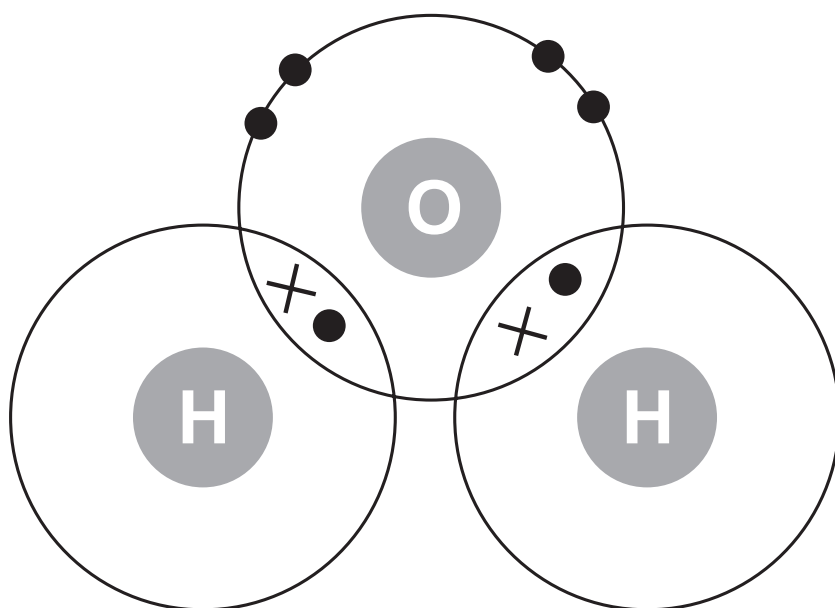
In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[illegible]

- (b)** Describe **one** other use for fingerprints.

[1]

Examiner Only	
Marks	Remark



(i) Hydrogen and oxygen form a bond by sharing a pair of electrons. What name is given to this type of bonding?

[1]

(ii) Complete the following sentence.

two metals : two non-metals : a metal and a non-metal

This type of bonding normally happens between

[1]

(b) Explain, in terms of electrons, why elements in Group 0 do **not** usually form bonds.

[1]

THIS IS THE END OF THE QUESTION PAPER

Examiner Only	
Marks	Remark

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SYMBOLS OF SELECTED IONS

Positive ions

Name	Symbol
Ammonium	NH_4^+
Chromium(III)	Cr^{3+}
Copper(II)	Cu^{2+}
Iron(II)	Fe^{2+}
Iron(III)	Fe^{3+}
Lead(II)	Pb^{2+}
Silver	Ag^+
Zinc	Zn^{2+}

Negative ions

Name	Symbol
Butanoate	$\text{C}_3\text{H}_7\text{COO}^-$
Carbonate	CO_3^{2-}
Dichromate	$\text{Cr}_2\text{O}_7^{2-}$
Ethanoate	CH_3COO^-
Hydrogencarbonate	HCO_3^-
Hydroxide	OH^-
Methanoate	HCOO^-
Nitrate	NO_3^-
Propanoate	$\text{C}_2\text{H}_5\text{COO}^-$
Sulfate	SO_4^{2-}
Sulfite	SO_3^{2-}

Data Leaflet

Including the Periodic Table of the Elements

For the use of candidates taking
 Science: Chemistry,
 Science: Double Award
 or Science: Single Award

Copies must be free from notes or additions of any
 kind. No other type of data booklet or information
 sheet is authorised for use in the examinations

 SOLUBILITY IN COLD WATER OF COMMON SALTS,
 HYDROXIDES AND OXIDES

Soluble
All sodium, potassium and ammonium salts
All nitrates
Most chlorides, bromides and iodides EXCEPT silver and lead chlorides, bromides and iodides
Most sulfates EXCEPT lead and barium sulfates Calcium sulfate is slightly soluble
Insoluble
Most carbonates EXCEPT sodium, potassium and ammonium carbonates
Most hydroxides EXCEPT sodium, potassium and ammonium hydroxides
Most oxides EXCEPT sodium, potassium and calcium oxides which react with water

 gcse examinations
 chemistry

a = relative atomic mass (approx)
x = atomic symbol
b = atomic number

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	145 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	231 Pa Protactinium 91	238 U Uranium 92	237 Np Neptunium 93	242 Pu Plutonium 94	243 Am Americium 95	247 Cm Curium 96	245 Bk Berkelium 97	251 Cf Californium 98	254 Es Einsteinium 99	253 Fm Fermium 100	256 Md Mendelevium 101	254 No Nobelium 102	257 Lr Lawrencium 103