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6888/01

October/November 2018

1 hour

No Additional Materials are required.

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs, tables or rough working.
Do **not** use staples, paper clips, highlighters, glue or correction fluid.
Do **not** write in any barcodes.

Answer **all** questions.

You may use an electronic calculator.

A copy of the Periodic Table is printed on page 9.

You may lose marks if you do not show your working or if you do not use appropriate units.

The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use

This document consists of **9** printed pages and **3** blank pages.

- 1 Fig. 1.1 shows a representation of the conversions between the three states of matter.

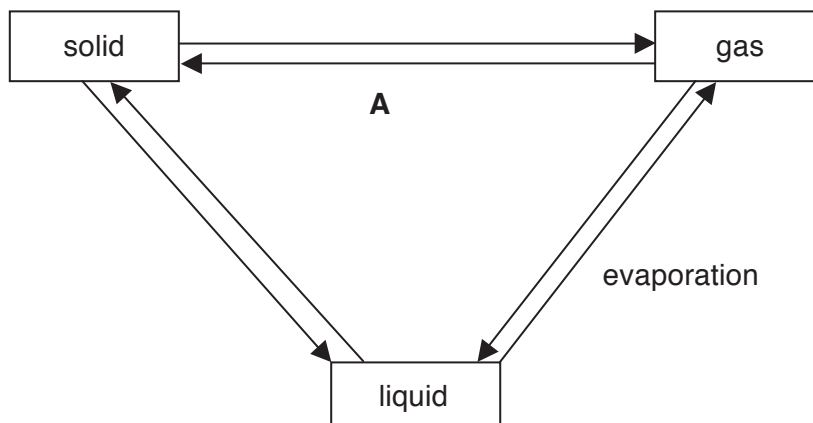


Fig. 1.1

- (a) Name the process labelled **A** in Fig. 1.1.

..... [1]

- (b) Explain, using the kinetic particle theory, why a liquid can flow but a solid cannot.

.....
 [1]

- 2 Fig. 2.1 shows a simple pendulum swinging between points **B** and **D**.

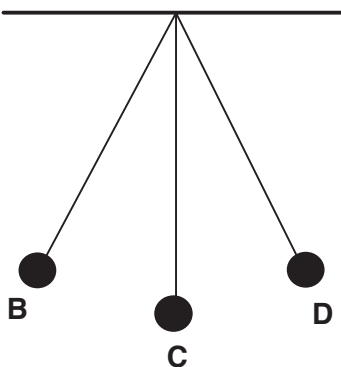


Fig. 2.1

Describe, using Fig. 2.1, the period of the pendulum.

.....
 [2]

- 3 Draw a dot and cross diagram to show the electronic structure of hydrogen chloride, HCl .
(Show outer electrons only)

[2]

- 4 The centre of mass of an object is a point where its mass seems to be concentrated.

Fig. 4.1 shows two objects **E** and **F**.

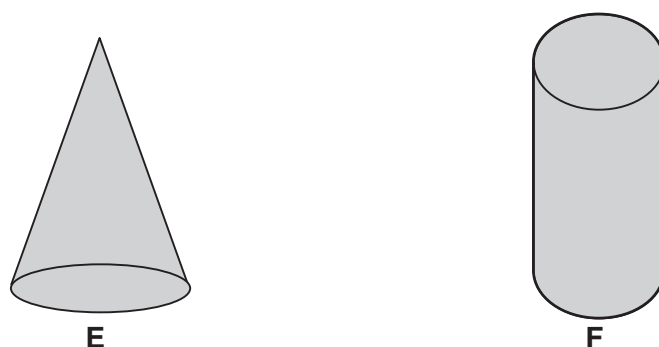


Fig. 4.1

Mark, with a cross (x) on Fig. 4.1, the possible position of the centre of mass of each of the objects.

[2]

- 5 Two isotopes of carbon are ^{12}C and ^{14}C .

Describe the difference between the nuclei of these isotopes.

.....

..... [1]

- 6 Fig. 6.1 shows an iron bar being magnetised by placing it next to a strong bar magnet.

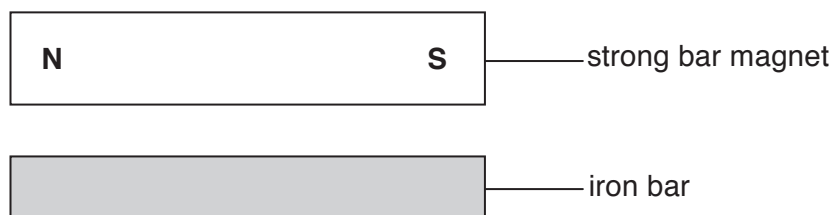


Fig. 6.1

State and explain what effect a sheet of paper placed between the magnet and the iron bar would have on the iron bar.

.....
.....
..... [2]

- 7 Copper is extracted from molten copper(II) chloride by electrolysis as shown in Fig. 7.1.

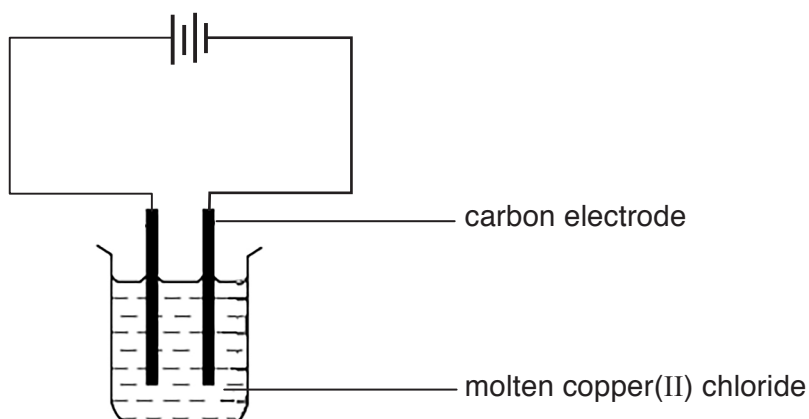


Fig. 7.1

- (a) Name the product formed at the anode.

..... [1]

- (b) Name an ion found in the electrolyte.

..... [1]

- (c) Explain why carbon is used as an electrode.

..... [1]

- 8 Fig. 8.1, Fig. 8.2 and Fig. 8.3 show different ways in which two cells can be connected in a circuit.

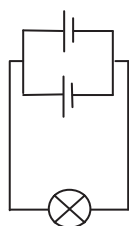


Fig. 8.1

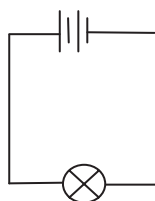


Fig. 8.2

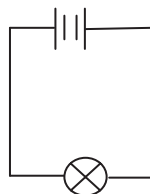


Fig. 8.3

State which circuit has the brightest bulb, and explain why.

.....

 [2]

- 9 Iodine crystals change directly into a gas when heated.

Explain why this is a physical change.

..... [1]

- 10 Fig. 10.1 shows a 400 V power supply connected to two thin metal discs, **G** and **H**, 3 cm apart.

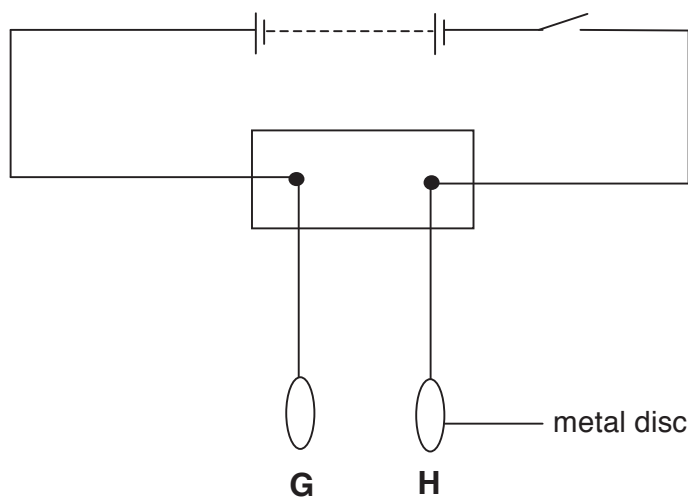


Fig. 10.1

Describe what initially happens to the thin metal discs when the switch is closed, and explain why.

.....

 [2]

- 11 The ions found in aluminium carbonate are Al^{3+} and CO_3^{2-} .

State the formula of aluminium carbonate.

..... [1]

- 12 Fig. 12.1 shows a circuit consisting of a 1.5 V cell, a switch and a bulb with a resistance of $2.0\ \Omega$.

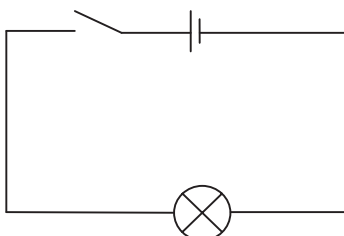


Fig. 12.1

Calculate the power dissipated by the bulb.

..... W [2]

- 13 (a) Paraffin is obtained from the fractional distillation of crude oil.

State **one** use of paraffin other than domestic use.

..... [1]

- (b) State the products of the incomplete combustion of paraffin.

.....
..... [2]

- 14 (a) The three main stages involved in the purification of water are filtration, sedimentation and chlorination.

Describe the purpose of the sedimentation stage.

.....
..... [1]

- (b) Water found in some areas of Swaziland has temporary hardness.

- (i) Name a salt that is responsible for the temporary hardness of water.

..... [1]

- (ii) Describe how temporary hardness can be removed.

..... [1]

- 15 Fig. 15.1 shows a cathode ray oscilloscope (CRO) displaying the output voltage signal from an a.c. generator.

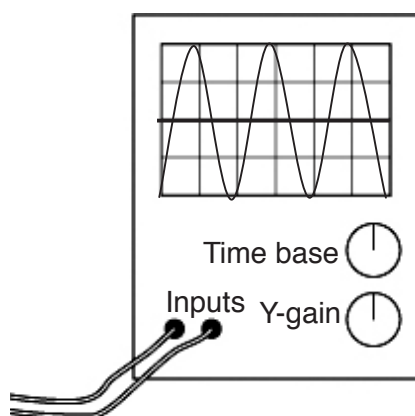


Fig. 15.1

The Y-gain is set at 2 V/div.

Calculate the output voltage of the a.c. generator displayed by the cathode ray oscilloscope.

voltage [2]

- 16 The nuclide A_ZX is found to emit beta (β) particles to form a new nuclide.

Write an equation to show the new nuclide after the nuclide A_ZX has undergone beta decay.



- 17 Name the ion present in all acids.

..... [1]

- 18 Musa lights firecrackers to celebrate the beginning of a new year.

State the energy conversions that occur when the firecrackers are lit.

.....
..... [2]

- 19 Fig. 19.1 shows a Blast Furnace used for the extraction of iron from iron ore.

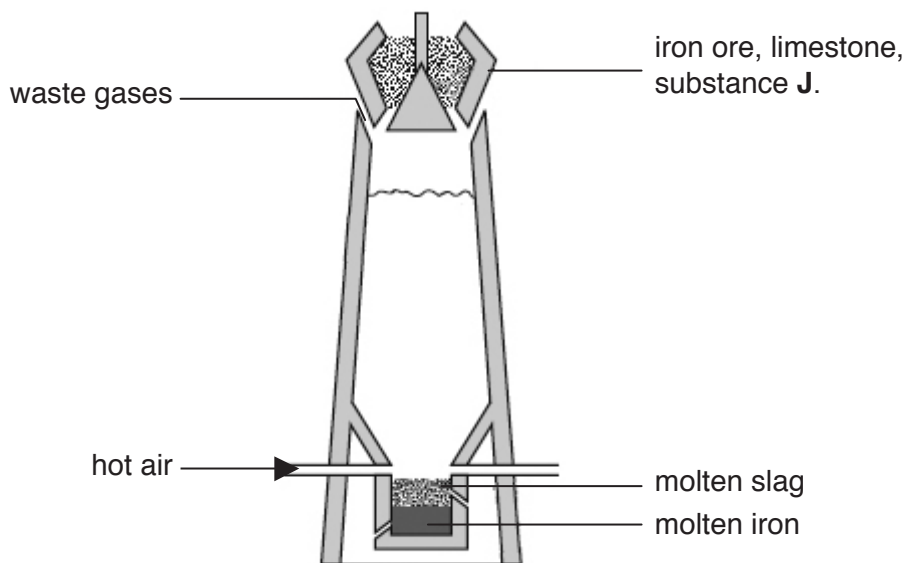


Fig. 19.1

Name the substance labelled **J** in Fig. 19.1.

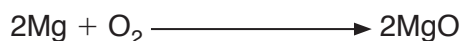
..... [1]

- 20 A glass bottle cracks when Mandla pours hot water into it.

Suggest how the hot water causes the glass bottle to crack.

.....
 [2]

- 21 The following equation shows the combustion of magnesium in air to form magnesium oxide.



Define *oxidation*, in terms of electron transfer, using this equation.

.....
 [2]

DATA SHEET

The Periodic Table of the Elements

Group																													
I	II									III	IV	V	VI	VII	0														
7 Li Lithium 9 Be Beryllium 23 Na Sodium 11 Mg Magnesium															1 H Hydrogen 11 B Boron 12 C Carbon 14 N Nitrogen 16 O Oxygen 19 F Fluorine 20 Ne Neon 27 Al Aluminium 28 Si Silicon 31 P Phosphorus 32 S Sulfur 35.5 Cl Chlorine 40 Ar Argon														
39 K Potassium	40 Ca Calcium	45 Sc Scandium	48 Ti Titanium	51 V Vanadium	52 Cr Chromium	55 Mn Manganese	56 Fe Iron	59 Co Cobalt	59 Ni Nickel	64 Cu Copper	65 Zn Zinc	70 Ga Gallium	73 Ge Germanium	75 As Arsenic	79 Se Selenium	80 Br Bromine	84 Kr Krypton												
85 Rb Rubidium	88 Sr Strontium	89 Y Yttrium	91 Zr Zirconium	93 Nb Niobium	96 Mo Molybdenum	98 Tc Technetium	101 Ru Ruthenium	103 Rh Rhodium	106 Pd Palladium	108 Ag Silver	112 Cd Cadmium	115 In Indium	119 Sn Tin	122 Sb Antimony	128 Te Tellurium	127 I Iodine	131 Xe Xenon												
133 Cs Cæsium	137 Ba Barium	139 La Lanthanum *	178 Hf Hafnium	181 Ta Tantalum	184 W Tungsten	186 Re Rhenium	190 Os Osmium	192 Ir Iridium	195 Pt Platinum	197 Au Gold	201 Hg Mercury	204 Tl Thallium	207 Pb Lead	209 Bi Bismuth	209 Po Poizotium	210 At Astatine	222 Rn Radon												
223 Fr Francium	226 Ra Radium	227 Ac Actinium †																											
87	88	89	†																										

* 58–71 Lanthanoid series
† 90–103 Actinoid series

Key	a	a = relative atomic mass	232	Th	231	Pa	238	U	237	Np	244	Pu	243	Am	247	Cm	247	Bk	251	Cf	252	Es	257	Fm	258	Md	259	No	260	Lr
	X	X = atomic symbol	90	Th	91	Pa	92	U	93	Np	94	Pu	95	Am	96	Cm	97	Bk	98	Cf	99	Es	100	Fm	101	Md	102	No	103	Lr
	b	b = atomic (proton) number	90	Th	91	Pa	92	U	93	Np	94	Pu	95	Am	96	Cm	97	Bk	98	Cf	99	Es	100	Fm	101	Md	102	No	103	Lr

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).

