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**PHYSICAL SCIENCE**

**0652/32**

Paper 3 Core Theory

**October/November 2017**

MARK SCHEME

Maximum Mark: 80

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**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Question	Answer	Marks
1(a)(i)	measuring cylinder ;	1
1(a)(ii)	balance ;	1
1(b)(i)	154 (g) ;	1
1(b)(ii)	use of $\rho = m / v = (154 / 118)$ ; = 1.3 ; g / cm <sup>3</sup> ;	3
1(c)(i)	expands ; decreases ;	2
1(c)(ii)	convection ;	1

Question	Answer	Marks
2	hydrocarbons ; fractional distillation ; boiling point ; bitumen ; (addition) polymerisation ;	5

Question	Answer	Marks
3(a)	visible / ultraviolet ; Sun ; <u>electrical</u> (potential) ;	3
3(b)(i)	splitting of nucleus ; into two new nuclei ; detail e.g. initial nucleus large / mention of other fission fragments ;	3
3(b)(ii)	less carbon dioxide / carbon monoxide / sulfur dioxide / eq ;  danger of radioactive material leaking / cost of construction or decommissioning / reprocessing (of spent fuel rods) / eq ;	2

Question	Answer	Marks
4(a)(i)	oxygen is 21% of air ;	1
4(a)(ii)	nitrogen / N <sub>2</sub> ;	1
4(b)(i)	4 3 2 ;	1
4(b)(ii)	oxidation ;	1
4c	no reaction / no change (in water level) ;  copper is unreactive / less reactive than iron / does not react with oxygen / eq ;	2
5(a)(i)	$i = r$ or equal ;	1
5(a)(ii)	ray bends at BOTH boundaries ;	2

Question	Answer	Marks
	ray refracted towards, but not beyond normal AND emergent ray parallel to incident ray ;	
5(b)(i)	critical (angle) ;	1
5(b)(ii)	reflected back into water $i = r$ (approx.) ;	1

Question	Answer	Marks
6(a)(i)	use a tap funnel / longer thistle funnel reaching into the acid ;	1
6(a)(ii)	<i>any two from:</i> heat more concentrated acid increase surface area of zinc ;;	2
6(a)(iii)	pops / explodes / burns with a blue flame ;	1
6(b)(i)	substance used to produce (heat / thermal) energy ;	1
6(b)(ii)	water / H <sub>2</sub> O ;	1
6(b)(iii)	<i>any two from:</i> difficult to transport (as a gas) / (liquid) petrol is easier to transport difficult to store / needs pressure vessel to store / needs to be at high pressure to store not readily available other sensible suggestions ;;	2

Question	Answer	Marks
7(a)	rock containing metal ;	1
7(b)(i)	background radiation / radiation from surroundings ;	1
7(b)(ii)	B ; E ;	2
7(b)(iii)	<i>any two from:</i> helium nucleus two protons and two neutrons fast moving / double electronic charge / positively charged particle ; ;	2
7(b)(iv)	random (nature of emissions) ;	1

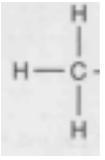
Question	Answer	Marks
8	gas ; VII / 7 / seven ; gas ; 2.8.1 ; Na+ ; 16 ; 32 ;	7

Question	Answer	Marks
9(a)(i)	variable resistor ;	1
9(a)(ii)	(current) decreases ;	1
9(b)(i)	correct circuit symbol ; connected in parallel with the battery ;	2

Question	Answer	Marks
9(b)(ii)	use of $V = I R$ or $I = V/R = 4.6 \div 8.0$ ; 0.58 or 0.575 ;	2
9(c)(i)	<b>Z</b> correctly drawn in parallel with <b>Y</b> ;	1
9(c)(ii)	greater ;	1

Question	Answer	Marks
10(a)(i)	found uncombined / as metallic element / OWTTE ;	1
10(a)(ii)	silver / mercury / any correct ;	1
10(b)(i)	bauxite ;	1
10(b)(ii)	(aluminium is) more reactive than carbon / higher in reactivity series ;	1
10(b)(iii)	2 correct uses of stainless steel cutlery / surgical instruments / exhaust pipes / eq. ;	2

Question	Answer	Marks
11(a)	<b>B</b> <b>A</b> <b>C</b> } all three correct ;;	2
11(b)(i)	poles correct ;	2
11(b)(ii)	(like poles) repel ;	1

Question	Answer	Marks
12(a)	<i>any two from:</i> (a family of) similar compounds with similar properties same functional group same general formula ;;	<b>2</b>
12(b)	 ;	<b>1</b>
	rest of molecule correct ;	<b>1</b>
12(c)	water / H <sub>2</sub> O ;	<b>1</b>
12(d)(i)	any number in range 3 to below 7 ;	<b>1</b>
12(d)(ii)	Universal indicator / pH meter ;	<b>1</b>