



PHYSICAL SCIENCE

0652/31

Paper 3 Core Theory

October/November 2017

MARK SCHEME

Maximum Mark: 80

Published

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This document consists of **7** printed pages.

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 ³ ;	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 ₂ ;	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 ₂ 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

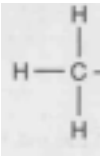
Question	Answer	Marks
8	gas ; VII / 7 / seven ; gas ; 2.8.1 ; Na+ ; 16 ; 32 ;	7

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)	Z correctly drawn in parallel with Y ;	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 A C } 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 ;;	2
12(b)	 ;	1
	rest of molecule correct ;	1
12(c)	water / H ₂ O ;	1
12(d)(i)	any number in range 3 to below 7 ;	1
12(d)(ii)	Universal indicator / pH meter ;	1