

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2014 series****0652 PHYSICAL SCIENCE****0652/21**

Paper 2 (Core Theory), maximum raw mark 80

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- 1 (a) 2.8 (cm) ; [1]
- (b) (i) point correctly marked to  $\leq \frac{1}{2}$  a square (e.c.f.) ; [1]
- (ii) extension is proportional to load ; [1]
- (c) (volume =)  $3 \times 6 \times 2.5 = 45 \text{ cm}^3$  ; [1]
- (i) density = mass/volume / (63 / 45) = 1.4 ;  
g/cm<sup>3</sup> ; [2]
- [Total: 6]**
- 2 (a) aqueous sodium hydroxide / ammonia ;  
with sodium hydroxide: blue precipitate insoluble (in excess) ;  
**OR** with ammonia: blue precipitate dissolving to deep blue solution ; [max 2]
- (b) boil / evaporate ;  
(crystallise and) filter / pour off liquid / wash ;  
dry in oven / dry with filter paper ; [3]
- (c) copper sulfate ; [1]
- [Total: 6]**
- 3 (a) exothermic ; [1]
- (b)  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$  ; [2]  
(1 for formulae, 1 for balancing)
- (c) (i) *bonds broken:*  
H – H ;  
O – O ;  
*bonds made:*  
H – O ; (*allow names*) [3]
- (ii) making bonds gives out more energy than that needed to break bonds ; [1]
- [Total: 7]**

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- 4 (a) a mixture of two (or more) metals ; [1]
- (b) metals expand ;  
copper more than invar ; [2]  
*(copper expands faster than invar, 1 mark max)*
- (c) strip bends away from contact ;  
breaking the circuit/ switching off heater ; [2]
- [Total: 5]**
- 5 (a) collection over water or in gas syringe ;  
graduations shown on collection vessel ; [2]  
*(collection by displacement of air – 1 mark only)*
- (b) molar mass of calcium carbonate is 100 ;  
contains 1 atom/ 12 u of carbon (therefore 12%) ; [2]
- [Total: 4]**
- 6 (a) wavelength correctly marked ; [1]
- (b) (i) 3 (or more) wavefronts drawn moving slightly left of top centre of the tank ;  
wavefront direction so angle of incidence = angle of reflection (by eye) ;  
wavelength constant and equal to incident wave train ; [3]
- (ii) reflection ; [1]
- [Total: 5]**
- 7 (a) oxygen used up (by combustion) ;  
forms carbon dioxide which dissolves (in the water) ;  
lower pressure ; [max 2]
- (b) nitrogen ; [1]
- (c) carbon monoxide formed ;  
toxic/ poisonous/ prevents blood carrying oxygen ; [2]
- [Total: 5]**

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- 8 (a) fizzes / bubbles formed ;  
floats ;  
'scoots' about surface ; [2]
- (b) potassium / rubidium / caesium / francium ;  
lithium ; [2]
- (c) magnesium / aluminium ;  
silicon / phosphorus / sulfur / chlorine / argon ; [2]
- (d) 2,8 for sodium ;  
2,8,8 for chlorine ;  
sodium and chloride (**NOT** chlorine) ; [3]
- [Total: 9]**

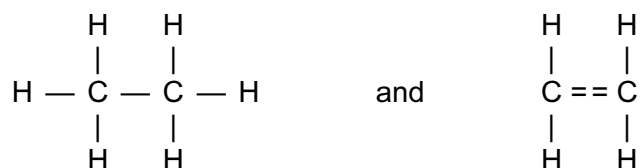
- 9 (a) (i) 1 less bright ;  
2 brighter ;  
3 not lit ;  
4 as bright ; [4]
- (ii) circuit 4 (accept 2) ;  
largest current taken from the cells ; [2]
- (b) (i) ammeter ; [1]
- (ii) correct symbol for ammeter (*if voltmeter is answer in (i) e.c.f. for this mark only*) ;  
circuit copied correctly and meter measuring a current ;  
ammeter correctly placed to measure current through cells ; [3]
- [Total: 10]**

- 10 (a) (i) iron rod is magnetised ; [1]
- (ii) ferromagnetic materials / steel / iron are attracted ;  
non-(ferro)magnetic materials / not all metals magnetic ; [2]
- (b) pins become induced magnets ;  
like poles at the bottom (can be scored from diagram) ;  
like poles repel ; [3]
- [Total: 6]**

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11 (a) 6, 6, 6 ;  
6, 6 8 ; [2]

(b) (i)



6 hydrogens in ethane ;  
4 hydrogens in ethane ;  
single bond in ethane and double bond in ethane ; [3]

(ii) bromine / bromine water ;  
no change with ethane ;  
decolourises with ethane ; [3]

(iii) used to make polythene / plastics / named addition polymer / ethanol ; [1]

[Total: 9]

12 (a) deflected by an electric field / attracted / repelled to charged plate ;  
towards the positive plate / away from negative plate ; [2]

(b) electrons ; [1]

[Total: 3]

13 (a) any mention of randomness of decay ; [1]

(b) clear lines within  $\pm 2.5$  minutes of correct answer from the axes showing the  
points chosen ;  
24.5 or 2.5 (min) ; [2]

(c) contains 2 protons ;  
2 neutrons ; [2]  
(allow: helium nucleus /  $\text{He}^{2+}$  for 2 marks OR helium ion / atom 1 mark max)

[Total: 5]