

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

## **MARK SCHEME for the October/November 2015 series**

### **0652 PHYSICAL SCIENCE**

**0652/22**

Paper 2 (Core Theory), maximum raw mark 80

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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0652	22

- 1 (a) atom of an element with same number of proton/proton number ; [1]  
different number of neutrons/nucleon or neutron number; [1]

(if no reference to 'number' 1 max, for both proton and nucleon)

- (b) atomic/proton number ; [1]  
mass/nucleon number ; [1]

- (c) 2 electrons in first level and 4 in outer level; [1]

[Total 5]

- 2 (a) Arrow from C ; [1]  
vertically downwards ; [1]

- (b) (i) Use of mass  $\times$  g (= 80  $\times$  10) ; [1]  
800 N (accept use of (9.8 or 9.81 N kg<sup>-1</sup>)) ; [1]

- (ii) Use of weight  $\times$  distance (= 800  $\times$  6.0) (ecf) ; [1]  
= 4800 (Nm) ; [1]

- (iii) decreases ; [1]  
(moment = force  $\times$  distance from X) distance decreases owtte ; [1]

[Total 8]

- 3 brass ; [1]  
graphite/sulfur ; [1]  
air ; [1]  
graphite ; [1]  
chlorine ; [1]

[Total 5]

- 4 (a) conduction ; [1]

- (b) copper fastest, iron slowest ; [1]  
brass quicker conductor than aluminium ; [1]

[Total 3]

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0652	22

- 5 (a) (i) loses one/an electron ; [1]  
(ii)  $Cl^-$  ; [1]  
18 ; [1]
- (b) 8 electrons round chlorine ; [1]  
shared pair between hydrogen and chlorine ; [1]
- (c) sodium hydroxide/sodium oxide ; [1]  
Water ; [1]
- OR**
- sodium carbonate/hydrogencarbonate ; [1]  
water AND carbon dioxide ; [1]
- (accept correct formulae)

[Total 7]

- 6 (a) (i) I clearly marked equal distance behind the mirror as object is in front and in line with the object ; [1]  
(accept very small angle between incident and reflected ray,  $< 5^\circ$ )
- (ii) Ray 1 correctly reflected back along its own path ; [1]
- (iii) Ray 2 correctly reflected ; [1]
- (iv) normal drawn and 'r' correctly identified ; [1]
- (v) Ray 1 correctly continued along its own path ; [1]  
Ray 2 correctly continued along its own path ; [1]
- (vi) E at a suitable point with between the rays [1]
- (b) angle of reflection = angle of incidence ; [1]
- (c) virtual (accept cannot be projected onto a screen) ; [1]

[Total 9]

- 7 (a) nitrogen – 2 ; [1]  
hydrogen – 8 ; [1]  
oxygen – 4 ; [1]
- (can be listed in any order with the correct number)  
(award one mark if all three names correct and no other marks gained)

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0652	22

- (b) 40 + 12 + 48 ; [1]  
100 ; [1]

(correct final answer with no working scores 2 marks, ignore any unit given)

- (c) (i) any number between 4 and 6.9 ; [1]

(4 is acceptable but 7 is not)

- (ii) 7 ; [1]

[Total 7]

- 8 (a) balloons are charged (by rubbing) [1]

(accept charge transferred from jumper to balloon or vice versa)

both have same charge (accept both positive / negative) ; [1]  
like charges repel ; [1]

- (b) water conducts (charge) ; [1]  
water removes charge / balloons discharged ; [1]

[Total 5]

- 9 (a) any one from: [1]  
coloured ions / compounds / ;  
more than one ion formed / different oxidation states / *variable valencies* ;  
useful catalysts / form complexes ;  
high densities / melting points ;

(accept conducts electricity or energy)

- (b) arsenic / selenium / bromine / krypton ; [1]

- (c) (i) malachite / copper pyrites ; [1]

- (ii) gold / silver / mercury / platinum ; [1]

- (iii) unreactive ; [1]

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0652	22

- (d) (i) no reaction/no change/OWTTE ; [1]  
copper formed/iron dissolves/solution turns colourless; [1]
- (ii) iron is more reactive than copper ; [1]

[Total 8]

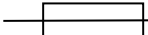
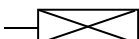
- 10 (a) (i) heat/energy given out ; [1]
- (ii)  $2C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O$  ; [2]  
(all formulae correct – 1 mark; correct balancing – 1 mark)

- (b) (i) carbon monoxide ; [1]
- (ii) poisonous/toxic/prevents transport of oxygen in blood/bonds with haemoglobin ; [1]

- (c) (i) members differ by  $CH_2$ /same general formula/functional group ; [1]  
(accept similar chemical properties/physical properties increase down series)

- (ii) ethane has carbon-carbon single bond ; [1]  
ethaene has carbon-carbon double bond ; [1]

[Total 8]

- 11 (a) correct circuit diagram for fuse  ; [1]  
(accept  )

- (b) use of  $R = V/I$  ( $=12/3.2$ ) ; [1]  
 $= 3.75$  ; [1]  
ohm or  $\Omega$  ; [1]

- (c) 5 A ; [1]  
must be greater than 3.2 A (accept for 13 A fuse) ; [1]  
and smallest above 3.2 A/relevant comment re 13 A fuse ; [1]

(If 3 A is chosen and reason given is that it is the nearest to current allow 1c).

- (d) (i) lamp correctly drawn in parallel with the original lamp ; [1]
- (ii) circuit current/current through fuse now larger ; [1]  
greater than 5 A/ $= 6.4$  A ; [1]

[Total 10]

<b>Page 6</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge IGCSE – October/November 2015</b>	<b>0652</b>	<b>22</b>

12 (a) randomness of decay ; [1]

(b) (i)  $4600 \text{ s}^{-1}$  (Bq) ; [1]

(ii) Indication on graph of finding time at which count rate halves ; [1]  
 $25 \pm 2 \text{ s}$  ; [1]

(c) Protective clothing / use tongs / short exposure time / shielding etc. ; [1]

**[Total 5]**