

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 series

0652 PHYSICAL SCIENCE

0652/21

Paper 2 (Core Theory), maximum raw mark 80

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- 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^{-1})) ; [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]**

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- 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)

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

(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]

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- (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]

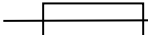
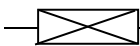
- 10 (a) (i) heat/energy given out ; [1]
- (ii) $2C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O$; [2]
(all formulae correct – 1 mark; correct balancing – 1 mark)

- (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 Ω ; [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]

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12 (a) randomness of decay ; [1]

(b) (i) 4600 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]