UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2011 question paper

for the guidance of teachers

0652 PHYSICAL SCIENCE

0652/21   Paper 2 (Core Theory), maximum raw mark 80

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.

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UNIVERSITY of CAMBRIDGE
International Examinations

1   **(a)** balance ;   [1]

    (b) burette ;   [1]

    (c) thermometer ;   [1]

    (d) beaker **OR** burette ;   [1]

                                                     [Total: 4]

2   **(a)** 50 (m / s) ;   [1]

    (b) deceleration ;
          constant ;   [2]

    (c) use of area under graph, S = ½ × 30 × 10 ;
          150 (m) ;   [2]
          (calculation 30 × 10 = 300 m – max 1)

    (d) (i) zero ;   [1]

         (ii) mention of frictional force ;   [1]

    (e) car **A** ;
          larger gradient ;
          greater acceleration ;   [max 2]

                                                     [Total: 9]

3 (a) suitable example of ionic compound e.g. sodium chloride ;
suitable example of covalent compound e.g. ammonia ;   [2]

(b) suitable example for ionic compound ;
e.g. conduct electricity when molten or in aqueous solution / giant ionic structure
/ high melting and boiling points / etc.

suitable example for covalent compound ;
e.g. does not conduct electricity when molten / simple molecular structure
/ low melting and boiling points / etc.   [2]

(c) diagram showing 2 electrons in outer shell ;
3 shells with 2 electrons in first shell and 8 in middle shell ;   [2]

[Total: 6]

4 (a) bauxite ;   [1]

(b) aluminium too reactive ;
more reactive than carbon / carbon not reactive enough / will not replace carbon ;   [2]

[Total: 3]

5 (a) (i) so that the mean temperature of the ice is measured ;   [1]

(ii) sample is below room temperature ;
so absorbs energy from the surroundings ;   [2]

(b) $-2(°C)$;   [1]

(c) temperature remains constant / ice melting ;
molecules gain potential energy / bonds are broken ;   [2]

[Total: 6]

6 (a)

name	formula	mass of 1 mole / g	
water	H_2O	**18**	;
hydrogen chloride	**HCl**	36.5	;
sodium fluoride	**NaF**	42	;
nitrogen	N_2	**28**	;

[4]

(b) Na^+ **AND** 11 ;

F^- **AND** 9 ; [2]

[Total: 6]

7 (a) (i) 45 ; [1]

(ii) 60 ; [1]

(b) (i) (a fast moving) electron ; [1]

(ii) loses 1 neutron ;
gains proton ; ('neutron changes to proton' gains 2 marks)

[2]

[Total: 5]

8 (a) suitable advantage, e.g. no pollution, etc. ;
suitable disadvantage, e.g. needs to be made, etc. ; [2]

(b) $2H_2 + O_2 \rightarrow 2H_2O$;; [2]
(correct formulae – 1 mark and correct balancing – 1 mark)

(c) lighted splint ;
pops ; [2]

(d) (i) ammonia ; [1]

(ii) Haber / Haber-Bosch ; [1]

[Total: 8]

9 **(a)** the (vibrating) rubber hits air molecules ;
causing them to vibrate / forming a sound wave ; [2]
(no mention of vibration 1 max.)

(b) **(i)** same frequency (approximately) ;
smaller amplitude ; [2]

(ii) number of waves (or vibrations) per second ;
Hz or hertz ; [2]

[Total: 6]

10 **(a)** halogens ; [1]

(b) fluorine / bromine / iodine / astatine ; [1]

(c) correct use of chlorine ; [1]
e.g. water sterilization / making plastics / etc.

(d) magnesium ; [1]

(e) bubble chlorine into the solution ;
turns brown / yellow ; [2]

(f) 35 ;
36 (allow e.c.f. on number in atom, i.e. atom + 1 for a max 1) ; [2]

[Table: 8]

11 **(a)** lamp / bulb ; [1]

(b) **(i)** 20 Ω ; [1]

(ii) use of $I = V / R$ (= 9 / 20) ;
= 0.45 A ; [2]

(iii) use of $V = IR$ (= 0.45 × 12) ;
= 5.4 V ; [2]

[Total: 6]

12 (a) alkanes ;   [1]

(b) propane ;
C_3H_8 ;   [2]

(c) contains oxygen ;
hydrocarbons contain hydrogen and carbon only ;   [2]

[Total: 5]

13 (a) straight lines between poles ;
all lines start on one pole and finish on the other, none touch each other ;
arrows pointing north to south ;   [3]

(b) complete circuit ;
mercury is a conductor ;   [2]

(c) the rod will kick ;
towards / away from the observer ;   [2]

(d) kick / move in the opposite direction ;   [1]

[Total: 8]