CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2014 series

0652 PHYSICAL SCIENCE

0652/22 Paper 2 (Core Theory), maximum raw mark 80

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1 **(a)** 2.8 (cm) ; [1]

(b) **(i)** point correctly marked to ⩽ ½ a square (e.c.f.) ; [1]

(ii) extension is proportional to load ; [1]

(c) (volume =) $3 \times 6 \times 2.5 = 45$ cm^3 ; [1]

(i) density = mass/volume / (63 / 45) = 1.4 ;
g/cm^3 ; [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) $2H_2 + O_2 \rightarrow 2H_2O$;; [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]

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]

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]

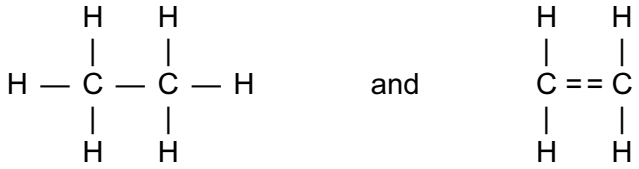
(ii) ferromagnetic materials / steel / iron are attracted ;
non-(ferro)magnetic materials / not all metals magnetic ; [2]

(b) pins become induced magnets ;
like poles at the bottom (can be scored from diagram) ;
like poles repel ; [3]

[Total: 6]

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 ± 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 / He^{2+} for 2 marks OR helium ion / atom 1 mark max*)

[Total: 5]