

**MARK SCHEME for the October/November 2009 question paper
for the guidance of teachers**

0620 CHEMISTRY

0620/02

Paper 2 (Core Theory), maximum raw mark 80

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- 1** (a) bromine and fluorine / Br and F [1]
- (b) krypton / Kr [1]
- (c) nitrogen and oxygen / N and O [1]
- (d) 175 [1]
- (e) (i) basic
ALLOW: metallic [1]
- (ii) (burning) fossil fuels / fuels containing sulfur / volcanoes ; [1]
- effect of SO₂ on environment e.g. destroys trees / kill plants / kills animals or plants in lakes or rivers / chemical erosion of (limestone) buildings / corrosion of metals ;
ALLOW: difficulty in breathing
NOT: kills plants / animal in seas / kills marine life [1]
- (iii) any three of:
- starts off high pH / pH above 7 / named pH above 7 / alkaline (pH) ;
as acid added pH goes down ;
neutralises / neutralisation / neutral / pH 7 ;
pH ends up below 7 / named pH below 7 / acid (pH) ; [3]
- (iv) universal indicator paper / pH meter [1]
- (v) potassium nitrate
ALLOW: KNO₃ [1]
- 2** (a) compound: top box ;
element: 2nd box ;
ion: 5th box ;
molecule: 4th box ; [4]
- (b) air + steel / first and last boxes ticked [1]

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(c) (i) any four of:

nucleus or particles on inside and electrons on outside ;

nucleus labelled ;

electrons on outside labelled ;

ALLOW: e for label

two electrons ;

protons + neutrons in nucleus + labels ;

ALLOW: p for proton and n for neutron

IGNORE: incorrect number of neutrons

two protons ; [4]

(ii) balloons / (arc) welding / (advertising) lights / growing Si or Ge crystals / making Ti or Zr /
coolant (in nuclear reactors) / wind tunnels / for divers [1]

NOT: as an inert gas / in (hot) air balloons / in bulbs

(iii) helium unreactive / second box down ticked [1]

3 (a) structure of ethanol with all atoms and bonds shown

ALLOW: OH in place of O – H [1]

(b) (i) exothermic [1]

(ii) 16.2 (g) [1]

(iii) $2 \text{ (CO}_2\text{)} + 3 \text{ (H}_2\text{O)}$ [1]

(c) any two of:

(very) high melting / boiling points ;

(very) high density ;

ALLOW: harder

form coloured compounds ;

NOT: they are coloured

variable oxidation numbers / can form more than one type of ion / variable valency /

form complex ions ;

are (good) catalysts ;

ALLOW: chemical differences e.g. do not react with cold water [2]

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- (d) (i) any two of:
bubbles / effervescence ;

copper carbonate / solid dissolves ;

solution becomes coloured / solution goes green / change of colour ;
NOT: wrong colour [2]

- (ii) aqueous / dissolved in water [1]

- (e) polymer ; addition ; monomers ; [3]

- 4 (a) any two physical properties of group I metal e.g.
(fairly) low melting boiling point (for a metal) ;

solid ;

conducts heat or conducts electricity ;

malleable ;

soft ;
ALLOW: ductile / shiny (when cut)
NOT: hard / sonorous [2]

- (b) 1 [1]

- (c) (i) atoms of same element / same proton number with different numbers of neutrons /
different number of nucleons [1]

- (ii) 78 [1]

- (d) boiling point 500 – 680 (actual = 669) ; [1]

- reactivity: any idea of faster than rubidium e.g. explosion / very violent spitting ;
ALLOW: more reactive / increased reaction [1]

- (e) CsCl [1]

- (f) pH 7 [1]

- (g) (aqueous) silver nitrate / aqueous lead nitrate ; [1]

- white precipitate ;
(result conditional on correct reagent) [1]

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- 5 (a)** double bond(s) ringed [1]
- (b)** C₁₀H₁₆ [1]
- (c)** red-brown / brown ; [1]
to colourless / loses its colour ;
NOT: becomes discoloured [1]
- (d) (i)** **A** thermometer ; **B** condenser ; **C** measuring cylinder ; [3]
NOT: measuring tube
- (ii)** arrangement: random ; [1]
ALLOW: far apart [1]

movement: random / rapid / move everywhere ; [1]
- (e) (i)** idea of oxygen not in excess / carbon monoxide formed (instead of carbon dioxide) [1]
ALLOW: doesn't burn completely / doesn't burn as much as it could
ALLOW: carbon or soot formed (instead of carbon dioxide)
- (ii)** toxic / kills you / poisonous / asphyxiation / suffocation [1]
NOT: harmful
- (f) (i)** **A** [1]
- (ii)** **C** [1]
- (iii)** **B** [1]
- 6 (a)** decomposition [1]
- (b)** ions must be able to move [1]
NOT: charges must be able to move
REJECT: ions and electrons move = 0
- (c)** lower melting point of the electrolyte [1]
ALLOW: helps dissolve the aluminium oxide
- (d)** **B** [1]
- (e)** anode: oxygen ; [1]

cathode: aluminium ; [1]
(both aluminium and oxygen but at wrong electrodes = 1)

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(f) oxygen reacts with them / oxygen reacts with carbon ; [1]

'burns' them away / carbon dioxide formed / gas formed ;
ALLOW: the electrodes get used up [1]

(g) 3 [1]

(h) aircraft body / car body / saucepans/ electricity cables / food containers / window frames /
cooking foil / other suitable uses
NOT: alloys unqualified [1]

7 (a) both parts required for each mark
A: yes – air and water present ; [1]

B: no – no water / there is only air ; [1]

C: no – coating protects / zinc protects (from air and water) / zinc corrodes instead /
zinc is a sacrificial metal ; [1]

(b) any three of:

oxygen blown into molten iron ;

to oxidise sulphur / carbon / phosphorus / silicon ;

basic oxides / CaO / MgO added ;

react with phosphorus and silicon ;

(P and Si) removed as slag / slag formed ; [3]

(c) chemical plant / surgical instruments / cutlery [1]

(d) O removed (from iron oxide) / oxidation number (of iron) decreased [1]

(e) iron(II) oxide + hydrochloric acid → iron chloride + water
(1 for correct reactants, 1 for correct products) [2]