

MARK SCHEME for the October/November 2008 question paper

0620 CHEMISTRY

0620/02

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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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Page 2	Mark Scheme	Syllabus
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- 1 (a) metal;
non-metal;
non-metal;
non-metal;
non-metal; [5]
ALLOW: named metal or non-metal or correct symbols
- (b) metallic character decreases (across the table)/metals on the left and non-metals on the right [1]
ALLOW: metals get less reactive (across the table)/metals conduct better across the table)
- (c) (i) electrons shown in shells as 2,8,1 [1]
ALLOW 2,8,1
- (ii) + e/electron (on the right) [1]
- (d) soft; increase; lithium; basic; [4]
- [Total: 12]

- 2 (a) sulphur dioxide → combustion of fossil fuels containing sulphur;
carbon monoxide → incomplete combustion of fossil fuels;
ALLOW: carbon monoxide → car exhausts [3]
nitrogen oxides → car exhausts;
- (b) (i) oxygen is added [1]
ALLOW: electrons are lost (from sulphur dioxide)
- (ii) 21% [1]
ALLOW 19-22%
- (iii) neutralisation [1]
- (iv) Any two of:
crops remove nitrogen (or phosphorus or potassium) from soil/
nitrogen or essential elements etc. removed when crops harvested;
fertilisers provide nitrogen or essential elements or nutrients or minerals/
fertilisers improve plant growth or yield; [2]
- (v) ammonium nitrate [1]
NOT: ammonia nitrate/ammonium salt/nitrate salt
- [Total: 9]

Page 3	Mark Scheme	Syllabus
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- 3 (a) (i) heating (calcium carbonate in a furnace)
- (ii) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
- (iii) neutralising (acid) soil/neutralising industrial waste [1]
ALLOW: for making mortar/for making limewater
NOT: for limewater
- (b) (i) thermometer; [3]
flask;
measuring cylinder;
- (ii) calcium carbonate + hydrochloric acid \rightarrow calcium chloride + carbon dioxide + water [2]
(1 mark for correct reactants; 1 mark for correct products)
ALLOW: hydrogen chloride in place of hydrochloric acid
- (iii) 86s [1]
ALLOW: between 81 and 90s
- (iv) slope of graph steeper and always above other line; [2]
graph flattens out at 80 cm^3 gas;
- (v) (speed) decreased/less/slower; [2]
(speed) increased/more/faster;

[Total: 13]

Page 4	Mark Scheme	Syllabus
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- 4 (a) haematite (or any other correct ore)
NOT: iron oxide
- (b) (i) calcium carbonate/limestone/ CaCO_3 [1]
(ii) C/just above the iron [1]
- (c) (i) $2\text{C} + \text{O}_2 \rightarrow 2\text{CO}$
1 mark for O_2 ; 1 mark for 2C and 2CO; [2]
(ii) poisonous/toxic/kills you/deadly/suffocates you [1]
NOT: harmful/causes breathing difficulties
- (d) 1st and 3rd boxes ticked [1]
- (e) Any two of:
blast furnace can only be used for metals below zinc or carbon;
aluminium is very reactive or high in the reactivity series or too reactive or higher than iron in the reactivity series;
carbon cannot remove oxygen from aluminium oxide/carbon cannot displace aluminium;

aluminium above carbon in reactivity series or more reactive than C = 2 marks
too much heat required for carbon to remove oxygen from aluminium oxide = 2 marks [2]
- (f) (i) electrolysis [1]
(ii) aircraft bodies/car bodies/(overhead) power cables/drinks cans/window frames etc. [1]

[Total: 11]

Page 5	Mark Scheme	Syllabus
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- 5 (a) (i) temperature of the water rises/heat given to the water/heat or energy given out
thermometer reading goes up
- (ii) carbon dioxide + water (1 mark each)
- (b) any two from coal/natural gas/wood/paraffin/any other suitable fuel containing carbon [2]
ALLOW: named alcohols (except ethanol)
NOT: alkenes/named alkenes/naphtha
- (c) OH/-OH [1]
NOT: complete formula for ethanol
- (d) blue cobalt chloride (paper); turns pink [2]
or white/anhydrous copper sulphate; turns blue
- (e) (i) painting/galvanising/covering with plastic/sacrificial protection/(electro)plating [1]
ALLOW: oiling/greasing
NOT: removing air/removing water
- (ii) contains water [1]
NOT: dissolves in water
- (iii) Any two of: [2]
high boiling point or melting point;
can act as catalyst;
forms coloured compounds;
high density;
compounds can have variable oxidation states or have ions with different charges;
ALLOW: general metallic properties e.g. conducts electricity; conducts heat; ductile
etc.
NOT: not very reactive

[Total: 12]

Page 6	Mark Scheme	Syllabus
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- 6 (a) Any two of;
(group of similar organic) compounds with same chemical properties;
(group of similar organic) compounds showing trend in physical properties;
have same functional group;
have same general formula;
members differ by CH_2 group; [2]
ALLOW: can be made by same method
- (b) ethane; [2]
correct structure of ethane;
ALLOW: correct structure from incorrectly named alkane
- (c) 1st row
correct structure of ethene; [2]
use e.g. for making plastics/ethanol etc.;
- 2nd row
correct structure of ethanoic acid; [1]
- 3rd row
 $\text{C}_2\text{H}_4\text{Br}_2$; [1]
- 4th row
methane; [2]
fuel;
- (d) 188 [1]
ALLOW: error carried forward from incorrect structure in the table

[Total: 11]

Page 7	Mark Scheme	Syllabus
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- 7 (a) (i) ions cannot move in solid;
ions move when molten;
- (ii) calcium has atoms/particles closely packed together/regularly arranged/strong forces between particles/particles can't move;
ALLOW: calcium has high boiling point (because of strong forces between particles)
chlorine has molecules/particles randomly arranged/far apart/particles can move easily (from place to place); [2]
ALLOW: chlorine has low boiling point (because of weak forces between particles)
- (b) (i) chlorine; [2]
calcium;
ALLOW: For 1 mark: calcium and chlorine the wrong way round
NOT: chloride/chloride ions
- (ii) graphite/carbon [1]
- (iii) to prevent it from reacting with the air/oxygen [1]
ALLOW: does not react/prevents (other) reactions (with calcium)
- (iv) any noble gas [1]
ALLOW: nitrogen
- (c) with sodium hydroxide [2]
white precipitate; insoluble in excess;
- with ammonia [1]
no precipitate/(very slight) white precipitate
ALLOW: no reaction/no change

[Total: 12]