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.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2014 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.
1 (a) (i) A [1]
(ii) B [1]
(iii) C [1]
(iv) E [1]
(v) E [1]
(vi) D [1]

(b) 1 mark for each correct word:
atoms;
protons;
neutrons. [3]

[Total: 9]

2 (a) (i) chloride / Cl [1]
(ii) sulfate [1]
(iii) MgCl₂ [1]
(iv) 26 g [1]

(b) bromine water / bromine / aqueous bromine [1]
saturated → no colour change or remains orange / yellow / brown [1]
note: mark dependent on correct reagent
unsaturated → decolourised / goes colourless [1]
ignore: goes clear / discoloured
note: mark dependent on correct reagent
allow: (acidified) potassium manganate(VII) (1) remains purple / remains pink / no
colour change with saturated hydrocarbon (1) decolourised with unsaturated
hydrocarbon (1)

(c) (i) pH 5 [1]
(ii) one or both carboxylic acid groups ringed [1]

[Total: 9]

3 (a) sulfuric acid + sodium chloride → sodium sulfate + hydrogen chloride [1]
(b) (i) bonding electron pairs on both overlap areas between hydrogen and oxygen atoms 
   do not allow: additional electrons on the hydrogen atom [1]
   4 non-bonding electrons on outer shell of oxygen 
   note: these electrons do not have to be paired up [1]

(ii) white [1]
    precipitate [1]

(c) (i) 10.8 [1]
   (ii) 1.5 (cm$^3$) [1]
   (iii) 13 (cm$^3$) [1]

(d) it loses oxygen/MnO$_2$ loses oxygen/hydrogen gains oxygen [1]
   allow: oxidation number of manganese decreases/manganese gains electrons

(e) C
   because: forms different ions/ions with different charges/forms 2 types of ions 
   note: dependent on C
   has coloured oxide/has coloured compound [1]
   ignore: has high boiling point/has high density [1]

[Total: 11]

4 (a) H$_2$O on right [1]
    2 (HCl) on left [1]
    note: mark dependent on H$_2$O on right

(b) (i) A = flask/Erlenmeyer [1]
      B = (top pan) balance [1]
      carbon dioxide is a gas/gas escapes/carbon dioxide escapes/carbon dioxide given off/gas given off [1]

(c) (i) allow: 420–440 (s) [1]
   (ii) 0.175 g [1]
   (iii) increases/gets faster [1]
      decreases/gets slower [1]
decreases / gets slower

(d) 2\textsuperscript{nd} and 3\textsuperscript{rd} boxes down ticked (decomposition and endothermic)

(e) (i) Any two from:
• calcium oxide is basic
• reacts with acidic gases / reacts with acidic vapours / reacts with sulfur dioxide / removes acidic gases / removes sulfur dioxide
  allow: reacts with acids
• idea of neutralisation
  ignore: prevents gases escaping unless qualified
  ignore: reacts with sulfur

(ii) any suitable use e.g. neutralising (or reducing acidity of) acidic soils / neutralising (or reducing acidity of) acidic industrial waste / making mortar / steelmaking

[Total: 15]

5 (a) Any four from:
• both giant structures
• both have layered structures
• graphite covalent
• sodium chloride ionic
• graphite macromolecule / giant covalent structure
• graphite has layers which are separated / further apart (than C-C bonds)
• sodium chloride has ions touching
• graphite has only one type of particle / graphite is an element / only has C atoms
• sodium chloride has two types of particles / sodium chloride is a compound
• graphite has hexagonal arrangement (of atoms)
• sodium chloride has cubic arrangement allow: square arrangement
• graphite has atoms all of one size
• sodium chloride has different sized particles / ions
ignore: properties / weak or strong bonding

(b) (i) substance containing only one type of atom
  allow: substance that cannot be split up (by chemical means)

(ii) \( C + O_2 \rightarrow CO_2 \)
(c) (i) A 
(ii) C 
(iii) B 
(iv) D 
[Total: 11]

6 (a) (i) Any two from:
- have same functional group
- group of similar compounds/have similar chemical properties
- (molecular) formula increases by CH₂ unit
- physical properties show a trend/density shows a trend/boiling points show a trend
- they have a general formula

(ii) C₅H₁₂ 
(iii) increases 
(iv) allow: between 0.50 and 0.58

(b) any suitable solid fuel e.g. coal/wood/coke/peat
ignore: bitumen/petroleum
any suitable liquid fuel e.g. paraffin/fuel oil/diesel/petrol etc.

(c) (i) X in top compartment;
allow: X in top pipe
F outside or in bottom right pipe;
M outside or in bottom left pipe;
(ii) C₂H₄ 
H₂ 
(iii) high temperature
allow: heat/stated temperatures between 200–1000 °C
catalyst
ignore: names of incorrect catalysts
[Total: 14]
7 (a) Any four from:
• melting/solid changes to liquid
  ignore: dissolving
• in solid gallium the particles are close together
• in solid gallium the particles only vibrate allow: particles do not move
• when gallium melts particles become random/move randomly
• when gallium melts, the particles start sliding over each other/bumping into
each other/particles move
  ignore: particles further apart in liquid
• idea of energy (of the hot tea causing the particles to slide/move)
• ideas about forces between particles being weakened (on melting)
  note: there must be some reference to particles/atoms/ions to score these
marking points

(b) 2 (Ga₂O₃) [1]
4 (Ga) [1]
  note: 2nd mark dependent on first being correct

(c) Any two from:
• aluminium does not corrode/does not react;
• aluminium has an (unreactive) oxide layer
• low density/lightweight
• malleable
• allow: not toxic
  note: unreactive oxide layer is 2 marks
  ignore: does not rust

(d) (i) arrow under Al foil [1]
(ii) Al₂Cl₆ [1]
  ignore: AlCl₃
(iii) aluminium has lower density (than silver)
  allow: aluminium is less expensive
  ignore: reference to melting point

[Total: 11]