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.
### Mark Scheme

**Cambridge IGCSE – October/November 2014**

<table>
<thead>
<tr>
<th>Question</th>
<th>Mark</th>
<th>Syllabus</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (a) (i)</td>
<td>E</td>
<td>0620</td>
<td>21</td>
</tr>
<tr>
<td>(ii)</td>
<td>A and D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(iii)</td>
<td>D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(iv)</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(v)</td>
<td>D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(vi)</td>
<td>A and D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>C₂H₄Br₂</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>4 (H₂O)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 (O₂)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>note: mark dependent on 4 (H₂O)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total: 9</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
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</tr>
</thead>
<tbody>
<tr>
<td>2 (a) (i)</td>
<td>sodium / Na⁺</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii)</td>
<td>X is fluoride</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Y is nitrate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(iii)</td>
<td>0.244 (mg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>allow:</td>
<td>0.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(iv)</td>
<td>4th box down ticked (weakly acidic)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>(add nitric acid) add silver nitrate</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>white precipitate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>note: mark dependent on correct reagent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>polymer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>monomer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total: 9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3  (a) ring around the OH group [1]

(b) bromine (water)
  allow: bromination [1]

decolourised / turns colourless
note: mark dependent on correct reagent
ignore: goes clear / gets discoloured

allow: potassium manganate(VII) / potassium permanganate (1)
turns colourless (1)

ignore: incorrect colour of reagent

(c) (i) to break up the cells / to extract the pigment / to separate the pigment from
the petals / idea of getting the colour out of the petals, e.g. otherwise the
colour won’t come out [1]

idea that solvent dissolves the pigment / idea of making a solution
ignore: find out how pure the rose petals are / reference to separating
colours

(ii) pigment might be absorbed onto filter paper / pigment sticks to filter paper [1]

(d) (i) chromatography [1]

(ii) spot near the bottom and above the solvent level [1]

(iii) to keep atmosphere in jar saturated (with solvent vapour)
  allow: to reduce / prevent (solvent) evaporation [1]

(iv) A and C [1]

(e) structure of ethanol with ALL atoms and bonds shown [2]

[Total: 12]
4 (a) thermometer [1]

(b) Any two from:
- same volume of water in can
- same height of burner (from can)
- wick same height
- same rate / amount of stirring of water
- **allow**: same temperature of water at start
- **allow**: same amount of fuels burnt / same temperature rise
- **allow**: same type of can [2]

(c) so same temperature throughout the water / to stop differences in temperature in the different parts of the water / otherwise the temperature will be higher at the bottom (of the water) / so not hotter in one place
- **ignore**: to mix the water / so there are no convection currents [1]

(d) decreases / goes down
- idea of liquid or fuel turning to vapour / gas;
- **allow**: gases formed
- **ignore**: fuels evaporate
- **note**: 2nd mark dependent on first [1]

(e) F [1]

(f) (i) mixture of metals / mixture of metal(s) + non-metals
- **do not allow**: compound [1]

(ii) covers surface / idea of protective layer
- prevents contact with air / prevents contact with water / so air (or water) does no react with steel
- **do not allow**: reference to tin being more reactive / sacrificial protection (for second marking point) [1]

(g) 1st box down ticked (giant covalent) [1]

[Total: 11]
5  (a) Any four from: [4]  
- suitable named metal / metal oxide e.g. reactive metal such as Mg / Zn or 
- their oxides 
- suitable named acid 
- metal + acid gives metal salt / named metal gives named metal salt 
- metal + acid gives off hydrogen 
  note: complete word equation for metal + acid → salt + hydrogen (2) 
- metal oxide + acid gives metal salt / named metal oxide gives named metal 
- salt 
- water also product of reaction of metal oxide + acid 
  note: complete word equation for metal oxide + acid → salt + water (2) 

(b) exothermic [1] 

(c) suitable use of radioactive isotope e.g. detecting leaks in pipes / checking 
- thickness of paper / tracer / cancer treatment / investigating thyroid function [1] 
  ignore: atomic bombs / explosions 

(d) protons 92 and 92 [1] 
- neutrons 143 and 146 [1] 
- electrons 92 and 92 [1] 

[Total: 9] 

6  (a) (i) (concentration) decreases [1] 
- then remains constant 
  allow: levels out [1] 
(ii) 3.8 (hr) / 3 hr 48 min [1] 
(iii) 9 (hr) 
  allow: 8.8–9.2 (hr) [1] 
(iv) steeper graph line from same starting point [1] 
- levels off lower than 0.10 mol /dm³ [1] 
(v) increase the temperature / increase concentration of sodium hydroxide 
  allow: add a catalyst [1]
(b) Any four from:

- acid in burette
- use (volumetric) pipette to put sodium hydroxide into flask
- idea of correct setup of apparatus, i.e. flask under burette
- indicator in flask
- run hydrochloric acid into sodium hydroxide
- until indicator changes colour
- any indication of good technique e.g. repeating experiment / add acid
- slowly / shaking flask after each addition of acid

Note: answers must be in the correct context, e.g. do not allow indicator in burette

(c) bonding pair of electrons between H and Cl and no additional electrons on the H atom
- six non-bonding electrons around the chlorine atom

Ignore: inner shell electrons in Cl.

[Total: 13]

7 (a) for better crop / for better plant growth / to replace elements (or named elements or minerals) lost from soil when crops harvested / for more plant protein
- allow: to give more nutrients to plants
- ignore: for healthy plant growth / to give plants the compounds they need to grow / to help plants grow

(b) neutralisation acid-base (reaction)

(c) ammonium nitrate

(d) $2 \text{NH}_4^+ \to 1 \text{SO}_4^{2-}$ / 2 ammonium to 1 sulfate
- allow: 2:1 or 1:2 ratio unqualified
- allow: $(\text{NH}_4)_2\text{SO}_4$

(e) Any two from:

- slaked lime can form an alkaline solution with water / slaked lime is calcium
- hydroxide / slaked lime is a hydroxide / slaked lime is basic
- slaked lime reacts with ammonium (salts)
- allow: slaked lime reacts with fertiliser
- ammonia escapes from soil / gas escapes from soil
(f) positive: anode and negative cathode
   at + electrode \( \rightarrow \) chlorine
   at – electrode \( \rightarrow \) potassium

[Total: 9]

8 (a) Any four from:

- dissolving
- diffusion
- in iodine solid the particles are close together
- in iodine solid the particles \textit{only} vibrate  \allow\: particles do not move
- in solution the iodine molecules are further / far apart
- in solution the particles are randomly arranged/ no particular arrangement
- in solution, particles move (fairly) freely / in solution particles slide over solvent molecules
\allow\: in solution particles move slowly (from place to place)
- in solution there is bulk movement of particles from higher to lower concentration / particles spread out in solution / move everywhere / mix up
\allow\: particles move from higher to lower concentration
- ideas of explanation of dissolving in terms of solvent molecules getting between the iodine particles
- ideas about forces between particles of iodine being weakened on dissolving

(b) (i) solid

(ii) heat causes astatine to melt / energy causes astatine to melt
\allow\: the astatine has melted / radioactivity melts the astatine

(iii) \text{At}_2 \text{ on right}
   2 (\text{NaAt}) \text{ on left}
\allow\: 2nd mark dependent on \text{At}_2 \text{ or } 2\text{At} \text{ on right}

[Total: 8]