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)  B and D  [2]  
(ii)  A  [1]  
(iii)  C  [1]  
(iv)  A  [1]  
(v)  D  [1]
(b)  KBr  
\textit{allow:} K^+Br^-
(c)  146  
\textit{allow:} 1 mark for correct atomic masses 19 and 32  

[Total: 9]

2  
(a)  \textbf{Any four} from:  
solids: particles close together/no space between particles/particles arranged regularly/particles touching  
solids: particles only vibrate  
\textit{allow:} particles cannot move/particles in fixed positions  
liquids particles can slide over each other/particles have limited movement  
\textit{ignore:} particles can move unqualified  
liquids: particles close together/particles not arranged regularly/particles arranged randomly/particles not in fixed positions  
\textit{ignore:} particles further apart than in solids  
gases: particles far apart/particles arranged randomly  
gases: particles can move everywhere/particles move anywhere/particles move randomly  
\textbf{note:} It must be clear which state is being referred to  
\textbf{note:} there must be reference to particles (or atoms/molecules/ions) in the answer to gain marks

(b)  
(i)  A  [1]  
(ii)  E and F  
\textit{allow:} B  [2]  
(iii)  C and E  [2]  
(iv)  B and F  [2]
(c) (i) 4th box down (last box) ticked [1]

(ii) argon is unreactive/inert [1]
    
    air (or oxygen) may oxidise metals/air (or oxygen) may react with the (hot)
    metals/to prevent the air (or oxygen) reacting with the metals [1]

[Total: 14]

3 (a) (i) mortar
    allow: mortar and pestle [1]

(ii) any suitable solvent other than water e.g. ethanol
    allow: ethanoic acid/aqueous ammonia
    ignore: hydrochloric/sulfuric/nitric acids/strong alkalis/aqueous solutions
    of salts [1]

(iii) evaporate some of the solvent
    allow: evaporate/heat
    allow: add more rhubarb [1]

(b) (i) it would dissolve/it would mix with the solvent/solvent would wash it off/so
    that the spot/Y didn’t dissolve in the solvent/Z would dissolve in the solvent [1]

(ii) any two from:
    dip paper into the solvent
    put lid on jar
    let solvent run up paper/let solvent separate spots
    ignore: wait for spots to appear/spots start to spread (unqualified)
    take paper out before solvent reaches the top/record solvent front
    ignore: reference to \( R_f \) values/locating agents [2]

(c) (i) ring around one or both carboxylic acid groups;
    do not allow: ring around whole structure [1]

(ii) \( \text{C}_2\text{H}_2\text{O}_4 \)
    ignore: \((\text{COOH})_2\) [1]
(d) (i) H₂O

(ii) CO and CO₂ are gases/CO and CO₂ are given off/the products are gases
     (and water)
     ignore: other substances evaporated

(iii) any suitable source e.g. respiration/burning fuels/burning named carbon-
      containing fuel/from limekilns or other suitable decomposition reaction
     ignore: from burning (unqualified)/exhaled air/animals (unqualified)
     allow: from car exhausts

(iv) any two of:
      it is a greenhouse gas/absorbs infrared radiation
      allow: warms the atmosphere/traps heat in the atmosphere
      causes global warming/increase temperature of the atmosphere
      allow: warms the atmosphere/traps heat in the atmosphere
      reject: absorbs heat from the Sun
      effects of global warming e.g. desertification/rise in sea level/more extreme
      weather/climate change
      ignore: references to ozone layer

[Total: 13]

4 (a) filter funnel with filter paper + container to collect filtrate
     correct labels for two of: (filter) funnel, filter paper, baker or flask
     ignore: incorrect labels
     ignore: filtrate/water/sand

(b) (i) potassium nitrate

(ii) Na⁺ and CO₃²⁻ (both required)

(iii) sodium chloride

(iv) total mass = 20 g
     % by mass = 14%
     allow: error carried forward from incorrect total mass

(c) (i) CO₂

(ii) pH 12

[Total: 9]
5 (a) alcohol(s)/alkanol [1]

(b) O–H
allow: OH [1]

(c) (i) 3 (H₂) [1]
(ii) (hydrogen is) flammable/explosive
allow: fire hazard [1]
(CO is) poisonous/toxic
ignore: CO harmful [1]

(d) (i) decreases
then remains constant [1]
(ii) 0.28 (mol/dm³) [1]
(iii) allow: values between 44–46 (hours) [1]
(iv) curve steeper at start;
curve levels out at same level and before 45 hrs [1]

(e) bonding pair of electrons between H and Cl
do not allow: if extra electrons on the H atom [1]
Six non-bonding electrons around the Cl
ignore: inner shell electrons in Cl [1]

[Total: 13]

6 (a) (i) acidic oxide because oxide of non-metal [1]

(ii) Any three from:
sulfur dioxide reacts with water in air/reacts with water on surface of building/forms acid rain
allow: sulfur dioxide is acidic/it is acidic
limestone is a carbonate
idea of reaction of acid with limestone/carbonate
carbon dioxide (+ salt + water) formed [3]
(b) (i) carry out in fume cupboard
(ii) speeds up reaction
(iii) \( \text{O}_2 \) (on left)
   correct balance (2 on right)
   \textit{note}: second mark dependent on \( \text{O}_2 \) or 2\( \text{O} \) on left
(iv) to prevent it turning into liquid/vapour
   \textit{allow}: so temperature is below melting point/so that it can form crystals
(v) 200 g

(c) (i) 4\textsuperscript{th} box down ticked (pipette)
(ii) indication that indicator changes colour
   \textit{allow}: any stated colour change

(d) water absorbed

[Total: 13]

7 (a) Any four from:
   colour gets darker down the Group
   correct colours of two of the halogens (chlorine green/yellow green + bromine brown/reddish-brown + iodine grey/grey-black/black)
   \textit{note}: all three halogen colours correct is 2 marks
   correct state of two of the halogens (chlorine gas, bromine liquid, iodine solid)
   \textit{note}: all three states correct is 2 marks
   reactivity decreases down the Group
   \textit{allow}: any two differences in reactivity correctly compared e.g. chlorine is more reactive than bromine (1 mark maximum)
   \textit{do not allow}: mention of incorrect difference in reactivity
   example of reactivity of pair of halogens/halides e.g. chlorine reacts with potassium bromide
   \textit{allow}: density increases down Group
   \textit{allow}: boiling points/melting points get higher down the Group

(b) diatomic

(c) 7 electrons in the outer shell
   2 electrons in inner shell
   \textit{note}: this mark cannot be obtained if other inner shells are drawn

(d) bromine + potassium iodide \( \rightarrow \) iodine + potassium bromide

[Total: 9]