

QUICK APPROACH TO A' LEVEL PRACTICALS.

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WORKED OUT EXAMPLES

UNEB 2015

You are provided with a substance **k** which contains **two cations** and **two anions**, carry out the following tests on **k** and identify the cations and anions in it.

Identify any gases evolved. Record your observations and deductions in the table below.

TESTS	OBSERVATION	DEDUCTIONS
a) Heat a spatula endful of k in a dry test tube	Purple/violet vapour forms. Purple/black sublimate. Vapour turns blue litmus to red. Yellow residue when hot and white when cold.	Iodine gas given off, thus I⁻ ZnO formed.
b) Shake 3 spatula endful of K with about 5cm ³ of water and filter. Keep both the filtrate and residue.	Colourless filtrate White residue.	Non transition metal ions OR Zn²⁺, Ca²⁺, Mg²⁺, Ba²⁺, Al³⁺, Pb²⁺ ions present.
c) Divide the filtrate into seven parts.	White precipitate insoluble in excess.	Ca²⁺, Mg²⁺, Ba²⁺ probably present.

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i)	To the 1 st part of the filtrate, add dilute sodium hydroxide solution dropwise until in excess.		
ii)	To the 2 nd part of the filtrate, add ammonia solution dropwise until in excess and allow the mixture to stand.	White precipitate insoluble in excess.	Mg²⁺ and Ba²⁺ suspected.
iii)	To the third portion of the filtrate add 2-3 drops of dilute sulphuric acid.	White precipitate formed.	Ba²⁺ suspected.
iv)	to the fourth part of the filtrate add 2-3 drops of potassium chromate (VI) solution followed by 2-3 drops of ethanoic acid. Allow the mixture to stand.	Yellow precipitate insoluble in ethanoic acid.	Ba²⁺ confirmed. Note: no mark for deduction if insoluble is not mentioned.
v)	To the fifth part of the filtrate add copper turnings followed by 2-3 drops of concentrated sulphuric acid and heat the mixture.	Brown vapour/ fumes. OR reddish-brown fumes. Purple/ violet vapour.	N ₂ O gas thus NO ₃ ⁻ present. I ₂ gas thus I ⁻

vi)	To the sixth part of the filtrate add 2-3 drops of nitric acid then 2-3 drops of silver nitrate solution followed dilute ammonia solution dropwise until in excess.	Pale yellow precipitate insoluble in excess ammonia solution.	I suspected Note: No mark for deduction if in soluble is missing.
vii)	To the seventh part of the filtrate add 2-3 drops of lead (II) nitrate solution.	Yellow precipitate	I confirmed.
d)	Wash the residue with water and the dissolve it in dilute hydrochloric acid. Divide the acidic solution into 3 parts.	Residue dissolves to form a Colourless solution.	Non transition metal cations OR Zn²⁺, Ca²⁺, Mg²⁺, Ba²⁺, Al³⁺, Sn²⁺, Sn⁴⁺ ions present. Note: No mark for Pb²⁺ because it does not dissolve in HCl
i)	To the first part of the acidic solution add sodium hydroxide solution dropwise until excess.	White precipitate soluble in excess to a Colourless solution.	Zn²⁺, Al³⁺ present.
ii)	To the first part of the acidic solution add dilute ammonia solution dropwise until excess.	White precipitate soluble in excess to a Colourless solution.	Zn²⁺ present. Note: No mark if soluble is missing.

To the third part of the acidic solution add a small amount of solid ammonium chloride. shake and add 2-3 drops of disodium hydrogen phosphate solution by dilute ammonia solution dropwise until in excess.	White precipitate soluble in excess ammonia to a Colourless solution.	Zn²⁺ confirmed. Note: No mark if soluble in ammonia is missing.
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Cations in K are Ba²⁺, Zn²⁺ and the anions in K are NO₃⁻, I⁻

UNEB 2014

You are provided with substance **Y** which contains **two cations** and **two anions**. You are required to carry out the following tests on **Y** and identify the anions and cation in it. Record your observations and deductions in the table below.

TESTS	OBSERVATIONS	DEDUCTIONS
a) Heat 2 spatula endful of Y strongly in a dry test tube.	Colourless liquid that turned anhydrous copper (II) sulphate blue. Colourless gas that turns blue litmus red and lime water milky. Yellow residue when hot and white when cold.	Water of crystallization thus a hydrated salt. CO ₂ gas thus CO ₃ ²⁻ , HCO ₃ ⁻ , C ₂ O ₄ ²⁻ , The residue is ZnO
b) To 3 spatula endfuls of Y, add dilute nitric acid dropwise until in there is no further change and warm.	Effervescence of a Colourless gas that turns blue litmus red and lime water milky.	CO ₂ thus CO ₃ ²⁻ present.

c) To the solution from (b) above, add dilute sodium hydroxide dropwise until there is no further change. Filter the mixture. Keep both the residue and filtrate.	White precipitate insoluble in excess. Colourless filtrate White residue.	Ca²⁺, Mg²⁺, Ba²⁺ Zn²⁺, Al³⁺, Sn²⁺, Pb²⁺ Ca²⁺, Mg²⁺, Ba²⁺ present
d) To the filtrate, add dilute nitric acid until the solution is just acidic and divide the acidic filtrate into six parts. i) To the first part of the acidified solution add 2-3 drops of silver nitrate solution followed by dilute ammonia dropwise until in excess.	White precipitate soluble in excess to a Colourless solution. Yellows precipitate insoluble in excess.	Zn²⁺, Al³⁺, Sn²⁺, Pb²⁺, Sn⁴⁺ present Br⁻, I⁻ suspected
ii) To the second part of the acidified filtrate, add 6 drops of concentrated sulphuric acid and warm. To the mixture add sodium thiosulphate solution.	Brown solution formed which turned to Colourless on adding Na ₂ S ₂ O ₃ solution.	I ₂ given off thus I ⁻

iii)	To the third part of the acidified filtrate, add 2-3 drops of lead (ii) nitrate solution.	Yellow precipitate	I ⁻ confirmed
iv)	To the fourth part of the acidified filtrate, add sodium hydroxide solution dropwise until in excess.	White precipitate soluble in excess forming a Colourless solution.	Zn²⁺, Al³⁺, Sn²⁺, Pb²⁺, Sn⁴⁺ present
v)	To the fourth part of the acidified filtrate, add ammonia solution dropwise until in excess.	White precipitate soluble in excess forming a Colourless solution.	Zn²⁺ present
vi)	To the sixth part of the acidified solution, add a spatula endful of ammonium chloride followed by 3-4 drops of disodium hydrogen phosphate followed by dropwise addition of ammonia solution until in excess.	White precipitate soluble in excess ammonia forming a Colourless solution.	Zn²⁺ confirmed.
e)	Wash the residue and dissolve it in dilute hydrochloric acid and divide the solution into 3 parts.	Dissolves to give a Colourless solution.	Ca²⁺, Mg²⁺, Ba²⁺ suspected

i)	To the first part of the acidic solution, add dilute sodium hydroxide solution dropwise until in excess.	White precipitate insoluble in excess	Ca²⁺, Mg²⁺, Ba²⁺ present
ii)	To the first part of the acidic solution, add dilute sodium hydroxide solution dropwise until in excess.	White precipitate insoluble in excess	Mg²⁺, Ba²⁺ present.
iii)	To the third part of the acidified solution, add 2-3 drops of potassium chromate (VI) solution.	Yellow precipitate	Ba²⁺ confirmed

- f) (i) The anions in **Y** are **CO₃²⁻, I⁻**
(ii) The cations in **Y** are **Ba²⁺, Zn²⁺**

UACE 2013

You are provided with substance **W** which contains **two cations** and **two anions**. You are required to carry out the following tests on **W** and identify the anions and cation in it. Record your observations and deductions in the table below. Identify any gas(es) evolved.

TESTS	OBSERVATIONS	DEDUCTIONS
a) Heat 1 spatula endful of W strongly in a dry test tube until there is no further no change	Colourless liquid / condensate that turns anhydrous copper (II) sulphate to blue. Colourless gas that turns blue litmus red and lime water milky. Reddish brown residue when hot and yellow when cold. Black residue.	Hydrated salt CO ₂ gas thus CO ₃ ²⁻ , HCO ₃ ⁻ or C ₂ O ₄ ²⁻ PbO or Fe ₂ O ₃
b) To a spatula endful of W, add 2-3 drops of concentrated sulphuric acid and warm.	Effervescence/ gas bubbles of a Colourless gas that turns blue litmus to red and lime water milky.	CO ₂ gas therefore CO ₃ ²⁻ , HCO ₃ ⁻ . Note: reject C ₂ O ₄ ²⁻
c) To 2 spatula endfuls of W, add dilute nitric acid until there is no further no change. Add sodium hydroxide dropwise until in excess Filter and keep both the filtrate and residue.	Effervescence/ gas bubbles of a Colourless gas that turns blue litmus to red and lime water milky. White precipitate insoluble in excess turns brown. Colourless filtrate Brown residue	CO ₂ gas thus CO ₃ ²⁻ confirmed Zn²⁺ Al³⁺, Sn²⁺, Pb²⁺, Sn⁴⁺ present Mn ²⁺ present. Zn²⁺ Al³⁺, Sn²⁺, Pb²⁺, Sn⁴⁺ present

d) To the filtrate, add dilute nitric acid until the solution is just acidic. Divide the resultant solution into four parts.	White precipitate soluble in the acid to form a Colourless solution.	Zn²⁺ Al³⁺, Sn²⁺, Pb²⁺, Sn⁴⁺ probably present
i) To the first part of the acidic filtrate, add sodium hydroxide solution dropwise until in excess.	White precipitate soluble in excess to a Colourless solution	Zn²⁺ Al³⁺, Sn²⁺, Pb²⁺, Sn⁴⁺ probably present
ii) To the second part of the acidic filtrate add aqueous ammonia solution dropwise until in excess.	White precipitate insoluble in excess	Al³⁺, Pb²⁺ present
iii) To the third part of the acidic solution, add dilute sulphuric acid	White precipitate formed	Pb²⁺ probably present
iv) Use the fourth part of the acidic solution to carry out the test of your own choice to confirm on of the cation in W. <u>PROCEDURE:</u> Add 3 drops of potassium iodide solution. <u>OR</u>	Yellow precipitate	Pb²⁺ confirmed present

<p>Add potassium chromate (VI) followed BY sodium hydroxide solution.</p> <p><u>OR</u></p> <p>Add a soluble chloride e.g. HCl and heat.</p>	<p>Yellow precipitate</p> <p>White precipitate soluble on heating.</p>	
<p>e) To two spatula endfuls W, add about 5cm³ of water, shake and filter. Divide the filtrate into five parts.</p> <p>i) To the first part of the filtrate, add sodium hydroxide solution dropwise until in excess.</p>	<p>Colourless filtrate</p> <p>White residue</p> <p>White precipitate insoluble in excess turns brown.</p>	<p>Non transition metal ions probably Zn²⁺, Ca²⁺, Mg²⁺, Ba²⁺, Al³⁺, Pb²⁺ both in residue and filtrate.</p> <p>Mn²⁺ probably present</p>
<p>ii) To the second part of the filtrate add aqueous ammonia dropwise until in excess.</p>	<p>White precipitate insoluble in excess turns brown.</p>	<p>Mn²⁺ probably present</p>
<p>iii) Use the third part of the acidic solution to carry out the test of your own choice to confirm on of the cation in W.</p>		

<p><u>PROCEDURE:</u></p> <p>Add concentrated nitric acid followed by solid sodium bismuthate.</p> <p><u>OR:</u> Add concentrated nitric acid followed by solid PbO_2 and heat.</p> <p><u>NOTE:</u></p> <ul style="list-style-type: none"> ✓ The order of reagents matters. ✓ Sodium bismuthate solution is rejected ✓ If PbO_2 is used heating is a must. 	<p>Purple solution</p>	<p>Mn^{2+} confirmed present.</p>
<p>iv) To the fourth part of the filtrate, add 2-3 drops of lead (II) nitrate solution and heat.</p>	<p>White precipitate insoluble on heating</p>	<p>Cl^- absent, SO_4^{2-}, SO_3^{2-} probably present</p>
<p>v) Use the fifth part of the filtrate to carry out the test of your own choice to confirm on of the anions in W.</p>	<p>White precipitate insoluble in the acid.</p>	<p>SO_4^{2-} confirmed.</p>

<u>PROCEDURE:</u> Add barium nitrate solution followed by dilute nitric acid.		
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- f) Identify the;
- i) Cations in W Mn^{2+} Pb^{2+}
- ii) Anions in W CO_3^{2-} SO_4^{2-}

UACE 2012

You are provided with substance which contains **two cations** and **two anions**. You are required to carry out the following tests on **W** and identify the anions and cation in it. Record your observations and deductions in the table below.

TEST	OBSERVATION	DEDUCTION
a) Heat 2 spatula endful of W strongly in a dry test tube	Colourless condensate/ liquid turned anhydrous copper (II) sulphate blue. Colourless gas turned blue litmus red and acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution from orange to green. Gas with sweet smell. Solid turned green <u>Note:</u> fruity smell is rejected.	Water given off thus a hydrated compound. Sulphur dioxide gas given off probably SO_3^{2-} , SO_4^{2-} . Propanone vapour given off probably CH_3COO /Acetal ion NiO or FeO
b) To two spatula endfuls of w , in a dry test tube , add concentrated sulphuric acid and warm.	Colourless gas turned blue litmus paper red. Vinegar smell. Fruity smell is rejected.	Probably acetate ion or CH_3COO^-

	solution dropwise until in excess.		
ii)	To the second part of the acidified filtrate add potassium iodide solution .	No observable change	Pb^{2+} absent.
iii)	To the third portion of the acidified filtrate add 5drops of litmus solution followed by dilute ammonia solution dropwise until in excess.	Blue solution/ blue lake	Al^{3+} confirmed
iv)	To the fourth portion of the acidified filtrate add 5 drops of barium nitrate solution.	White precipitate formed.	SO_4^{2-} present.
d)	Wash the residue with water and dissolve in dilute hydrochloric acid. Divide the acidic solution into 3 portions.	Dissolved to give green solution.	Ni^{2+} , Fe^{2+} probably present.
i)	To the first portion of the acidic solution add sodium	Green precipitate insoluble in excess.	Ni^{2+} , Fe^{2+} probably present.

hydroxide solution dropwise until in excess.		
ii) To the second portion of the acidic solution, add dilute ammonia solution dropwise until in excess.	Green precipitate soluble in excess to a light blue solution.	Ni^{2+} probably present.
iii) Use the third portion of the acidic solution to carry out a test of your own choice to confirm one of the cations in W. PROCEDURE: Add excess ammonia solution followed by dimethylglyoxime solution.	Red precipitate formed.	Ni^{2+} confirmed present.

e)

i) The cations in W are Ni^{2+} Al^{3+}

ii) The anions in W are CH_3COO^- , SO_4^{2-}

UACE 2011

You are provided with substance **P** which contains **two cations** and **two anions**. You are required to carry out the following tests on **p** and identify the anions and cation in it. Record your observations and deductions in the table below. Identify any gas(es) evolved

TESTS	OBSERVATION	DEDUCTIONS.
a) Heat one spatula endful of P in a dry testube.	Colourless liquid turns anhydrous copper (II) sulphate blue. Colourless gas that turns blue litmus paper red and lime water milky White fumes Colourless gas which turns acidified $K_2Cr_2O_7$ green. Green solid turns black/ brown residue.	Hydrated salts thus water of crystallization The gas is CO_2 thus CO_3^{2-} , HCO_3^- or $C_2O_4^{2-}$ CH_3COO^- SO_3 gas, SO_2 gas thus SO_4^{2-} , SO_3^{2-} CuO, FeO, NiO (for black) and Fe_2O_3 (brown).
b) To 2 spatula endfuls of P, add about 3cm ³ of water. Shake vigorously and filter. Divide the filtrate into 5 parts. Keep the residue.	Green filtrate. Green residue	Transition metal ions probably Cu^{2+} , Fe^{2+} , or Cr^{3+} in both filtrate and residue.
i) To the first part of the filtrate add dilute sodium hydroxide solution dropwise until in excess.	Green precipitate insoluble in excess.	Probably Ni^{2+} , Fe^{2+} present.
ii) To the first part of the filtrate add dilute ammonia solution dropwise until in excess.	Green precipitate insoluble in excess turns brown.	Fe^{2+} present.

iii) To the third part of the filtrate add 3-4 drops of concentrated nitric acid followed by 2-3 drops of potassium thiocyanate.	Green solution turns yellow(or orange) then blood red on addition of potassium thiocyanate solution.	Fe^{2+} oxidized to Fe^{3+} thus Fe^{2+} confirmed.
iv) To the fourth part of the filtrate add 2-3 drops of lead(II) nitrate solution. Heat and allow to cool.	White precipitate insoluble on heating	Cl^- absent or SO_4^{2-} , SO_3^{2-} suspected.
v) Use the fifth part of the filtrate to carry out the test of your own choice to confirm one of the anions in P. <u>PROCEDURE:</u> Add barium nitrate solution followed by dilute nitric acid <u>OR:</u> Add acidified barium chloride solution.	White precipitate insoluble in the acid.	SO_4^{2-} confirmed present.
c) Wash the residue with water and dissolve it in dilute hydrochloric acid. Divide the resultant solution into 3 portions.	Effervescence of a Colourless gas which turned blue litmus red and lime water milky. Green solution formed	The gas is CO_2 thus CO_3^{2-} confirmed Probably Ni^{2+} , Cu^{2+} or Fe^{2+} present
a) To the first portion add dilute sodium hydroxide solution dropwise until in excess.	Green precipitate insoluble in excess.	Ni^{2+} , Fe^{2+} present
b) To the first portion add dilute ammonia solution dropwise until in excess.	Green precipitate soluble in excess to a pale blue solution.	Ni^{2+} present
c) Use the third portion of the solution to carry out a test of your own choice to confirm one of the cations in P	red precipitate	Ni^{2+} confirmed present.

<p><u>PROCEDURE:</u></p> <p>Add aqueous ammonia followed by 2 drops of dimethylglyoxime solution.</p>		
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d) Identify the;

- Cations in P are Fe^{2+} and Ni^{2+}
- Anions in p are CO_3^{2-} and SO_4^{2-}

TRIAL QUESTIONS

PRACTICAL ONE

You are provided with substance **T** which contains **three cations** and **one anion**. You are required to carry out the following tests on **T** and identify the anions and cation in it. Record your observations and deductions in the table below.

TEST	OBSERVATIONS	DEDUCTIONS
a) Heat a spatula endful of t in a dry test tube until there is no further change.		

b) Shake 2 spatula endfuls of t with about 3cm ³ of water. Add dilute sodium hydroxide solution to the mixture dropwise until in excess, warm, and filter. Keep both the filtrate and the residue.		
c) To the filtrate add dilute nitric acid dropwise until the solution is just acidic. Divide the acidic solution into six parts.		
i) To the first part of the acidic solution, add dilute sodium hydroxide solution dropwise until in excess. Warm the mixture		
ii) To the second part of the acidic solution ,add dilute ammonia		

dropwise until in excess.		
iii) To the third part acidic solution , add 2-3 drops of potassium iodide solution.		
iv) To the fourth part of the acidic solution ,add 2-3 drops of litmus solution , followed by ammonia solution dropwise until in excess.		
v) To the fifth part of the acidic solution ,add 2-3 drops lead (II) ethanoate solution .		
vi) Use the sixth part to carry out a test of your own choice to confirm the anion in T		
d) Wash the residue with water and dissolve it in dilute hydrochloric acid and		

divide the solution into 3 parts		
i) To the first part of the acidic solution, add dilute sodium hydroxide solution dropwise until in excess.		
ii) To the first part of the acidic solution, add dilute solution dropwise until in excess.		
iii) To the third part of the acidic solution, add 2-3 drops of potassium hexacyanoferrate(II) solution.		

e) Identify the;

- i) Anion in
T.....
- ii) Cations in **T**
 are.....

PRACTICAL 2

You are provided with substance **Y** which contains **two cations** and **two anions**. You are required to carry out the following tests on **Y** and identify the anions and cation in it. Identify any gases evolved. Record your observations and deductions in the table below.

TEST	OBSERVATION	DEDUCTIONS
a) Heat one spatula endful of Y in a dry testube.		
b) To two spatula endfuls of Y in a testube, add about 3cm ³ of water. Shake and filter keep both filtrate and residue. Divide the filtrate into 5 parts		
i) To the first part of the filtrate, add dilute sodium hydroxide solution dropwise until in excess.		
ii) To the first part of the filtrate, add dilute ammonia solution dropwise until in excess.		
iii) Use the third part of the filtrate to carry out a test of your own choice to confirm one		

	of the cations present in Y		
iv)	To the fourth part of the filtrate, add 2-3 drops of lead (II) nitrate solution.		
v)	Use the fifth part of the filtrate to carry out a test of your own choice to confirm one of the anions present in Y		
c)	Wash the residue and dissolve it in dilute hydrochloric acid. Divide the solution into 4 parts.		
i)	To the first part of the solution, add dilute sodium hydroxide solution dropwise until in excess.		
ii)	To the first part of the solution, add dilute ammonia solution dropwise until in excess.		
iii)	To the third part of the solution, add potassium thiocyanate.		
iv)	Use the fourth part of the solution to carry out a test of your own choice to confirm one of the cations present in Y.		

d)

(i) the cations present in Y are

(ii) the anions present in Y are.....

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PRACTICAL 3

You are provided with substance **R** which contains **two cations** and **two anions**. You are required to carry out the following tests on **R** and identify the anions and cations in it. Identify any gases evolved. Record your observations and deductions in the table below.

TESTS	OBSERVATIONS	DEDUCTIONS
a) Heat one spatula endful of R in a dry testube.		
b) To one spatula endful of R in a dry testube, add 2-3 drops of concentrated sulphuric acid and warm gently.		
c) Put 2 spatula endfuls of R in a testube. Add about 5cm ³ of water, shake well and filter. Keep both filtrate and residue.		

d) Divide the filtrate into four portions.		
i) To the first portion of the filtrate add 5 drops of neutral iron (III) chloride solution and heat gently to boiling.		
ii) To the second part of the filtrate, add dilute sodium hydroxide solution dropwise until in excess. Heat the mixture.		
iii) To the third part of the , add ammonia solution dropwise until in excess.		
Use the fourth portion of the filtrate to carry out a test of your own choice to confirm one of the cations in R.		
e) Wash the residue with a little water. transfer into a test tube and dissolve in dilute hydrochloric acid.		

divide the solution into 3 portions.		
i) To the second portion of the solution, add dilute sodium hydroxide solution dropwise until in excess and Heat the mixture.		
ii) To the second portion of the solution, add ammonia solution dropwise until in excess		
iii) Add 3 drops of potassium hexacyanoferrate(II) solution OR Add potassium iodide solution. OR Add potassium iodide solution followed by sodium thiosulphite solution.		

f) Identify;

- i) The cations in R.....
- ii) The anions in R.....

PRACTICAL 4

You are provided with a substance **Z** which contains **two cations** and **two anions**, carry out the following tests on **Z** and identify the cations and anions in it.

Identify any gases evolved. Record your observations and deductions in the table below.

TESTS	OBSERVATIONS	DEDUCTIONS
a) Heat a spatula endful of Z in a dry test tube.		
b) Dissolve three spatula endfuls of Z in water.		
i) To the first part of the solution add dilute hydrochloric acid .		
ii) To the second part of the solution add iron(III) chloride.		
iii) To the third part of the solution		

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add barium nitrate solution.		
iv) To the fourth part of the solution add dilute sodium hydroxide solution dropwise until ion excess and filter. Keep both the filtrate and residue.		
c) Acidify the filtrate with dilute hydrochloric acid and divide it into 3 portions. i) To the first portion of the acidified filtrate add dilute sodium hydroxide solution dropwise until in excess.		
ii) To the second portion of the acidified filtrate add dilute ammonia solution dropwise until in excess.		
iii) To the third portion of the filtrate add 2-3 drops of potassium iodide solution		
d) Wash the residue and dissolve it in dilute hydrochloric acid. Divide the resultant solution into two parts. i) To the first part of the solution add sodium hydroxide solution dropwise until in excess.		
ii) To the second portion of the resultant solution add dilute ammonia		

solution dropwise until in excess.		
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- e) Identify the ions in substance Z
- Cations.....
 - Anion.....

Question5

You are provided with a substance **D** which contains **two cations** and **two anions**, carry out the following tests on **D** and identify the cations and anions in it.

Identify any gases evolved. Record your observations and deductions in the table below.

TESTS	OBSERVATIONS	DEDUCTIONS
a) Heat a spatula endful of D strongly in a dry test tube.		
b) Place 2 spatula endful of D in a test tube, add about 5cm ³ of water. Shake and filter. Keep both the filtrate and the residue.		

i)	To the first portion of the filtrate add dilute sodium hydroxide solution dropwise until in excess.		
ii)	To the first portion of the filtrate add dilute ammonia solution dropwise until in excess.		
iii)	To the third portion of the filtrate add few drops of hexacyanoferrate(II) solution.		
iv)	To the fourth portion of the filtrate add 2 drops of lead (II) nitrate solution and warm.		
v)	Use the fifth portion of the filtrate to confirm one of the anions in D		
c)	Wash the residue with water. Heat a small portion of the residue strongly in a dry test tube.		
d)	Transfer the rest of the residue to a test tube and dissolve it in dilute hydrochloric acid. Divide the solution into 3 parts.		
i)	To the first part of the solution add dilute sodium hydroxide dropwise until in excess.		

ii)	To the first part of the solution add dilute ammonia dropwise until in excess.		
iii)	To the third part of the solution, add 2-3 drops of potassium thiocyanate solution .		

e) Identify the ions in substance D

- i) Cations.....
- ii) Anions.....

PART 3

ORGANIC CHEMISTRY PRACTICALS

2015

You are provided with an organic compound **M**. you are required to determine the nature of **M**. carry out the following tests on **M** and record your observations and deductions in the table below.

TESTS	OBSERVATIONS	DEDUCTIONS
a) Burn a small amount of M on the tip of a dry spatula or dry porcelain.	White solid burns with a blue non sooty flame	Aliphatic saturated compound
b) (i) shake a half spatula endful of M with about 2cm ³ of dilute sodium hydroxide solution.	Dissolves to form a Colourless solution.	Acidic compound OR Carboxylic acid, alcohol. Acc: salt of amine
(ii) shake a half spatula endful of M with about 2cm ³ of water and add 2-3 drops of litmus solution.	Dissolves to form a Colourless solution. Solution turns litmus solution to red.	Polar compound. Acidic compound probably carboxylic acid. Acc: salt of amine
c) Shake a spatula endful of M with about 5cm ³ of water and divide the solution into 3 parts. i) To the first part of the solution add 2-3 drops of sodium hydrogen carbonate solution.	Effervescence/ Colourless gas bubbles given off.	Carboxylic acid probably present.
ii) To the second part of the solution, add 2-3 drops of 2,4-dinitrophenylhydrazine(Brady's) solution.	No observable change OR No yellow precipitate	Aldehyde, ketone absent Acc: carbonyl absent.
iii) To the third part of the solution add 2-3 drops of iron (III) chloride solution and warm.	No observable change OR No purple colouration.	Phenol absent.
d) Dissolve a spatula endful of M in about 5cm ³ of water. To the solution add about 1-2 cm ³ of dilute sodium hydroxide solution. heat the mixture, cool, add 2-3 drops of silver	White precipitate Acc: white residue	Cl ⁻ released.

nitrate solution and filter. Keep both the filtrate and the residue.		
e) To the residue add dilute ammonia dropwise until in excess.	Residue dissolves to give a Colourless solution.	Cl ⁻ present.
f) To the filtrate add about equal volume of ethanol followed by 3-4 drops of concentrated sulphuric acid. Heat the mixture and cool.	Sweet fruity smell	Ester formed/ Esterification occurs thus carboxylic acid confirmed

g) State the nature of M

M is an aliphatic carboxylic acid with a chloro group.

OR

M is aliphatic compound with both a carboxyl/ carboxylate group and chloro group.