

Experiment 1:

You are provided with substance X, which contains **two cations** and **two anions**. Carryout the following tests to identify them. Identify any gases which may be evolved.

Write your observations and deductions in the table below:

Required: Substance X is a mixture of $(\text{NH}_4)_2\text{SO}_4$ & ZnCO_3

TESTS	OBSERVATIONS	DEDUCTIONS
a)Heat two spatula endfuls of X in a dry test tube strongly until no further change.		
b)To two spatula endfuls of X, add 6cm^3 of water. Shake well and then filter. Keep both filtrate and residue separate.		
c)To the filtrate, add a few drops of dilute nitric acid until the solution is just acidic. Divide the acidic solution into three parts.		
(i)To the 1 st portion, add dil NaOH soln drop – wise until in excess and warm .		

(ii)To the 2 nd part, add 3 drops of $\text{Pb}(\text{NO}_3)_2$ soln and warm		
(iii)Carryout a test of your own choice to third part to confirm one of the anions present in X		
c)Dissolve the residue obtained in (b) add about 5cm^3 of dil nitric acid. Divide the resultant solution into 4 parts.		
(i)To the 1 st part, add dil NaOH soln drop – wise until in excess		
(ii)To the 2 nd part, add dil ammonia soln drop - wise until in excess		
(iii)To the 3 rd part, add 2-3 drops of KI soln		
(iv)To the 4 th part, add solid NH_4Cl followed by 3-4 drops of Na_2HPO_4 soln and then dil ammonia drop -wise until in excess		

d) Cations present in X

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Anions present in X

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Experiment 2:

You are provided with substance W, which contains **two cations** and **two anions**. Carryout the following tests to identify them. Identify any gases which may be evolved.

Write your observations and deductions in the table below:

Write your observations and deductions in the table below:

Required: Substance W is a mixture of PbO, NaCl & Ba(NO₃)₂

TESTS	OBSERVATIONS	DEDUCTIONS
a)To two spatula endfuls of W in a dry test tube, add conc H ₂ SO ₄ acid and warm.		
b)To two spatula endfuls of W, add 8cm ³ of water. Shake well and then filter. Keep both filtrate and residue separate.		
c)Divide the filtrate into 7 parts. (i) To the 1 st part, add dil NaOH soln drop – wise until in excess		

(ii) To the 2 nd part, add dil ammonia soln drop - wise until in excess		
(iii)To the 3 rd part, add Na ₂ SO ₄ soln		
(iv)To the 4 th part, add K ₂ Cr ₂ O ₇ soln followed by dil HCl and then dil H ₂ SO ₄		
(v)To the 5 th part, add 1- 2 drops of Pb(NO ₃) ₂ soln and warm		
(vi)To the 6 th part, add AgNO ₃ soln followed by dil HNO ₃		
(vii)To the 7 th part, add zinc metal powder followed by excess NaOH soln and then warm		
(iv)To the 4 th part, add solid NH ₄ Cl followed by 3-4 drops of Na ₂ HPO ₄ soln and then dil ammonia drop -wise until in excess		
d)Wash the residue obtained in (b) with water and dissolve it in 5cm ³ of dil HNO ₃ and warm the mixture. Divide it into 4 parts after cooling		

(i) To the 1 st part, add dil NaOH soln drop – wise until in excess		
(ii) To the 2 nd part, add dil ammonia soln drop - wise until in excess		
(iii) To the 3 rd part, add Na ₂ SO ₄ soln		
(iv) To the 4 th part, carryout a test of your own choice to confirm the second cations present in X		

Cations present in X

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Anions present in X

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Experiment3:

You are provided with substance W, which contains **two cations** and **two anions**. Carryout the following tests to identify them. Identify any gases which may be evolved.

Write your observations and deductions in the table below:

Write your observations and deductions in the table below:

Required: Substance R is a mixture of Zn(CH₃COO)₂; Na₂SO₃ ; CuO

TESTS	OBSERVATIONS	DEDUCTIONS
a) Heat 2 spatula endfuls of R in a dry test tube strongly until no further change.		
b) To two spatula endfuls of W in a dry test tube, add conc H₂SO₄ acid and warm.		
c) To two spatula endfuls of W, add 8cm ³ of water. Shake well and then filter. Keep both filtrate and residue separate. Divide the filtrate into 8 parts.		
(i) To the 1 st part, add dil NaOH soln drop – wise until in excess		
(ii) To the 2 nd part, add 2-3 drops of KI soln		
(iii) To the 3 rd part, add dil ammonia soln drop -wise until in excess		
(iv) To the 4 th part, carryout a test of your own choice to confirm the second cations present in R		

(v) To the 5 th part, add neutral FeCl_3 soln and heat		
(vi) To the 6 th part, add 2-3 drops of $\text{Pb}(\text{NO}_3)_2$ followed by dil HNO_3		
(vii) To the 7 th part, add 1cm^3 of dil HCl and warm		
(viii) To the 8 th part, add acidified KMnO_4 soln		
d) To the residue obtained in (c) wash with water and then add 5cm^3 of dil HNO_3 and warm gently to dissolve. Divide it into 4 parts after cooling		
(i) (i) To the 1 st part, add dil NaOH soln drop – wise until in excess		
(ii) To the 2 nd part, add zinc metal powder and warm gently.		
(iii) To the 3 rd part, add 2-3 drops of KI soln		

Cations present in R

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Anions present in R

.....and

Experiment 4:

You are provided with substance W, which contains **two cations** and **two anions**. Carry out the following tests to identify them. Identify any gases which may be evolved.

Write your observations and deductions in the table below:

Write your observations and deductions in the table below:

Required: Substance T is a mixture of KI ; $\text{Ba}(\text{NO}_3)_2$ and CuO

TESTS	OBSERVATIONS	DEDUCTIONS
a) To two spatula endfuls of W in a dry test tube, add conc H_2SO_4 acid and warm.		
b) To 3 spatula endfuls of T, add 8cm^3 of water. Shake well and then filter. Keep both filtrate and residue separate. Divide the filtrate into 8 parts.		
(i) To the 1 st part, add dil NaOH soln drop – wise until in excess		
To the 2 nd part, add dil ammonia soln drop – wise until in excess		
(iii) To the 3 rd part, dil H_2SO_4 acid		
(iv) To the 4 th part, carry out a test of your		

own choice to confirm the second cations present in T		
v)To the 5 th part, add aluminium metal powder followed by excess dil NaOH soln and warm		
vi)To the 6 th part, add Pb(NO ₃) ₂ soln		
vii)To 7 th part, add AgNO ₃ soln		
viii)To the 8 th part, add a spatula endful of bleaching powder or soln followed by 1cm ³ of dil HNO ₃ and 1cm ³ of chloroform and shake gently.		
d)Wash the residue obtained in (c) with water and then add about 5cm ³ dil HNO ₃ and warm gently to dissolve. Divide the resultant soln into 3 parts, after cooling		
(i)To the 1 st part, add dil NaOH soln drop – wise until in excess		

ii)To the 2 nd part, add magnesium metal powder and leave to stand		
iii)To the 3 rd part, add 2-3 drops of KI soln followed by Na ₂ S ₂ O ₃ soln		

Cations present in T

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Anions present in T

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Experiment5:

You are provided with substance W, which contains **two cations** and **two anions**. Carryout the following tests to identify them. Identify any gases which may be evolved.

Write your observations and deductions in the table below:

Write your observations and deductions in the table below:

Required: Substance Q is a mixture of ZnCO₃; PbO; Na₃PO₄

TESTS	OBSERVATIONS	DEDUCTIONS
a)To 2 spatula endfuls of Q, add 7cm ² of water and shake well to dissolve. Filter and keep both filtrate and residue		
b)To the filtrate in (a) add a few drops of dil nitric acid until the soln		

is just acidic. Divide the acidic soln into 4 parts. (i) To the 1 st part, add $\text{Pb}(\text{NO}_3)_2$ soln and warm		
(ii) To the 2 nd part, add $\text{Ba}(\text{NO}_3)_2$ soln		
(iii) To the 3 rd part, add 2-3 drops of AgNO_3 soln		
(iv) To the 4 th part, add ammonium molybdate soln followed by Conc HNO_3 and warm		
c) Wash the residue obtained in (a) with water and then add about 5cm^3 dil HNO_3 and warm gently to dissolve and then cool. To 4cm^3 of the cold soln, add ammonia soln drop-wise until in excess, shake well and then filter. Keep both the filtrate and residue separate.		
d) To 4cm^3 of the filtrate in (c) add dil HNO_3 drop -wise until the soln is just acidic. Divide the resultant soln into 4 parts		
(i) To the 1 st part, add dil NaOH soln drop – wise until in excess		

(ii) To the 2 nd part, add KI soln		
(iii) To the 3 rd part, add dil ammonia soln drop - wise until in excess		
(iv) To the 4 th part, carryout a test of your own choice to confirm the cations present in Q		
e) Wash the residue obtained in (c) with dil ammonia soln and then add 5cm^3 of dil HNO_3 . Divide the resultant soln into 4 parts		
(i) To the 1 st part, add dil NaOH soln drop – wise until in excess		
To the 2 nd part, add dil ammonia soln drop - wise until in excess		
iii) To the 3 rd part, add sodium sulphate soln		
(iv) To the 4 th part, carryout a test of your own choice to confirm the cations present in Q		

Cations present in Q

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Anions present in Q

.....and.....

Experiment7

You are provided with substance **U** which contains **two cations** and **two anions**. Carryout the following tests to identify them. Record any gases which may be evolved.

Required: Substance U is a mixture of $\text{Cr}_2(\text{SO}_4)_3$; MgCO_3

TESTS	OBSERVATIONS	DEDUCTIONS
a)To 2 spatula endfuls of U , add 7cm^2 of water and shake well to dissolve. Filter and keep both filtrate and residue		
b)Divide the filtrate into obtained in (a) above into 6 parts (i)To the 1 st part, add dil NaOH soln drop – wise until in excess		
ii)To the 2 nd part, add dil ammonia soln drop -wise until in excess		
iii)To the 3 rd part, add Na_2CO_3 soln drop-wise until in excess		

iv)To the 4 th part, add excess NaOH soln followed by H_2O_2 soln and warm then add amylalcohol followed by dil H_2SO_3		
v) To the 5 th part, add $\text{Ba}(\text{NO}_3)_2$ soln followed by dil HNO_3		
vi)To the 6 th part, carryout a test of your own choice to confirm the anion present in U.		
c)Wash the residue obtained in (a) with water and dissolve it in about 4cm^3 of dil HNO_3 . Divide the resultant soln into 4 parts		
i)To the 1 st part, add dil NaOH soln drop – wise until in excess		

ii) To the 2 nd part, add dil ammonia soln drop -wise until in excess		
iii) To the 3 rd part, add Na ₂ SO ₄ soln		
iv) To the 4 th part, carryout a test of your own choice to confirm the cation present in U.		

Cations present in U

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Anions present in U

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Experiment 8

You are provided with substance **Z** which contains **two cations** and **two anions**. Carryout the following tests to identify them. Record any gases which may be evolved

Required: Substance Z is a mixture of ZnCO₃; MgO; Na₂C₂O₄

TESTS	OBSERVATIONS	DEDUCTIONS
a) To 2 spatula endfuls of Z, add 7cm ³ of water and shake well to dissolve. Filter and		

keep both filtrate and residue		
b) Divide the filtrate into obtained in (a) above into 3 parts (i) To the 1 st part, add lead (II) nitrate soln followed by dil HNO ₃		
ii) To the 2 nd part, add Ba(NO ₃) ₂ soln followed by dil HNO ₃		
iii) To the 3 rd part, carryout a test of your own choice to confirm the anion present in Z.		
c) Wash the residue obtained in (a) with water and then add 6cm ³ of dil HNO ₃ and warm to dissolve, allow it to cool down. To 4cm ³ of the cold resultant soln, add 7cm ³ of NaOH soln drop-wise, shake strongly. and then filter. Keep both filtrate and residue		

i)To the 1 st part, add dil NaOH soln drop – wise until in excess		
ii)To the 2 nd part, add Na ₂ CO ₃ soln drop-wise until in excess		
iii)To the 3 rd part, add dil ammonia soln drop -wise until in excess		
iv) To the 4 th part, carryout a test of your own choice to confirm the cation present in Z.		
e)Wash the residue obtained in (c) with NaOH soln and then add 4cm ³ of dil HNO ₃ shake well to dissolve. Divide the resultant soln into 4 parts		
i)To the 1 st part, add dil NaOH soln drop – wise until in excess		
ii)To the 2 nd part, add dil ammonia soln drop -wise until in excess		

iii)To the 3 rd part, add Na ₂ SO ₄ soln		
iv)To the 4 th part, add solid NH ₄ Cl followed by 3 -4 drops of Na ₂ HPO ₄ soln and add ammonia soln drop-wise until in excess		

Cations present in Z

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Anions present in Z

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Experiment9

You are provided with substance **G** which contains **two cations** and **two anions**. Carryout the following tests to identify them. Record any gases which may be evolved

Required: Substance G is a mixture of FeSO₄.7H₂O; Al₂(SO₄)₃; NaCl

TESTS	OBSERVATIONS	DEDUCTIONS
a)To two spatula endfuls of G in a dry test tube, add 5 drops of Conc H ₂ SO ₄ and warm		
b)To 2 spatula endfuls of G, add 7cm ² of water and shake well to dissolve. To the 5cm ³ of the resultant soln add 8cm ³ of		

NaOH soln drop-wise until in excess. Shake well and filter. Keep both filtrate and residue		
c) Dissolve the residue obtained in (b) in 4cm ³ of dil H ₂ SO ₄ . Divide the resultant soln into 3 parts.		
i) To the 1 st part, add dil NaOH soln drop – wise until in excess		
ii) To the 2 nd part, add dil ammonia soln drop -wise until in excess		
iii) To the 3 rd part, add a few drops of K ₃ Fe(CN) ₆ (III) soln		
d) To the filtrate obtained in (b), add dil HNO ₃ drop-wise until the soln is just acidic. Divide the resultant soln into 7 parts.		
i) To the 1 st part, add dil NaOH soln drop – wise until in excess		
ii) To the 2 nd part, add dil ammonia soln drop -wise until in excess		
iii) To the 3 rd part, add dil H ₂ SO ₄		

iv) To the 4 th part, carryout a test of your own choice to confirm the cation present in G.		
v) To the 5 th part, add lead (II) nitrate soln and warm		
vi) To the 6 th part, carryout a test of your own choice to confirm the anion present in G.		
vii) To the 7 th part, add AgNO ₃ soln followed by excess ammonia soln		

Cations present in G

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Anions present in G

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