

## AIM-

To detect the ions present in the given holi colors.

## APPARATUS REQUIRED-

Test tubes, test tube stand and holder ,Bunsen burner , china dish, spatula, tripod stand, mesh , dropper , filter paper .

## THEORY-

Holicolors or gulaals are mainly colored powders which are used for celebratory purposes during the festival of holi.

As the commercialisation of the holi market began,sellers started introducing artificial substances into naturally made holicolors to enhance their color. Eventually ,holi colors transformed into fully chemical colors ,and even though chemical colors are cost effective, they are a huge threat to human body.

These days most holi colors sold in the market are oxidized metals or industrial dyes mixed with engine oil. These chemicals are known to cause serious harm to person's health .

For example -

**GREEN color** is obtained from copper sulphate -which may cause allergies in eye or even temporary blindness.

**PURPLE COLOR** is obtained from chromium iodide - which may cause bronchial asthma or other forms of allergy.

**SILVER COLOR** is obtained from aluminium bromide - a known carcinogenic.

**RED COLOR** is obtained from mercury sulphite - which may cause skin cancer or minamata disease (mental retardation, paralysis, retardation , impaired vision)

**SHINY COLOR** are result of powdered glass being added to the colors.

**MOREOVER-**

- Many water colors have an alkaline base capable of causing severe injuries.
- Colors in the form of pastes have toxic compounds mixed in a base of engine oil or other inferior quality oil.
- These toxic compounds may cause skin allergy temporary blindness etc.

## TEST FOR GREEN COLOR

### a. PRELIMINARY OBSERVATIONS :

COLOR-GREEN

SOLUBILITY-SOLUBLE

STATE- CRYSTALLINE SOLID

### b. OBSERVATION TABLE:

#### ➤ TEST FOR ANIONS-

S.NO	EXPERIMENT	OBSERVATION	INFERENCE
1	Add dil. $H_2SO_4$ to the soln.	No change.	$CO_3^{2-}$ , $SO_3^{2-}$ , and $S^{2-}$ absent.
2	Add conc. $H_2SO_4$ to W.E. (water extract)	Reddish brown vapors with pungent smell.	$Br^{-}$ indicated.
Confirmatory test ( $Br^{-}$ )			
2.a	Add $AgNO_3$ and dil $HNO_3$	Light yellow ppt. (Partially	

	to the soln.	soluble in water)	
2.b	To W.E., add $\text{CCl}_4$ and conc. $\text{HNO}_3$ drop wise.	Orange colouration .	$\text{Br}^{1-}$ confirmed.
3	Add conc. $\text{H}_2\text{SO}_4$ and heat.	Reddish brown vapor persists.	$\text{NO}_3^{1-}$ indicated.
Confirmatory test ( $\text{NO}_3^{1-}$ )			
4	Now add Cu turnings	Vapor does not intensify.	$\text{NO}_3^{1-}$ absent.
Test for Independent Radicals.			
5	Add $\text{BaCl}_2$ to W.E.	White ppt. formed (water insoluble)	$\text{SO}_4^{2-}$ confirmed.
6	Add lead acetate to W.E.	White ppt. formed	$\text{SO}_4^{2-}$ confirmed.
7	Add ammonium molybdate to W.E. <b>B</b> oil it and add conc. $\text{HNO}_3$ after cooling .	No change observed.	$\text{PO}_4^{3-}$ absent.

**➤ TEST FOR CATIONS-**

S.NO	EXPERIMENT	OBSERVATION	INFERENCE
1	Add NaOH to W.E.	No reaction	$\text{NH}_4^{1+}$ absent
2	Add dilHCl to W.E.	No reaction	$\text{Pb}^{2+}$ absent
3	Add dilHCl and pass $\text{H}_2\text{S}$ .	Black ppt	$\text{Cu}^{2+}$ indicated
Confirmatory test ( $\text{Cu}^{2+}$ )			
3a	Dissolve black ppt in conc. $\text{HNO}_3$ and add $\text{NH}_4\text{OH}$	Blue color obtained.	$\text{Cu}^{2+}$ confirmed
To solution add acetic acid and divide into 2 parts			
3b	Add $\text{K}_4[\text{Fe}(\text{CN})_6]$ to part 1	Brown ppt	$\text{Cu}^{2+}$ confirmed
3c	Add KI to part 2	Brown color.	$\text{Cu}^{2+}$ confirmed
4	Add $\text{NH}_4\text{Cl}$ and $\text{NH}_4\text{OH}$ (excess)	White ppt formed	$\text{Al}^{3+}$ indicated $\text{Fe}^{3+}$ absent
Confirmatory test ( $\text{Al}^{3+}$ )			
Dissolve ppt in dilute HCl and divide into 2 parts			
4a	To aq soln add blue litmus	It turns red	Acidic soln
4b	Add $\text{NH}_4\text{OH}$ till solution turns blue	Floating white ppt with blue	$\text{Al}^{3+}$ confirmed

		adsorbed on it	
5	H <sub>2</sub> S added to step 4 solution	Dirty white ppt appears	Zn <sup>2+</sup> indicated
Confirmatory test (Zn <sup>2+</sup> )			
Dissolve ppt in dilute HCl and divide into 2 parts			
5a	To part 1 add NaOH	White ppt	Zn <sup>2+</sup> confirmed
5b	To part 2 add Potassium ferrocyanide	White ppt formed	Zn <sup>2+</sup> confirmed
6	(NH <sub>4</sub> ) <sub>2</sub> CO <sub>3</sub> added to step 4 solution	No change	Ba <sup>+2</sup> , Sr <sup>+2</sup> , Ca <sup>+2</sup> absent
7	(NH <sub>4</sub> ) <sub>2</sub> HPO <sub>4</sub> added to step 4 solution	No reaction	Mg <sup>+2</sup> absent

c.

CHEMICAL REACTIONS:

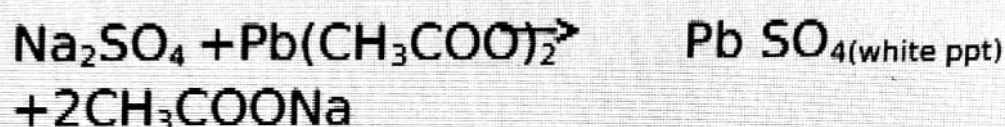
Reaction for:

1. Br<sup>-</sup>

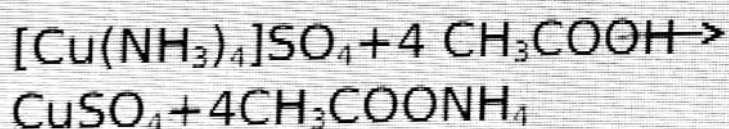


$2\text{NaBr} + \text{CCl}_4$  dissolves to give orange colour in  $\text{CCl}_4$  layer

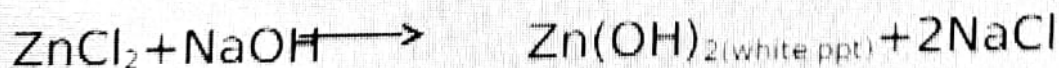
2.  $\text{SO}_4^{2-}$



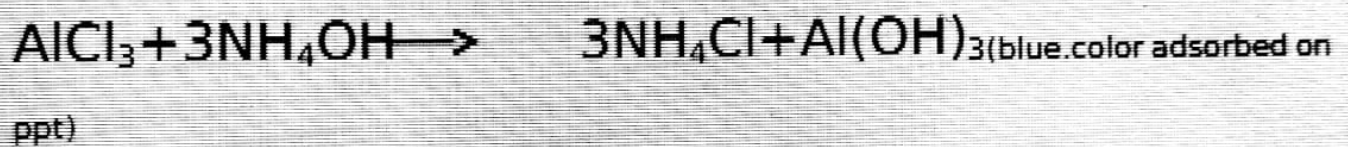
3.  $\text{Cu}^{2+}$



4.  $\text{Zn}^{2+}$



5.  $\text{Al}^{3+}$





## TEST FOR SILVER COLOR

### A. PRELIMINARY OBSERVATIONS :

COLOR-SILVER

SOLUBILITY-SOLUBLE

STATE- CRYSTALLINE SOLID

### B. OBSERVATION TABLE:

#### ➤ TEST FOR ANIONS

S.NO	EXPERIMENT	OBSERVATION	INFERENCE
1	Add dil. $\text{H}_2\text{SO}_4$ to the soln.	No change.	$\text{CO}_3^{2-}$ , $\text{SO}_3^{2-}$ , and $\text{S}^{2-}$ absent.
2	Add conc. $\text{H}_2\text{SO}_4$ to W.E. (water extract)	Reddish brown vapors with pungent smell.	$\text{Br}^{1-}$ indicated.
2.a	Add $\text{AgNO}_3$ and dil $\text{HNO}_3$	Light yellow ppt. (Partially	
Confirmatory test ( $\text{Br}^{1-}$ )			
		water)	
2.b	To W.E. add	Orange	$\text{Br}^{1-}$

	CCl <sub>4</sub> and conc. HNO <sub>3</sub> drop wise.	colouration .	confirmed.
3	Add conc. H <sub>2</sub> SO <sub>4</sub> and heat.	Reddish brown vapor persists.	NO <sub>3</sub> <sup>1-</sup> indicated.
Confirmatory test (NO <sub>3</sub> <sup>1-</sup> )			
4	Now add Cu turnings	Vapor does not intensify.	NO <sub>3</sub> <sup>1-</sup> absent.
Test for Independent Radicals.			
5	Add BaCl <sub>2</sub> to W.E.	White.ppt.form ed (water insoluble)	SO <sub>4</sub> <sup>2-</sup> confirmed.
6	Add lead acetate to W.E.	White ppt. formed	SO <sub>4</sub> <sup>2-</sup> confirmed.
7	Add ammonium molybdate to W.E. <b>Boil</b> it and add conc. HNO <sub>3</sub> after cooling .	No change observed.	PO <sub>4</sub> <sup>3-</sup> absent.

➤ TEST FOR CATIONS-

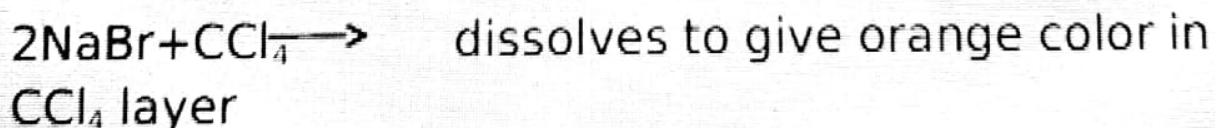
S.NO	EXPERIMENT	OBSERVATION	INFERENCE
1	Add NaOH to W.E.	No reaction	$\text{NH}_4^{1+}$ absent
2	Add dilHCl to W.E.	No reaction	$\text{Pb}^{2+}$ absent
3	Add dilHCl and pass $\text{H}_2\text{S}$ .	No reaction	$\text{Cu}^{2+}$ absent
4	Add $\text{NH}_4\text{Cl}$ and $\text{NH}_4\text{OH}$ (excess)	Brown ppt formed	$\text{Fe}^{3+}$ indicated $\text{Al}^{3+}$ absent
Confirmatory test ( $\text{Fe}^{3+}$ )			
Dissolve ppt in dilute HCl and divide into 2 parts			
4a	To part 1 ,add Potassium ferrocyanide	Blue color appears	$\text{Fe}^{3+}$ confirmed
4b	To part 1 ,add Potassium thiocyanate	Blood red coloration	$\text{Fe}^{3+}$ confirmed
5	Add $\text{H}_2\text{S}$ to step 4 solution	Black ppt appears	$\text{Co}^{2+}, \text{Ni}^{2+}$ Indicated.
6	Dissolve black ppt in aqua regia	Yellow coloration	$\text{Ni}^{2+}$ Indicated. $\text{Co}^{2+}$ absent
Confirmatory test ( $\text{Ni}^{2+}$ )			
Divide solution into 2 parts			
6a	Add $\text{NH}_4\text{OH}$	Rose pink	$\text{Ni}^{2+}$

	and DMG to part 1	color	confirmed
6b	Add NaOH to part 2	White ppt	Ni <sup>2+</sup> confirmed
7	Add NH <sub>4</sub> Cl and NH <sub>4</sub> OH (excess)	No change	Ba <sup>2+</sup> , Sr <sup>2+</sup> , Ca <sup>2+</sup> absent
8	(NH <sub>4</sub> ) <sub>2</sub> HPO <sub>4</sub> added to step 7 solution	No reaction	Mg <sup>2+</sup> absent

#### d. CHEMICAL REACTIONS:

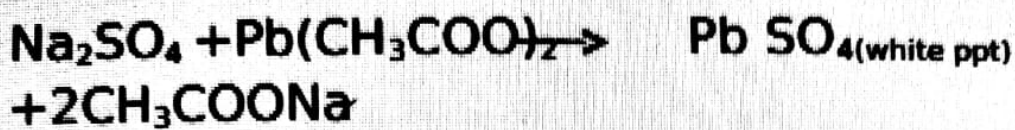
Reaction for:

1. Br<sup>1-</sup>

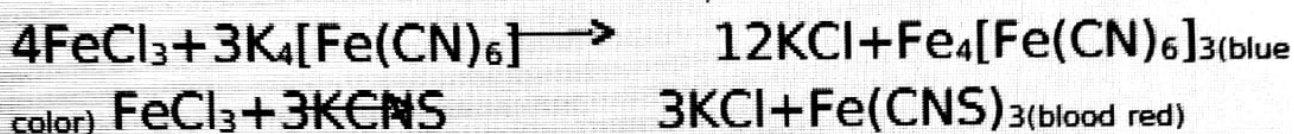
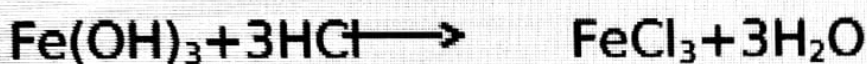


2. SO<sub>4</sub><sup>2-</sup>

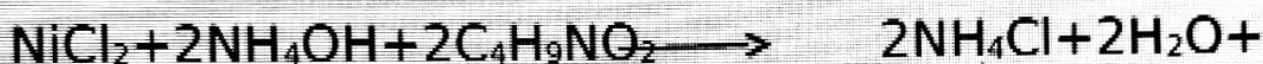




3.  $\text{Fe}^{3+}$



4.  $\text{Ni}^{2+}$



CONCLUSION

<u>COLOR</u>	<u>ANION PRESENT</u>	<u>CATION PRESENT</u>
<u>GREEN COLOR</u>	Br <sup>1-</sup> SO <sub>4</sub> <sup>2-</sup>	Zn <sup>2+</sup> Cu <sup>2+</sup> Al <sup>3+</sup>
<u>SILVER COLOR</u>	Br <sup>1-</sup> SO <sub>4</sub> <sup>2-</sup>	Fe <sup>3+</sup> Ni <sup>2+</sup>

- ❖ As seen above, dry colors (gulaal), contains several components which are related to skin related problems.
- ❖ Heavy metals present in the colorants can cause asthma, skin diseases and adversely affects the eye.

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# Introduction

- The tradition of holi has been present in India since time immemorial and holi celebration .
- Holi colors are available in multiple colors from orange to red to black and so on.
- Each color is equally prominent and equally preferred .
- The colors used here are green and silver and are bought from a local market.