CHEMICAL TEST TO DISTINGUISH BETWEEN PAIR OF COMPOUNDS

LEVEL A

TEST	REAGENT	INFERENCE
1- Iodoform test(Alcohols)		
2-Lucas test (1^0,2^0,& 3^0Alcohols)	$ZnCl_2$/HCl	Turbdity immediately in 3^0Alcohols
3-Neutral ferric chloride test (Phenol)	Neutral $FeCl_3$	Voilet colour
4-Bromine water test(Phenol)	Br_2/H_2O	White ppt
5-Iodoform test(Aldehydes&Ketones -$COCH_3$,Alcohol(-$C(OH)CH_3$	$NaOH/I_2$	Yellow Ppt of CHI_3
6-Tollens test(Aliphatic & Aromatic Aldehydes)	Amm.$AgNO_3$	Silver mirror at walls of test tube
7-Fehling test(Aliphatic Aldehydes)	Fehling A & Fehling B	Reddish Brown ppt of Cu_2O
8-Azo dye test(Aniline)	Aniline forms BDC with $NaNO_2$ + HCl than reacts with β-napthol	
9-Isocyanide test(1^0 Aniline)	$CHCl_3$ + KOH	Unpleasent odur or smell of Isocyanide
10-Heinsberg test(1^0, 2^0, 3^0 Amines)	$C_6H_5SO_2Cl$	Product of 1^0 Amines soluble in alkali. Product of 2^0 Amines are insoluble in alkali.
11-Sodium bicarbonate test (Acids)	$NaHCO_3$	Effervesence due to CO_2
12. aq.NaOH and $AgNO_3$ test Test		Ppt formed if-Cl/-X directly attached tosp^3

Distinguish By a Single Chemical Test(WITH CHEMICAL EQUATION)

LEVEL B

1. All aldehydes (R-**CHO**) give **Tollens' Test** and produce silver mirror.

   $RCHO + 2\,[Ag(NH_3)_2]^+ + 3\,OH^- \rightarrow RCOO^- + 2\,Ag \downarrow + 2H_2O + 4\,NH_3$

   Tollens' Reagent — silver ppt

   Note: HCOOH(methanoic acid) also gives this test, ketones(RCOR) do not give this test

2. All aldehydes (R-**CHO**) and ketones(R**CO**R) give **2,4-DNP test**

   RCOR + 2,4-DNP → Orange ppt

   R-CHO + 2,4-DNP → Orange ppt

Aldehydes and ketones having **CH_3CO**- (keto methyl) group give Iodoform Test. Alcohols having CH_3CH- group also give **Iodoform Test**.

$CH_3CHO + 3I_2 + 4\ NaOH \rightarrow CHI_3 + HCOONa + 3\ NaI + 3H_2O$

Yellow ppt

The following compounds give Iodoform Test: ethanol (C_2H_5OH), propan-2-ol ($CH_3CH(OH)CH_3$), ethanal(CH_3CHO), propanone(CH_3COCH_3), butanone ($CH_3COCH_2CH_3$) , pentan-2-one ($CH_3COCH_2\ CH_2CH_3$) , acetophenone ($PhCOCH_3$)

4. <u>All carboxylic acids (R-**COOH**) give **Bicarbonate Test**</u>

   $RCOOH + NaHCO_3 \rightarrow RCOONa + CO_2 + H_2O\uparrow$

   effervescence

5. <u>**Phenol** gives **$FeCl_3$** Test</u>

   $C_6H_5OH + FeCl_3 \rightarrow (C_6H_5O)_3Fe + 3\ HCl$

   (neutral) (violet color)

6. <u>All primary amines (R/Ar -**NH_2**) give **Carbyl Amine Test**</u>

   $R\text{-}NH_2 + CHCl_3 + KOH(alc) \rightarrow R\text{-}NC + KCl + H_2O$

   offensive smell

7. <u>Aniline gives Azo Dye Test (Only for aromatic amines)</u>

   $C_6H_5NH_2 + NaNO_2 + HCl \rightarrow C_6H_5N_2^+Cl^-$; then add β-naphthol → orange dye

8. <u>All alcohols (R**OH**) give **Na-metal test**</u>

   $R\text{-}OH + Na \rightarrow R\text{-}ONa + H_2$

   bubbles

9. For esters (RCOOR) : Hydrolyses first. Then see the products (acid & alcohol) and give a test to identify them
10. All alkenes (C=C) and alkynes (C≡C) decolorizes Br_2 – water from red to colorless
11. **Lucas Test to distinguish primary, secondary and tertiary alcohols**

    Lucas reagent: $ZnCl_2$/HCl

    3^0-alcohol + Lucas reagent → immediate turbidity

    2^0-alcohol + Lucas reagent → turbidity after sometime

    1^0-alcohol + Lucas reagent → no turbidity

CBSE QUESTIONS

Give one chemical test to distinguish between the following pairs of compounds:

1. Methylamine and dimethylamine
2. Secondary and tertiary amines
3. Ethylamine and aniline
4. Aniline and benzylamine
5. Aniline and N-methylaniline
6. Propanal and Propanone
7. Acetophenone and Benzophenone
8. Phenol and Benzoic acid
9. Benzoic acid and Ethyl benzoate
10. Pentan-2-one and Pentan-3-one
11. Benzaldehyde and Acetophenone
12. Ethanal and Propanal
13. Acetone and Acetaldehyde
14. Acetaldehyde and Benzaldehyde
15. Ethanoic acid and Ethnoyl chloride
16. Methanol and Ethanol
17. Propanol and Propan-2-ol
18. 2-Methyl Propan-2-ol and Propanol
19. Phenol and Cyclohexanol
20. 1^0,2^0,&3^0 Alchols
21. 1^0,2^0,& 3^0 Amines
22. Formic acid and Acetic acid

WORK SHEET

Match the following :-

Sl	Column A	Sl	Column B
1	Neutral Ferric Chloride solution	a	Test for carboxylic acid
2	Iodoform test	b	Test for p- , s- t- alcohol
3	Azodye test ($NaNO_2$ +HCl) and beta-napthol	c	Test for p- , s- t- amines
4	aq.NaOH and $AgNO_3$ test	d	Test for any aldehyde
5	Hinsberg's reagent (benzene sulphonyl chloride	e	Test for phenol
6	Tollen's Reagent (ammoniacal $AgNO_3$ solution)	f	Test for chloride
7	Lucas Test (anh. $ZnCl_2$ + conc.HCl)	g	Test for alphatic and aromatic 1^0-amine
8	$NaHCO_3$ solution	h	Test for aromatic 1^0-amine
9	Isocyanide Test Or Carbylamine Test	i	Test for ethanol. Ethanal ,
10	Fehling's solution (alkaline sol. Of $CuSO_4$ +	j	Acetophenone

Which one will give + ve test for the reagent

1) $NaOH + I_2$ (Propanal and Ethanal) .
2) Neutral $FeCl_3$ solution(Phenol , Acetic Acid)
3) Ammoniacal $AgNO_3$ solution (Propanone and Propanal)
4) $NaHCO_3$ solution (Benzoic acid and Phenol)
5) $CHCl_3$ and alcoholic KOH (Ethanamine and N-ethyl Ethanamine)
6) Benzene sulphonyl chloride .(2^0amine and 3^0amine)
7) ($NaNO_2$ +HCl) and beta-Napthol (CH_3NH_2 and Aniline)
8) anh. $ZnCl_2$ + conc.HCl (Isopropyl alcohol , Propanone)
9) aq.NaOH and $AgNO_3$ test (Chlorobenzene ,Cyclohexylchloride)
10) alkaline sol. Of $CuSO_4$ + sod.pot.tartarate (Acetone and Acetaldehyde)
11) Hinsberg's reagent (Methylamine and dimethylamine)
12) Tollen's Test (Formic acid and Acetic acid)
13) aq.NaOH and $AgNO_3$ test (Benzyl chloride and Chlorobenzene)
14) Acidic hydrolysis of ester + Iodoform test. (Methyl Acetate and Ethyl Acetate)
15) Na-metal test (Ethanol and Ethoxyethane)

MCQ

1. Which of the following compound will give positive idoform test.
   a. 3-methylpropan-2-ol
   b. 1-phenylpropan-1-ol
   c. 1-methylcyclopentanal
   d. 3-phenylpropan-2-ol
   i. a &c
   ii. a & d
   iii. b & c
   iv. b and d

2. Propan-1-ol and propan-2-ol can be distinguished by_____
   a. Lucas test
   b. Ferric chloride test
   c. Tollen's reagent test
   d. Na metal test

3. Lucas test is associated with_____ .
   a. Alcohol
   b. phenol
   c. Aldehyde
   d. Carboxylic acid

4. _____ alcohol react immediately with anhydrous $ZnCl_2$ + HCl and give insoluble Chloride.
   a. Methanol
   b. Butanol
   c. Isopropylalcohol
   d. 2- methylpropan-2-ol
5. C_2H_5OH and C_6H_5OH can be distinguished by
   a. Br_2+ H_2O
   b. I_2+NaOH
   c. $FeCl_3$
   d. both B and C
6. C_2H_5CHO and $(CH_3)_2CO$ be distinguished by testing with
   a. Phenyl Hydrazide
   b. Hydroxylamine
   c. Fehlings solution
   d. Sodium Bisulphide
7. Silver mirror test can be used to distinguished between
   a. Ketone and Acid
   b. Phenol and Acid
   c. Aldehyde And Acid
   d. Alcohol and phenol
8. The pair of compounds in which both the compounds give positive with tollen's reagent
   a. Glucose and Sucrose
   b. Fructose and Sucrose
   c. Acetophenone and Hexanal
   d. Glucose and Fructose
9. Acetone and Acetaldeyhde are differentiated by
   a. NaOH+I_2
   b. $[Ag(NH_3)_2]^+$
   c. HNO_3
   d. I_2
10. Which of the following pairs can be distinguished by sodium hypoiodite
    a. CH_3CHO and CH_3COCH_3
    b. CH_3CH_2CHO and CH_3COCH_3
    c. CH_3CH_2OH and $CH_3CH_2CHOHCH_3$
    d. CH_3OH and CH_3CH_2 CHO
11. CH_3CHO and $C_2H_5CH_2CHO$ can be distinguished by
    a. Bendict test
    b. Iodoform test
    c. Tollen's test
    d. Fehlings solution test
12. Dye test can be used to distinguished between
    a. Ethylamine and Acetamide
    b. Ethylamine and Aniline
    c. Urea and Acetamide
    d. Methylamine and Ethylamine
13. Hinsbergs reagent is :
    a. Benzenesulphonyl chloride
    b. Benzenesulphonic acid
    c. Phenyl iocyanide
    d. Benzenesulphamide
14. Iodoform can be prepared from, all except.
    a. Ethyl methyl ketone
    b. Isopropyl alcohol
    c. 3-methylbutan-2-one
    d. Isobutyl alcohol

STATE TRUE OR FALSE

1 Formic acid reduces Tollens' reagent

2Carboxylic acids do not give characteristic reactions of carbonyl Group

3Acetic acid does not give sodium bisulphite addition product

4Benzaldehyde does not give Fehling's test.

5 Can iodoform be prepared from ethanol ?

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