CHEMISTRY DEPARTMENT 2023
S.6 BRAINSTORMING TEST
TEST ON: DISTINGUISHING SPECIES

NAME TR. OPELE DANIEL INDEX number 0777376396
Signature GUIDE expected score(%)

Instructions: Attempt *all questions in this paper.*

1. (a) Name **one** reagent that can be used to distinguish between members of the following pairs of compounds. In each case state what would be observed when each member of the pair (s) is separately treated with the reagent you have named;

(i) **HCOOH and CH_3COOH** (1 ½ marks)

Reagent Ammoniacal silver nitrate solution. Emphasize; Spelling of reagent

Observations;
HCOOH; Silver mirror deposits formed.
CH_3COOH; No observable change.

(ii) **CH_3OH and CH_3CH_2OH** (1 ½ marks)

Reagent Iodine solution in presence of sodium hydroxide solution. Deny without; solution.

Observations;
CH_3OH; No observable change.
CH_3CH_2OH; Yellow precipitate is formed

(iii) $\begin{matrix} COO^- \\ | \\ COO^- \end{matrix}$ and $HCOO^-$ (03 marks)

Reagent Ammoniacal silver nitrate solution

Observations;
$\begin{matrix} COO^- \\ | \\ COO^- \end{matrix}$; No observable change
$HCOO^-$; Silver mirror deposits formed.

(iv) $(CH_3CH_2)_2NH$ and $CH_3CH_2NH_2$ (03 marks)

Reagent

Sodium nitrite and concentrated hydrochloric acid at 0°C

Observations;

$(CH_3CH_2)_2NH$; Yellow oily liquid formed

$CH_3CH_2NH_2$; A colourless solution and bubbles of a colourless gas.

2. (a) State what is observed when each of the following compounds is treated with ammoniacal silver nitrate solution:

(i) $CH_3CH_2C \equiv CH$ (1 mark)

observations

White precipitate is formed.

Equation

$CH_3CH_2C{\equiv}CH + AgNO_3(aq) + NH_3(aq) \longrightarrow CH_3CH_2C{\equiv}CAg(s) + NH_4NO_3(aq)$

(ii) $CH_3CH_2CH_2CHO$ (1 mark)

observations

Silver mirror deposits is formed.

Equation

$CH_3CH_2CH_2CHO + 2Ag(NH_3)_2OH(aq) \longrightarrow CH_3(CH_2)_2COONH_4(aq) + 2Ag(s) + H_2O(l) + 3NH_3(g)$

3. Name a reagent that can be used to distinguish between each of the following pairs of substances. In each case state what would be observed when the reagent is treated with each member of the pair.

(a) propan-2-ol and ethanol

Reagent: (½ mark)

Dony; when the word anhydrous is seperated.

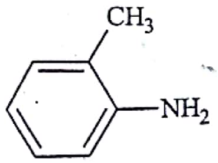
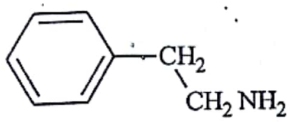
Anhydrous zinc chloride and concentrated hydrochloric acid at room temperature

Observation: (1 mark)

Propan-2-ol; Form a cloudy solution within 5 minutes.

Ethanol; No observable change at room temperature.

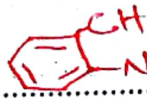
Reject; Without room temperature.

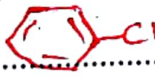
(b)  and 

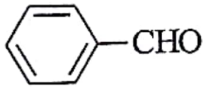
Reagent: (1 mark)

Sodium nitrite and concentrated hydrochloric acid at 0°C (1½ marks))

Observation:

 ; A colourless solution is formed

 ; A colourless solution and bubbles of a colourless gas.

(c) HCHO and 

Reagent: (1 mark)

Copper (II) sulphate solution in a solution of sodium tartarate and excess sodium hydroxide solution (1½ marks))

Observation:

HCHO ; Reddish brown precipitate

 ; No observable change.

4. Name one reagent that can be used to distinguish between each of the following pairs of compounds and state what would be observed in each case if the reagent is reacted with the compounds

(a) C_6H_5COOH and C_6H_5OH

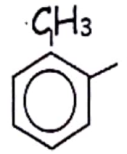
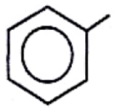
Reagent Neutral iron (III) chloride solution Reject; without Neutral.

Observations;

C_6H_5COOH ; ~~No~~ Reddish brown precipitate formed.

C_6H_5OH ; Violet colouration

Reject; No observable change for C_6H_5COOH.

(b)  and 

Reagent
Sodium nitrite and concentrated hydrochloric acid at 0°C

Observations;
 ; A colourless solution is formed.
 ; A colourless solution and bubbles of a colourless gas

(c) CH_3OH and CH_3CH_2OH

Reagent
Iodine solution in the presence of sodium hydroxide solution,

Observations;
CH_3OH ; No observable change
CH_3CH_2OH; Yellow precipitate is formed.

(d) $(CH_3)_2C=O$ and CH_3CH_2CHO (03 marks)

Reagent
Ammoniacal Silver nitrate solution

Observations;
$(CH_3)_2C=O$; No observable change
CH_3CH_2CHO ; Silver mirror deposit formed.

(e) HCOOH and HOOCCOOH (03 marks)

Reagent
Ammoniacal Silver nitrate solution

Observations;
HCOOH ; Silver mirror deposit formed.
HOOCCOOH ; No observable change.

(f) $CH_3C{\equiv}CCH_3$ and $CH_3CH_2C{\equiv}CH$ (03 marks)

Reagent.

Ammoniacal Silver nitrate solution

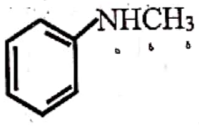
Observations;

$CH_3C{\equiv}CCH_3$ - No observable change.

$CH_3CH_2C{\equiv}CH$; White precipitate is formed.

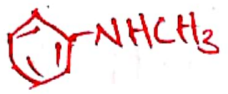
5. Name a reagent that can be used to distinguish between each of the following pairs of ions: In each case, state what would be observed if each member of the pair was treated with the reagent you have named.

(a) [illegible] and [illegible] (3marks)

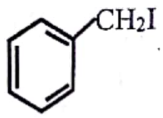
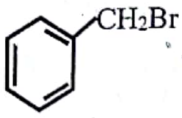
(b) $CH_3CH_2CH_2NH_2$ and  (3 marks)

Reagent: Sodium nitrite and concentrated hydrochloric acid at 0°C

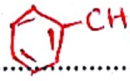
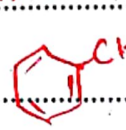
Observation: $CH_3CH_2CH_2NH_2$; A colourless solution and bubbles of a colourless gas



; Yellow oily liquid formed.

(c)  and  (3 marks)

Reagent; Hot sodium hydroxide solution followed by dilute nitric acid and silver nitrate solution.

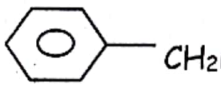
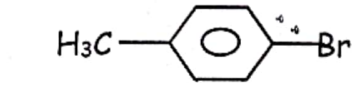
Observable;  - Yellow precipitate,  - Pale yellow precipitate formed.

(d) $CH_3CH_2COCH_3$ and $CH_3CH_2CH_2CHO$ (3 marks)

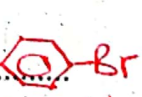
Reagent; Ammoniacal silver nitrate solution

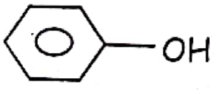
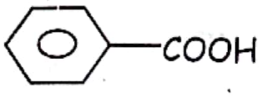
Observable $CH_3CH_2COCH_3$; No observable change

CH_3CH_2CHO; Silver mirror formed.

e)  and  (03 marks)

Hot sodium hydroxide solution followed by dilute nitric acid and silver nitrate solution

 ; Pale yellow precipitate formed,  ; No observable change.

 and  (03 marks)

Reagent

Reject; Without solution.

Sodium carbonate solution.

Observation

 ; No observable change

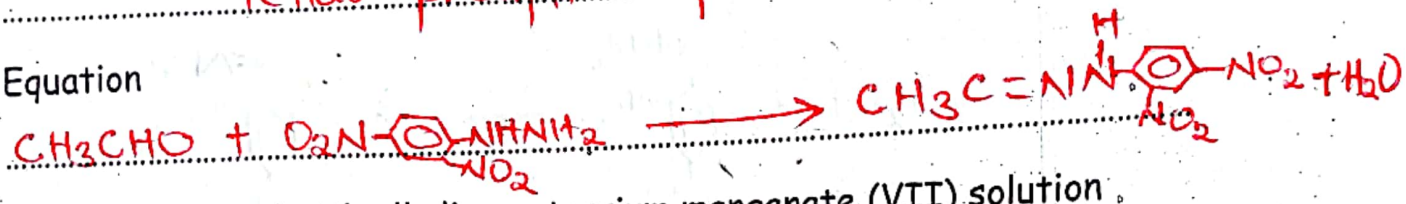
 ; Bubbles of a colourless gas.

6. State what would be observed and write equation for the reaction that would take place if:. (02 marks)

a) 2,4-dinitrophenyl hydrazine is added to ethanal.

Observation Yellow precipitate formed

Equation



b) Propene is mixed with alkaline potassium manganate (VII) solution.

Observation Purple colour solution turns to a colourless solution and a brown solid is deposited.

Equation

c) Propanone is mixed with sodium hydrogensuphite solution

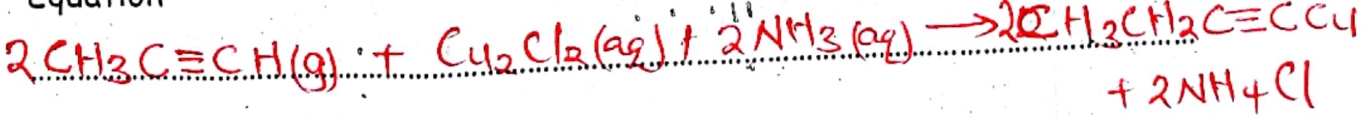
Observation White precipitate (crystals) is formed.

Equation

d) Propyne is mixed with ammoniacal copper(i) chloride solution

Observation Red precipitate formed

Equation



e) Propan-1-ol is mixed with iodine solution and sodium hydroxide solution

Observation ..

No observable change

Equation

No equation. Deny; when equations are written.

7. For each of the following pairs of species, Name a reagent that gives similar observations if treated with each of the species. In each case state what would be observed when the reagent named is treated with the species. state the functional group in the species, equation for the reaction when the reagent is treated with the specie. (03 marks)

(a) $(CH_3)_2C=O$ and CH_3CH_2CHO

Reagent

Reject; when the reagents words are seperated.

2,4-dinitrophenylhydrazine

Observations;

Yellow precipitate formed.

Functional group

~~C=O group~~ Carbonyl group $(-\overset{O}{\overset{\|}{C}}-)$.

Equation

$(CH_3)_2C=O + O_2N-C_6H_3(NO_2)-NHNH_2 \xrightarrow{H^+} (CH_3)_2C=N-NH-C_6H_3(NO_2)_2 + H_2O$.

END.