Experment 3
Alcohols and phenols
guidance pdf

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تجربة الاورغانيك للاسبوع

Alcohol and phenols

امتحان الميد رح يكون فيها مع alcohol and aldehydes

التجربه طويله و بدها وقت فتحضيرها مهم للفهم

جيبوا معكم كمامات عشان الكحول و جيبوا marker او ورق و لاصق لتعملوا labeling ل test tubes و ما تخربطوا الكحولات مع بعض و لا تنسوا

Gloves and goggles

رح تشتغلوا في هاي الكحولات 1-butanol

2-butanol

3-butanol

عدلوهم على الريبورتات و حطيتلكم التعديلات كلها و الملاحظات بالملف

_أنصحكم تبلشوا التجارب بالترتيب و لما تخلصوا كل تجرّبه يشوفها الدكتور و كلكم تسمعوا ملاحظاته و تكتبوها ! إذا ما بدكم تنعجقوا قسموا المهام بينكم من اول افضل

_بعد كل تجربة اهم اشي تنظفوا ال test tubes كثير كويس ~tape acetone لأنه إذا ما كان نظيف كل التجارب رح تطلع غلط و رح water ~ distilled water تعملوهم من الصفر مره ثانيه

_التزموا بل الخطوات بالحرف الواحد خطوه خطوه و لا تزيدوا ملي واحد او قطره منكم

_اهم نصيحه بكل اختبار بلشوا بل unknown اول اشي لتخلصوا منه ل report و ما تنسوه او تخربطوا فيه

كل التوفيق

wish you an enjoyable lab session!

PROCEDURE

1. Solubility in Water

Glassware: 4 test tubes

The following alcohols to be tested: 1- butanol, ~~ethanol~~, ~~ethylene glycol~~, or ~~2-methyl-2-propanol~~. 2-butanol 3-butanol

1. In each test tube, add **10** drops of one of the alcohols to be tested.
2. Add **2** mL of water to each test tube.
3. Shake very well.
4. Record your observations **and** result.

2ml لتقيس beaker في distal water ← ✱
by dropper

I. Solubility of Alcohols in Water

Alcohol	Structure	Solubility
~~ethanol~~ (2-butanol)	 $CH_3-CH(OH)-CH_2-CH_3$	✗
1-butanol	 $CH_3-CH_2-CH_2-CH_2-OH$	✗
~~2-methyl-2-propanol~~ (3-butanol)	 $(CH_3)_3C-OH$	soluble
~~ethylene glycol~~		

tertiary

branched


3
2
1
soluble
insoluble


* two layers


نتائج فيديو الدكتورة
3°
soluble
2°
two layers
1°
two layers

PROCEDURE *3. Chromic Acid Oxidation of Alcohols*

Glassware: 3 test tubes
The following alcohols to be tested: 1- butanol, 2-butanol, or ~~2-methyl-2-propanol~~. 3-butanol

8. In each test tube, place **5** mL of **Chromic Acid Reagent (1% potassium dichromate solution)**.
9. Add (up to **10** drops) of concentrated **sulfuric acid.**
10. Mix thoroughly and add **2** drops of one of the alcohol to be tested and shake.
11. Record your observations **and** result.

Positive results → Green solution will be formed.

II. Oxidation of Alcohols with Chromic Acid

Alcohol	Result (+ or −)	Observations (color, ppt,..)
1-butanol	+	orange change to green
2-butanol	+	orange change to green
~~2-methyl-2-propanol~~	−	No color change remains orange

يتأكسد

3-butanol

كحول 3° لا يتأكسد

III. Lucas Test


رح يطلع أخضر أفتح معكم
قريب للأزرق
نسيت أمورها

PROCEDURE

4. The Lucas Test

Glassware: 3 test tubes

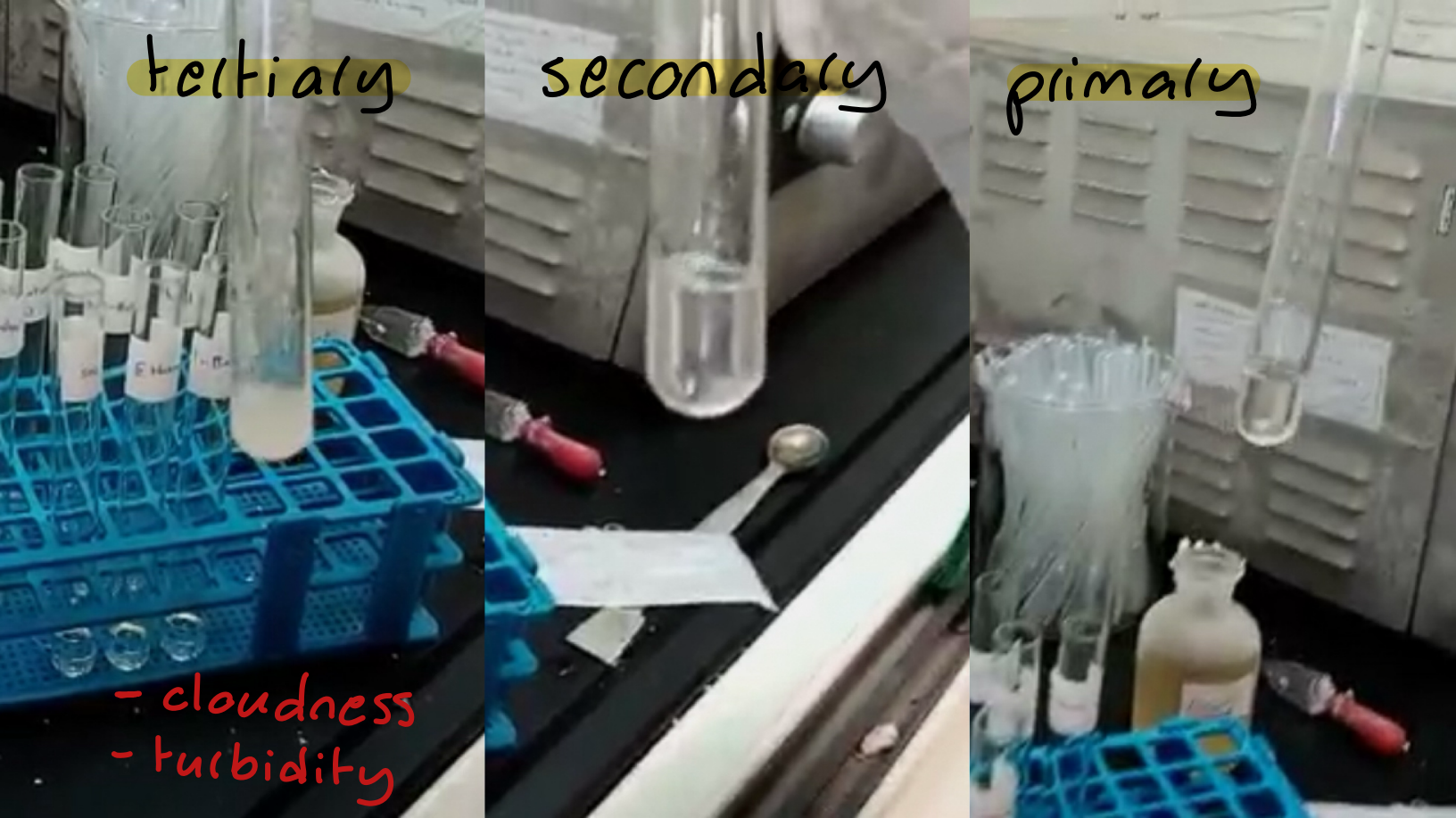
The following alcohols to be tested: 1- butanol, 2-butanol, or 2-~~methyl-2-propanol~~. 3-butanol

1. In each test tube, place **2** mL of **Lucas' reagent**
2. Add **6** drops of one of the alcohols to be tested.
3. Close the tubes with a piece of parafilm and shake well.
4. If no change occurs immediately, then place in water bath at (**100°C**) for **5-13** minutes.
5. Record your observations **and** result.

Positive results → White to cloudy mixture (immediately with 3° alcohols & within 5-10 min with 2° alcohols)

III. Lucas Test

Alcohol	Result (+ or –)	Observations (color, ppt,...)
1-butanol	–	remain clear / colorless
2-butanol	–	cloudness and turbidity appear After 5-10 minutes.
~~2-methyl-2-propanol~~ 3-butanol	+	immediate turbidity cloudy mixture


teltiary
secondary
primary
- cloudness
- turbidity

PROCEDURE

5. The Iodoform Test

Glassware: 3 test tubes
The following alcohols to be tested: 1- butanol, 2-butanol, or 2-methyl-2-propanol.

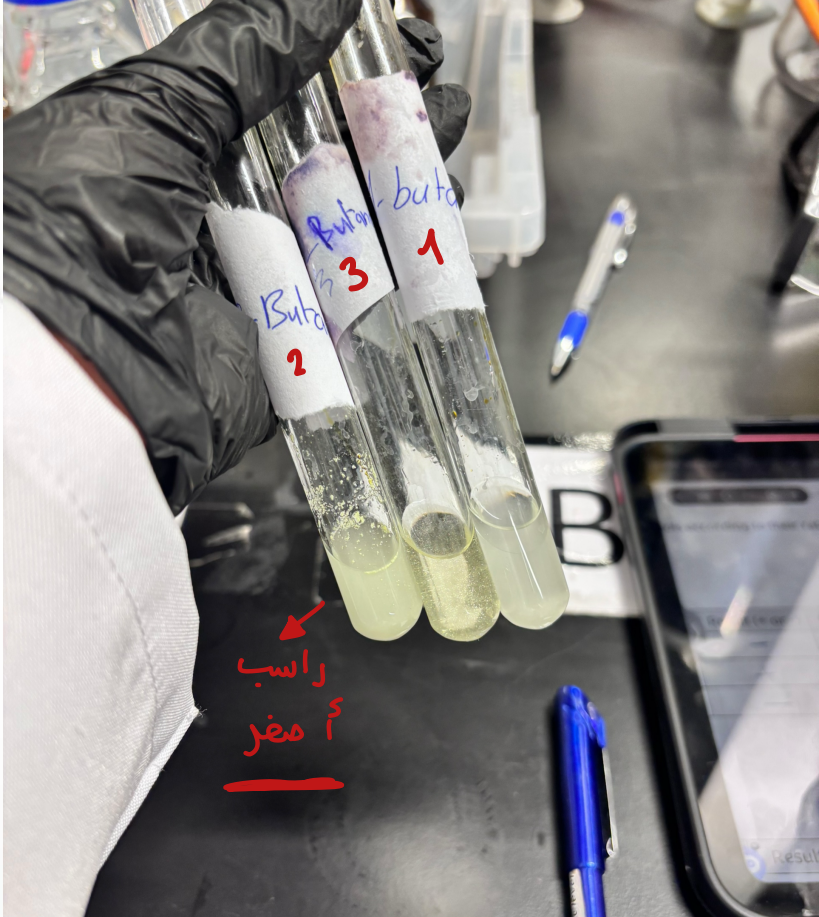
5. In each test tube, add **3** mL of **5% sodium hydroxide**.
6. Add 10 drops of one of the alcohols to be tested**.**
7. Add **5-10** drops of **iodine solution (**or up to **0.5** mL) gradually.
8. Shake very well.
9. Allow to stand for **3-5** minutes.
10. Record your observations **and** result.

Positive results → Bright yellow precipitate

IV. Iodoform Test

Alcohol	Result (+ or −)	Observations (color, ppt,..)
1-butanol	−	no reaction
2-butanol	+	yellow precipitate
~~2-methyl-2-propanol~~ 3-butanol	−	no reaction

راسب أصفر


راسب
أصفر

Ferric Chloride Test

PROCEDURE

Glassware: 1 test tube

مش مطلوب

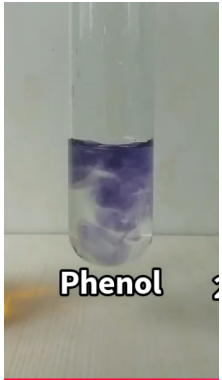
The following alcohols to be tested: phenol, and ~~cyclohexanol~~.

1. In a test tube, place **3** mL of **water.**
2. Add **5** drops of the **Unknown**.
3. Add **1-2** drops of **1% ferric chloride solution**.
4. Shake well and allow to stand for **1-2** minutes.
5. Record your observations **and** result.

Positive results → violet solution will be formed

I. Ferric Chloride Test

Alcohol	Result (+ or −)	Observations (color, ppt,..)
~~Cyclohexanol~~		
Phenol	+	purple / violet color



EXPERIMENT 3
ALCOHOLS AND PHENOLS
Report Sheet

Name		Section no:	

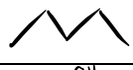
- **OBJECTIVES:**

1- Determine chemical properties of Alcohol / phenols.
2- identify the chemical properties of the unknown.

- **ALCOHOLS:**

I. Solubility of Alcohols in Water

للعظم

Alcohol	Structure	Solubility
~~ethanol~~ (2-butanol)	 $CH_3-CH(OH)-CH_2-CH_3$	X
1-butanol	 $CH_3-CH_2-CH_2-CH_2-OH$	X
~~2-methyl-2-propanol~~ (3-butanol)	 $(CH_3)_3C-OH$	soluble
~~ethylene glycol~~		

tertiary

branched

What general conclusions can you draw concerning the solubility of alcohols in water? Solubility increases with the number of hydroxyl groups and decreases as the chain lengh increase. branching increase solubility.

II. Oxidation of Alcohols with Chromic Acid

يتأكسد

Alcohol	Result (+ or –)	Observations (color, ppt,...)
1-butanol	+	orange change to green
2-butanol	+	orange change to green
~~2-methyl-2-propanol~~ (3-butanol)	–	No color change remains orange

كحول 3° لا يتأكسد

III. Lucas Test

Alcohol	Result (+ or –)	Observations (color, ppt,...)
1-butanol	–	remain clear / colorless
2-butanol	–	cloudness and turbidity appear After 5-10 minutes.
~~2-methyl-2-propanol~~ (3-butanol)	+	immediate turbidity cloudy mixture

Arrange the three alcohols according to their rates of reaction with the Lucas reagent: $3^\circ > 2^\circ > 1^\circ$

IV. Iodoform Test

Alcohol	Result (+ or –)	Observations (color, ppt,..)
1-butanol	–	no reaction
2-butanol	+	yellow precipitate
~~2-methyl-2-propanol~~ 3-butanol	–	no reaction

راسب أصفر

- **PHENOLS**

I. Ferric Chloride Test

Alcohol	Result (+ or –)	Observations (color, ppt,..)
~~Cyclohexanol~~		
Phenol	+	purple / violet color

أثناء المختبر

- **Unknown Alcohol Determination:**

Unknown ID:		
Test used	**Observation**	**Result**
Chromic Acid Oxidation		
Lucas Test		
Iodoform test		
Ferric Chloride		

- Based on your results, what is your unknown alcohol type?

- Draw the expected alcohol structure of your alcohol showing the main function group: