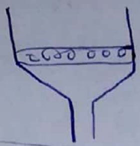
Exp [1] →

* راجعي الأدوات

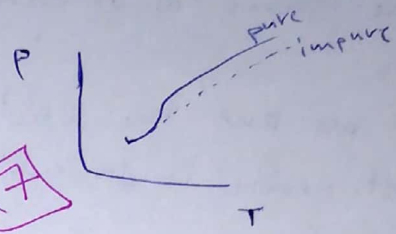


Buchner funnel

separatory funnel

Melting point (m.p) : physical Constant

check the purity



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- pure solid
  - (0.5 - 1) °C
  - بشكل سريع
  - ومعا جرى
  - - sharp (m.p)
- impure solid
  - (m.p.r) → الرواتا أنا
  - (2-20 °C)

equilibrium at 1 atm

* (m.p) → doesn't affect by pressure

---

impurities

18

- sloluble
  - ↓ affect on (m.p)
  - How ↓
- insoluble زي الرمل
  - ↓ don't affect because it's not enter in crystal lattice

※ it * Lower the m.p
   * Broaden (m.p range)

---

oil path

* in this exp we use oil that don't affect on the (m.p)
for example → * Silicon oil
                  parffin oil
} → should be high boiling
      " " stable.

* فلين → Cork

---

* thermometer is not immersed in oil → lower m.p
* Rapid heating → increase the m.p
* impurities → decrease

* اذا طلعت ما ديك بطلع ال m.p أكثر من أكثر وحدة فيه

أول m.p.r

* Many organic are solid at room tempreture → strong intermolecular forces

* difference in melting point → " " "

* we cane determine if two compounds are the same or different by m.p

* befor we put the solid in a capilary tube we must grouwe it to a fine particle by spatula

* melting point range → The (T) at which the solid begain to melt and which is completly liquid

⇒ the factor that affect the (m.p range) :
- particle size
- amount of materials
- density
- thickness of capilary tube
- the rate of heating → most critical factor

* Mid point → m.p range $\frac{(a-b)}{2}$ $\frac{a+b}{2}$

→ To large sample → increas m.p

→ high rate of heating → " "

To lower m.p → (a) thick-walled capilary tube
(b) soluble ~~impurities~~, impurities
(c) larger size crystal

2 Boiling point and Distillation

B.p → at temperature at which Vapor pressure = external pressure

Normal B.p → " " " Vapor pressure : external (1 atm) 760 mmHg

* B.p affect by changing in (P)

T↑ P^v↑

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external P↑ B.p↑ Vapor pressure↓

intermolecular forces
- Hydrogen Bonding H-(N O F)
- Dipole-Dipole (between polar molecules)
- London force (non-polar)

((كيفية المقارنة)) → ① Intermolecular force

H.Bonding > Dipole-Dipole > London

for pure liquid

② Mw

Mw↑ B.p↑

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③ الشكل

Branching↑ B.p↓

HF → H.bonding

Solutions

Solid Solute and non Volatile

زي الملح والسكر

Solute↑ B.p↑

Amount of Solute B.p↑

يتكون من سائلين

ذائبين ببعضهم (completely micible)

ومتطايرين (Volatile)

Vapor (P)

$P_A = X_A P^\circ_A$ $P_B = X_B P^\circ_B$ 1 ; 2

$P_{Solution} = X_A P^\circ_A + X_B P^\circ_B$ 1+2 ; 3

$X_A + X_B = 1$ $\frac{1}{3}$ $\frac{2}{3}$

B.p for Solution is between A, B

P^v " " " " " "

Distillation → purification
separation

① Simple distillation
* يكثف مرة واحدة

* we use it when the B.P of component is 80°C or more .. المدة ذي درجة الغليان

23

② Fractional distillation
* تستخدم وتكثف اكثر من مرة
* we use fractional column → provides a large surface area for Continous heat exchange between hot vapor and cool liquid
* " " it when the B.P is less than 80°C → اقل من المدة
* more efficiency

③ Vaccum distillation بالإختيار
Pexternal ↓ B.P ↓

We use it in ① distillation of high Boiling liquid
② Distillation of compound that decomposes at Patm.

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---

* Boiling stones → To prevent bumping
* grease: → to ensure a completly sealed system
* Thermometer should be below the opening → to measure the (T) at which we have equilibrium between liquid and gases
* The water enter the lower side and going out from the upper side
↓
condenser is always full of water
* we use water bath → ① for low boiling liquid
② flammable liquid
Volatile.
* fill flask to two third → To leave space for vapor produced
* if the thermometer not kept moist → B.P ↑

Recrystallization

↳ solid compound precipitates from saturated solution in form of crystal

To increas the precipitation : (1) cooling
(2) evaporation

25

we use Recrystallization : (1) for purification of solid.
(2) separation of solid mixture

impurities

- soluble → suction filtration
- Insoluble → we remove it by gravity filtration of the hot solution

* Lattice energy ↑ (طاقة الشبكة البلورية)
m.p ↑
Solubility ↓

properities of solvent which we use it in crystallization : [1] No react with substance to be purified

[2] No flammable

[3] Evaporate easly from crystals

[4] Disslove large amount of solid at high (T)
" small " " " " low (T)

[5] less toxic , Large volatility

2.6

* if we use two solvent they must be miscible in each other

* we add charcoal → to remove colored impurities

charcol → gravity filtration → suction → oven

* gravity filtration → to remove charcol
" " insoluble impurities

* we use oven → for solids which has high m.p

* Fluted filter paper → to make the rate of filtration fast

* Why the flask and filter paper.... shoul heated
after filtration → to prevent precipitation of sub , to have easy filtration

→ purification by recrystallization depends on :

① different solid have different solubilites

② Most solids are more soluble in hot

→ Solubility determine by two factors :

① like dissolve like

② The lattice energy

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---

if a substance soluble in one solvent and insoluble in other → pair solvent (miscible)

---

* Evaporation during the gravity filtration will reduce the amount of solvent.

and we minimize it to prevent supersaturation

---

4 | Extraction

مهم ↳ separation of sub. from mix. by using solvent prefer dissolve the sub

* extraction
  - ▷ solid - liquid → فصل مادة من خليط من المواد الصلبة باستخدام مذيب → فصل الكافيين من الشاي
  - ▷ liquid - liquid → فصل مادة من خليط من المواد السائلة باستخدام مذيب → فصل الكافيين من الماء

CHCl$_3$

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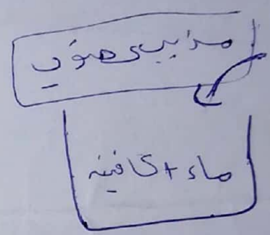
The importance :-

[1] separate an organic compound from its natural source

[2] " " " " from a reaction mixture

---

* distribution coefficient (K_D)



$$K_D = \frac{C_o}{C_w}$$

C_o ← تركيز المادة المراد فصلها بالمذيب العضوي

C_w ← تركيزها بالماء

29

* لما اضيف الكافيين رح يتوزع بالماء وبالمذيب

$$K_D = \frac{S_o}{S_w} = \frac{m_o / V_o}{m_w / V_w}$$

فصل اسهل K_D ↑

* نقوم بعملية الفصل على عدة مراحل .

$$C = \frac{m}{V}$$

---

* السائل العضوي يلي رح استخدمه للفصل لازم:

[1] Immiscible with liquid in which the solute

[2] dissolve the solute to be extracted

[3] No flammable.

* Salting out → (1) NaCl
  (2) Na$_2$CO$_3$
  (قبل غلي الشاي)

↳ [1] decrease the solubility of organic compound in water

[2] breaking up emulsion
استحلاب

* we can remove the emulsion by 3
[1] salting out [2] centrifugation
[3] stirring the layer with glass rod.

Salting out → we use Na_2CO_3, NaCl
↓
[1] salting out
[2] using to remove the acidic acid tannis by converting them to water soluble salts

30

Drying agent → anhydrous $CaCl_2$
" $MgSO_4$
" Na_2SO_4
مجفف الزوائد
to remove traces of water from organic layer

5

steam distillation

→ separation of slightly volatile, water insoluble sub from non volatile by using steam
"Bromo Benzene in water"

- sub that we want to separate them must be :-
  1. slightly volatile
  2. insoluble in water
  3. Inert toward steam and stable

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we use steam distillation :- (1) separation compound from mix which contain non volatile impurities
(2) separation of organic compound from it's natural source.

- essential oil
  1. Anise oil :
  2. Caraway
  3. cumin
  4. clove

$P_{total} = X_A P_A^o + X_B P_B^o$ → misible

32

$X_A = X_B = 1$ → $P_{total} = P_A^o + P_B^o$

constant → مابعتمد على مكونات المحلول بس بيعتمد على نوع السائلين

essential oil: Anise, clove, caraway, cumin

- B.p constant ← imicible

pV عكس الـ

- B.p → اثناء التقطير تكون اقل من اقل درجة غليان

تكون ثابتة واقل من B.p
اقل B.p للسوائل المكونة للمحلول

$\frac{n_A}{n_B} = \frac{P_A^o}{P_B^o}$, $\frac{m_A}{m_B} = \frac{P_A^o Mw_A}{P_B^o Mw_B}$

B.p → اقل من اقل

PV → اعلى من اعلى

* to extract most of essential oil we add → salt (p 7 salting out)
* last fraction → contains the same amount

* all fraction have the same composition in steam distillation.

steam distillation ← [hexane + acetone & water + bromobenzene]

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Simple	Steam
B.p Variable	B.p constant
B.p between acetone and water.	B.p اقل من اقل من كل منهما / below B.p of Bromo benzene and water
$P_{Total} = P_A X_A + P_B X_B$	$P_{Total} = P_A + P_B$
Diffirent	composition kept constant

steam dist. is used high boiling steam volatile organic compound at temp below b.p of water

chromatography (Technique) → تقنية

① separate the compound from the mix.
② Identify the organic sub.
③ To check the purity

34

Chromatography depend on (principles):
[1] Adsorption : depend on selective of component (TLC, column)
[2] partition : depend on partition of component between (paper, liquid-liquid, gas-liquid)

TLC) chromatography

35

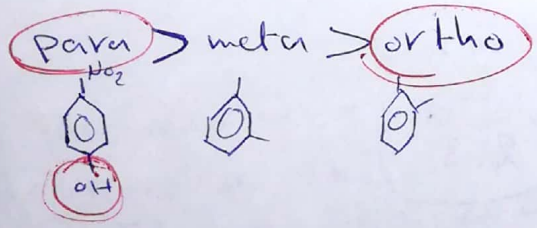
Stationary phase : Silica
Alumina

R_f = distance by Compound / distance by solvent
$R_f < 1$

factors that affect R_f :

[1] polarity of compound

polarity ↑ R_f ↓ m.p ↑



[2] polarity of stationary phase

polarity ↑ R_f ↓

[3] polarity of mobile phase

polarity ↑ R_f ↑

راجعي الرسم

* if the spots isn't colored &
① UV-light
② Iodine
③ sulfaric acid

⇒ Paper Chromatography.

* we use (petri dish.) ↓ stationary: water

yellow → R_f less

blue → R_f more

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* eluent → solvent → mobile phase

$P_t = P_A + P_B$

$= P^\circ_A x_A + P^\circ_B x_B$

$P_T =$

2:3

5

Dehydration of alcohols

Exp 7

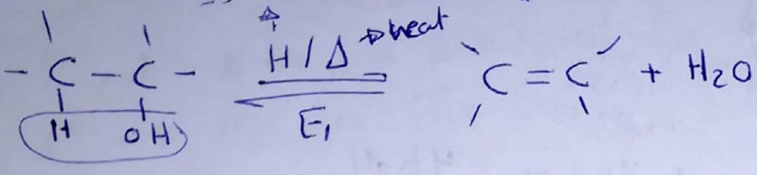
ازالة الماء

alcohols → 1°, 2°, 3°
* حسب الكربونة المرتبطة مع OH
مرتبطة مع كم مجموعة R .

* ال 3° يحدث بسرعة
* ال 1°, 2° بدهم تركيز عالي
من الحمض و بدهم حرارة عالية .
2°<1°<3°

(1)

* remove H_2O from alcohol
to become [alkene]
حمض قوي (H_2SO_4, H_3PO_4)



$3° > 2° > 1° > CH_3OH$
← Dehydration reaction

Why we use H_2SO_4, H_3PO_4 instead of HBr, HCl ... ?

because when it dissociate it give (HSO_4^-, $H_2PO_4^-$)
weak nucleophiles
↓
minimize substitution

but HCl, HBr → Cl^-, Br^-
will convert alcohol to alkyl halides.

* تتفاعل بارجاعية وشان
ازيد كمية النواتج بدفعه لليمين
من خلال ازالة الالكين
by distillation
because it has lower [b.p]

E_1 → [2°, 3°] (E_1)
E_2 → [1°]

ارجعي شوفي

* بضيف H^+ بعدين بزيح H_2O بعدين
بزيح H^+ ← E_1

(2)

* after distillation
↓
put the product in [ice]
to minimize loss of highly volatile product by evaporation .

→ separatory funnel
↓
بعد بالناتج NaOH → to remove acid
قبل
to prevent alkene to back to alcohol

المواد المتفاعلة → distillation → extraction

→ after extraction : put drying agent (anhydrous $CaCl_2$)
to remove water

percent yield = $\frac{\text{mass actual}}{\text{mass theoritical}} \times 100\%$

actual → ρ V → [m]

theoritical → حسب التفاعل

Test of unsaturation → =, ≡

1. Bromine → alkene ✓ / alkane X — * للتمييز الالكين والالكانات

$$-\overset{|}{C}=\overset{|}{C}- + Br_2 \xrightarrow{CCl_4} -\overset{|}{\underset{Br}{C}}-\overset{|}{\underset{Br}{C}}-$$

2. potassium permanganate ($KMnO_4$) → alkene ✓ / alkane X — * للتمييز الالكين والالكانات

$$-\overset{|}{C}=\overset{|}{C}- + 2KMnO_4 \xrightarrow{4H_2O} -\overset{|}{\underset{OH}{C}}-\overset{|}{\underset{OH}{C}}- + 2MnO_4 + 4KOH$$

major → مرتبطة مع عدد كربونات اكبر

* تحضير الالكين ← من وضع H_2SO_4 / H_3PO_4 على كحول

Nucleophilic Substitution — Exp 8

→ reaction of alcohols with halides.

تحضير هاليد الألكيل ← من كحول وحسب نوعه

4

$$R-OH + H-X \rightarrow R-X + H_2O$$

→ SN2

SN1 $3° > 2° > 1° >$ methyl (SN2)

سريع ← بطيء

- $2°, 1°$ → we use catalyste
- $3°$ → we use HX مباشرة
- → $PCl_3, PCl_5, ZnCl_2, SOCl_2$ ↓ بحط Cl مكان OH
- → PBr_5, PBr_3 → بحط Br مكان OH

* in preparation of alkyl halide ↓ اثر كحول الاسم.

→ تفاعلات هاليدات الالكيل (R-X)

1 Silver nitrate

$$R-X + CH_3CH_2OH + Ag^+ \rightarrow AgX + R-OCH_2CH_3 + H^+$$

(AgX: راسب ; $R-OCH_2CH_3$: ايثر)

SN1 $3° > 2° > 1°$

5

SN1 → يحدث في خطوتين
① Carbocation (slow) محددة السرعة
② AgX

2 Sodium Iodine

$$I^- + RCH_2X \xrightarrow{aceton} NaX + RCH_2-I$$

(NaX: راسب)

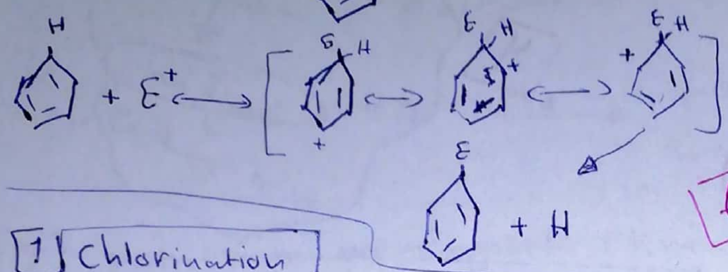
SN2 $1° > 2° > 3°$

* in mechanism
  * بضيف ال H على ال OH_2 بعدين بتطلع الي ... .

* Low rectivity of chloro benzene towards silver nitrate?
  ↓
  because phenylhalide don't react by SN1 or SN2.

Exp [9] Electrophilic Substitution

Benzene →



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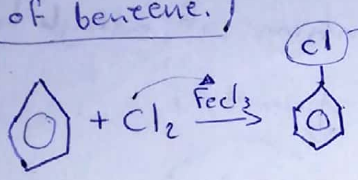
[1] Chlorination of benzene.

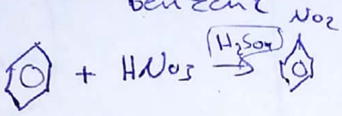


[2] Bromination of benzene

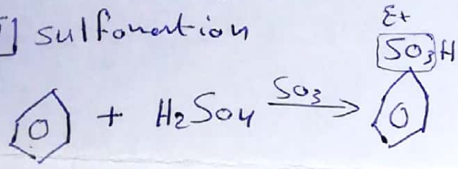
نفس الي قبل

$\xrightarrow{FeBr_3}$

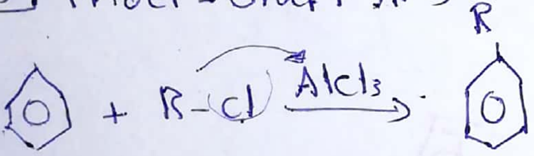
[3] Nitration of benzene



[4] sulfonation



[5] Fridel - Craft Alkylation



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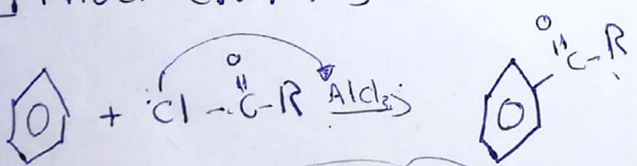
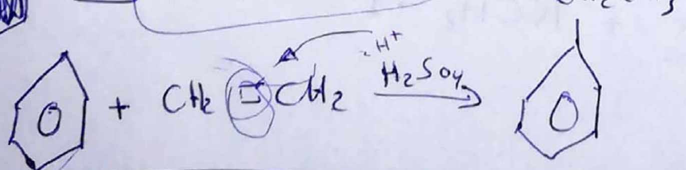
[8] Fridel - craf Acylation



[7] Alkylation



* Activating group → اذا كانت الذرة الثانية C, H, :
بتزيد سرعة التفاعل

* deactivating group → :, H, C - اذا لم تكن الثانية
- اذا كانت الذرة الاولى (+)
" " " " - هالوجين

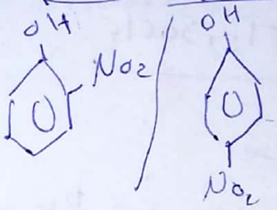
⇒ الصف مجموعة ثانية

* activating group + (Cl, Br, I)
↓
ح يتضافوا
ortho, para

* deactivating group + (Fe, Cl, Br, I)
→ ح يتضافوا meta.

⇒ Notes :

separation of ortho and para nitro phenol



by Steam distillation

لانه يتطايروا بالفصل البخاري

⇓

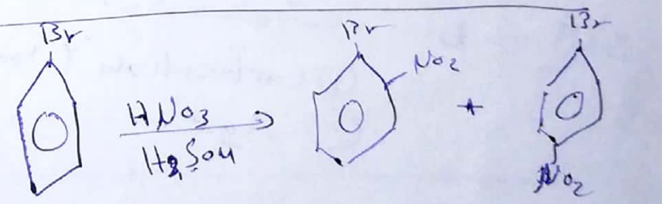
para has very low P° / B.p ↑

because of H-bonding

* When we increas T →

(1) Di and Tri nitration might

(2) oxidation of phenols by nitric acid.

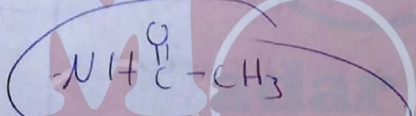


separation of ortho and para by suction fill. → recrystallization

O > P

solubility

⇒ acetanilide : متوسط



Exp. 10 | Alcohols and (phenols) → 

This exp. to study the physical and chemical properties.

8

→ Solubility in water

* alcohol is soluble in water.

① No. of (OH) ↑ solubility ↑

② Mw ↑ Solubility ↓

③ Branching ↑ Solubility ↑

※ $2R-OH + 2Na \rightarrow 2RO^-Na + H_2$

قاعدة ← ورقة عباد الشمس phenol Phthalein أو

غاز فقاعات

Methyl alcohol > 1° > 2° > 3°

للكشف عن قاعدة

← acidity

Reaction with Na

$-C=C- \rightarrow -C-C-$ (OH, OH) → carboxylic acid

※ Chromic acid oxidation of alcohols

برتقالي ($K_2Cr_2O_7$) → عامل مؤكسد

carboxylic acid

$R-CH_2OH + K_2Cr_2O_7 \xrightarrow{H_2SO_4} R-\overset{O}{\overset{\|}{C}}-OH$

1°

$R-CHOH + K_2Cr_2O_7 \xrightarrow{H_2SO_4} R-\overset{O}{\overset{\|}{C}}-R$

2° (R)

3° + $K_2Cr_2O_7$ → No reaction

للترتيب الكحول 1°, 2°, 3°

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※ Lucas test

$R-OH + ZnCl_2 \rightarrow R-Cl$

للترتيب 1°, 2°, 3° حسب سرعة التفاعل

SN1 3° > 2° > 1° > methyl

※ Iodoform test (I_2) →

يستخدم للكشف عن الميثيل الطرفية للكحول والكيتون بوسط قاعدي

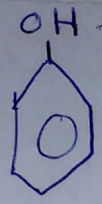
→ give yellow precipitate. CHI_3

$R-\overset{OH}{\underset{H}{C}}-CH_3 \xrightarrow{I_2/NaOH} R-\overset{O}{\overset{\|}{C}}-O^- + CHI_3$

$R-\overset{O}{\overset{\|}{C}}-CH_3 \xrightarrow{I_2/OH^-} R-\overset{O}{\overset{\|}{C}}-O^- + CHI_3$

* اذا ما في ميثيل طرفية تكون No reaction

phenols



OH → activating group

* aromatic
* S_N1 , S_N2 unlike E_1 , E_2 ✓
* it react → Electrophilic Substitution

* insoluble in water
* ethanol → more acidity than water

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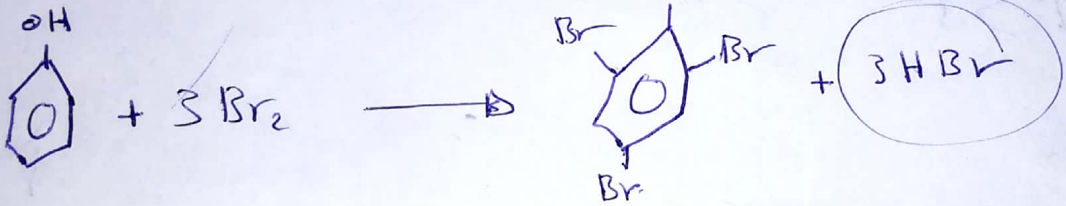
1 Bromination of phenols

(−OH) → strong

(−Br) → weak



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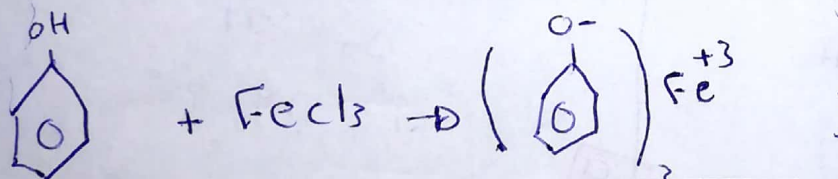
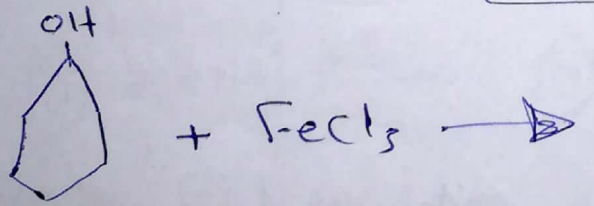
2 Ferric chloric test

كاشف امين الفينول كمثال على مركب آخر



11



11 Aldehydes and ketones

aldehydes: $R-\overset{O}{\overset{\|}{C}}-H$

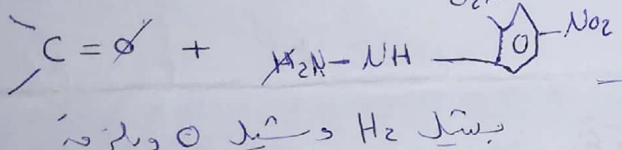
ketons: $R-\overset{O}{\overset{\|}{C}}-R$

12 2,4-dinitrophenyl hydrazine.

* $R-\overset{O}{\overset{\|}{C}}-H \xrightarrow[\text{agent}]{\text{oxidizing}} R-\overset{O}{\overset{\|}{C}}-OH$
* $R-\overset{O}{\overset{\|}{C}}-R \xrightarrow[\text{agent}]{\text{oxid.}} \text{No reaction}$

✕✕ Test for carbonyl group $\left(\overset{O}{\overset{\|}{C}}\right)$

we can test for (carbonyl) → 2,4-di nitro phenyl hydrazine



13

$AgNO_3 + NaOH \rightarrow Ag_2O$

$Ag_2O + NH_3 \rightarrow (Ag(NH_3)_2)OH$

✕ للتمييز بين الألدهايد والكيتون

1] Tollen's silver mirror test

aldehyde $\Rightarrow R-\overset{O}{\overset{\|}{C}}-H + 2[Ag(NH_3)_2]^+OH^- \rightarrow R-\overset{O}{\overset{\|}{C}}-O^-NH_4^+ + 2Ag + H_2O$

ketons $\Rightarrow R-\overset{O}{\overset{\|}{C}}-R + 2[Ag(NH_3)_2]^+OH^- \rightarrow$ No reaction

acetone → ketone

propanal → Aldehyde.

2] Fehling's and Bendict's test

aldehyds $\Rightarrow R-\overset{O}{\overset{\|}{C}}-H + 2[Cu(\text{complex})]^{+2} \rightarrow R-\overset{O}{\overset{\|}{C}}-O^- + Cu_2O$

ketons $\Rightarrow R-\overset{O}{\overset{\|}{C}}-R + 2[Cu(\text{complex})]^{+2} \rightarrow$ No reaction

3] Iodo form test.

$2[Ag(NH_3)_2]^+OH^-$

⇒ دون يكون كاربة اذا
الدهايد او كيتون بس
شحد كاربة ثاني

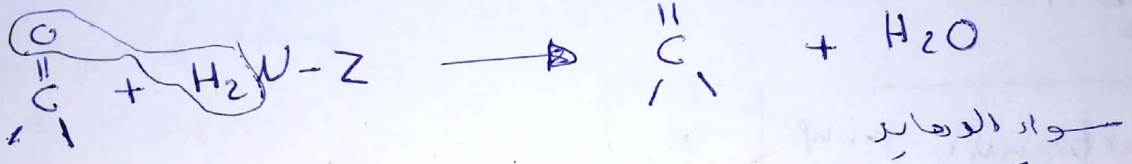
↓

يروح يحضر احد المشتقات
ويطلعه من الجدول

14

⇒ لتحضير المشتقات

Addition of nitrogen Nucleophilies



سواء الدهايد
او كيتون

⇒ ليش يحضر المشتقات ؟

1. easly purified
2. Crystalline solids
3. high m.p

15

* اكثر مشتق يستخدم ؟

2,4-Di nitro phenyl hydrazine

↓

لانه جميع مشتقاته
Solid
m.p easly determined

2,4 di nitro phenyl hydrazine

12 | preparation of Carboxylic acids

$$* \; R-\overset{O}{\overset{\|}{C}}-OH$$

16

Waye to prepare Acids :

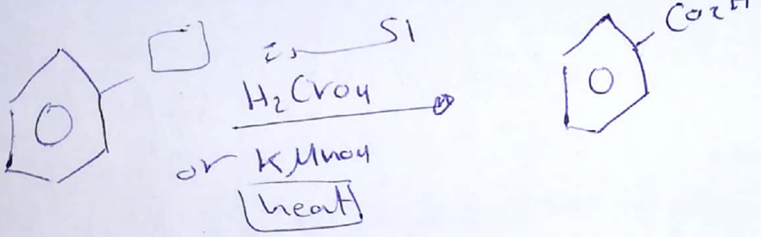
[1] oxidation of (1°) alcohol

$$R-\overset{OH}{\overset{|}{C}}H_2 \xrightarrow[(H_2CrO_4)]{[O]} R-\overset{O}{\overset{\|}{C}}-H \xrightarrow{[O]} R-\overset{O}{\overset{\|}{C}}-OH$$

تركيز   الدهايد   acid

المؤكسدة.
H_2CrO_4
$KMnO_4$

[2] oxidation of aromatic sid chain.
أكسدة السلسلة المتصلة بالبنزين



[3] rxn of grinard reagent with carbon dioxides

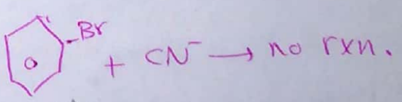
$$CH_3-CH_2-Br \xrightarrow[ether]{Mg} CH_3CH_2-MgBr \xrightarrow[(2)\,H_3O^+]{(1)\,CO_2} CH_3COOH.$$ زيادة كربون واحدة

*عند كحول يؤدي احضر منه $-\overset{\|}{C}-O-H$ بنفس عدد الذرات ⟵ oxid

وإن نفس عدد الذرات ⟵ grinard.

[4] Hydrolysis of cyanides : $C\equiv N$

$$R-C\equiv N + 2H_2O \xrightarrow{NaOH} R-\overset{O}{\overset{\|}{C}}-O^-Na^+ \xrightarrow{H^+} R-\overset{O}{\overset{\|}{C}}-OH.$$



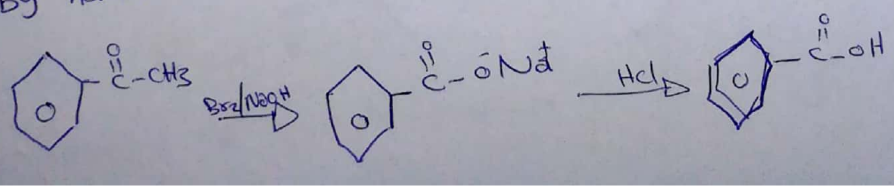
بسبب وجود عدم الثبات

phenyl halide → $CH_2=CH-X$
vinyl halide → (benzene)-X

لن تعمل الرابطة
التي فيها الـ
$C\equiv N$

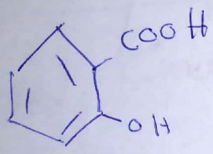
[5] by haloform : $[I_2$ or $Br_2]$.

Benzoic acid



Aspirin

regent → H_2SO_4



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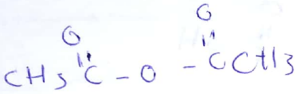
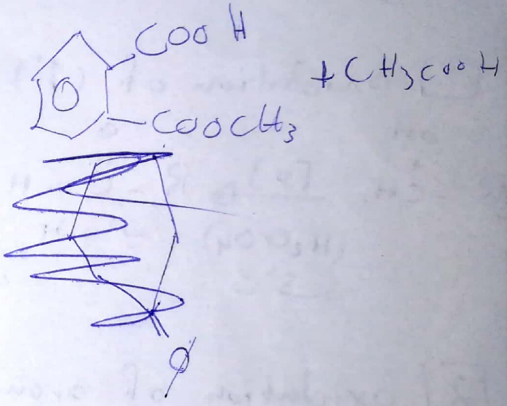


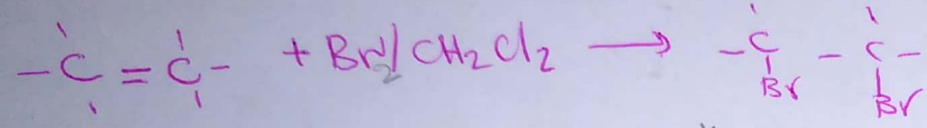
H_2SO_4 →



Tests

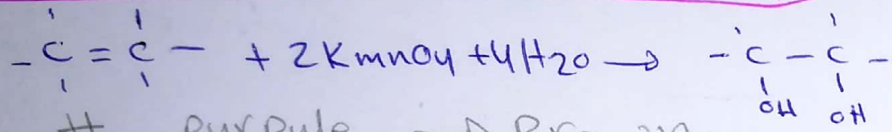
For Alkene & other [ALKane] → no rxn.

① **Bromine**



red-Brown → colorless.

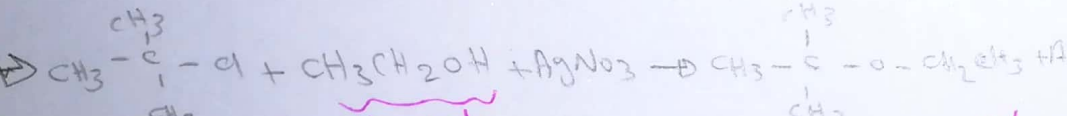
② **Potassium permanganate kmnoy**



purpule → Brown.

Reactivity for Alcohol (or Alkyl halide) الكحول

1. silver nitrate [SN1]. **3° > 2° > 1°**
2. Sodium iodine [SN2] **1° > 2° > 3°**



* carbocation الكربوكاتيون

* للتمييز بين الكحول الأولي والثانوية والثالثية

~~$KMnO_4$~~ ⇒ oxidation $K_2Cr_2O_7$

1° $R-\overset{O}{\overset{\|}{C}}-OH$ → carboxylic acid.

2° $R-\overset{O}{\overset{\|}{C}}-R$

orange → green.

3° No rxn.

Lucas test for Alcohol. $3° > 2° > 1°$

SN1

$$CH_3-\overset{CH_3}{\overset{|}{\underset{OH}{\underset{|}{C}}}}-CH_3 + ZnCl_2 \rightarrow CH_3-\overset{CH_3}{\overset{|}{\underset{Cl}{\underset{|}{C}}}}-CH_3$$

Iodoform test $I_2/NaOH$ بوسط قاعدي

* تكون عند مجموعة Methyl طرفية

← اذا كان Methyl طرفية

No rxn. ←

$$CH_3-\overset{OH}{\overset{|}{C}}H-CH_2CH_3 \xrightarrow{I_2/NaOH} CH_3-\overset{O}{\overset{\|}{C}}-O^- + CHI_3.$$

CH_3

⇒ Alcohol or Ketone [terminal methyl]

Ferric chloric test for phenol

$$\text{C}_6\text{H}_5\text{OH} + FeCl_3 \rightarrow (\text{C}_6\text{H}_5\text{O}^-)_3 Fe^{+3}$$

Violet or red

تكون عند وجود فينول

او عكسها لتمييز بين فينول وكحول ← No rxn.

* 2,4- dintrophynel hydrazine → اذا انتج راسب
يدل على وجود carbonyl group
بشيل O و H_2 و ببدله N=

Tollen's silver mirror test

تمييز بين كيتون والدهايد

$R-\overset{O}{\overset{\|}{C}}-H \rightarrow R-\overset{O}{\overset{\|}{C}}-OH$

$R-\overset{O}{\overset{\|}{C}}-R \rightarrow$ No rxn.

tollen's test #

$R-\overset{O}{\overset{\|}{C}}-H + 2[Ag[NH_3]_2]^{+}OH^{-} \rightarrow R-\overset{O}{\overset{\|}{C}}-O^{-}NH_4^{+}$ مهم #

$R-\overset{O}{\overset{\|}{C}}-R \rightarrow$ No. rxn.

Fehling & Bendicts test

$2[Cu[complex]]^{+2}$

$R-\overset{O}{\overset{\|}{C}}-H + 2[Cu[complex]]^{+2} \rightarrow R-\overset{O}{\overset{\|}{C}}-O^{-}$

$R-\overset{O}{\overset{\|}{C}}-R + 2[Cu[complex]]^{+2} \rightarrow$ No rxn.

red *

عوامل الأكسدة
⇒ Tollen's & Fehling → mild oxidation agent.

* Iodoform test → ketone → Yellow ppt [acetone]
Aldehyd → No rxn.