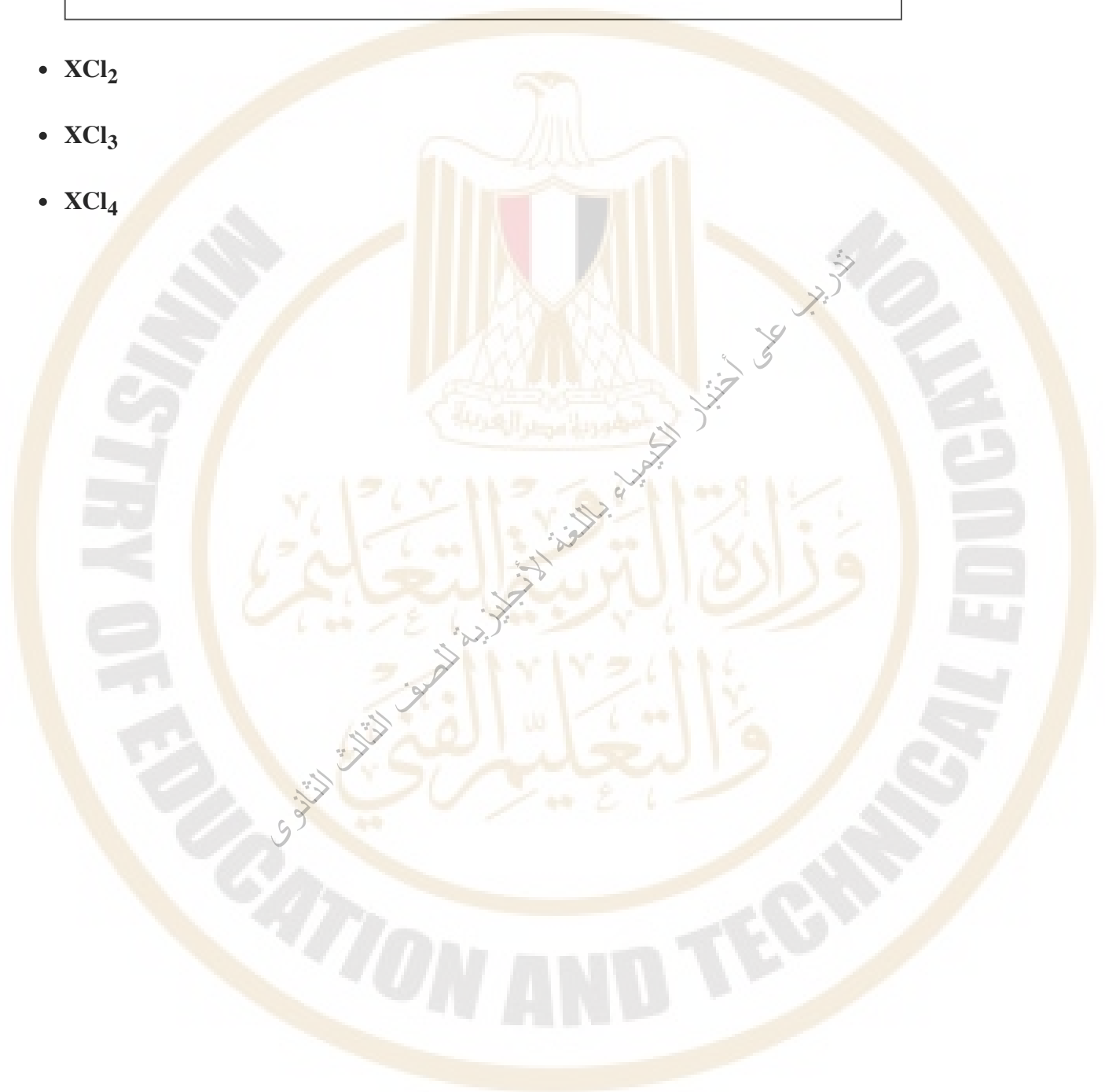# 1

The element (X) is a transition element lies in the fourth period , it has the highest possible oxidation state, it is possible to form all the following compounds <u>except</u> ....
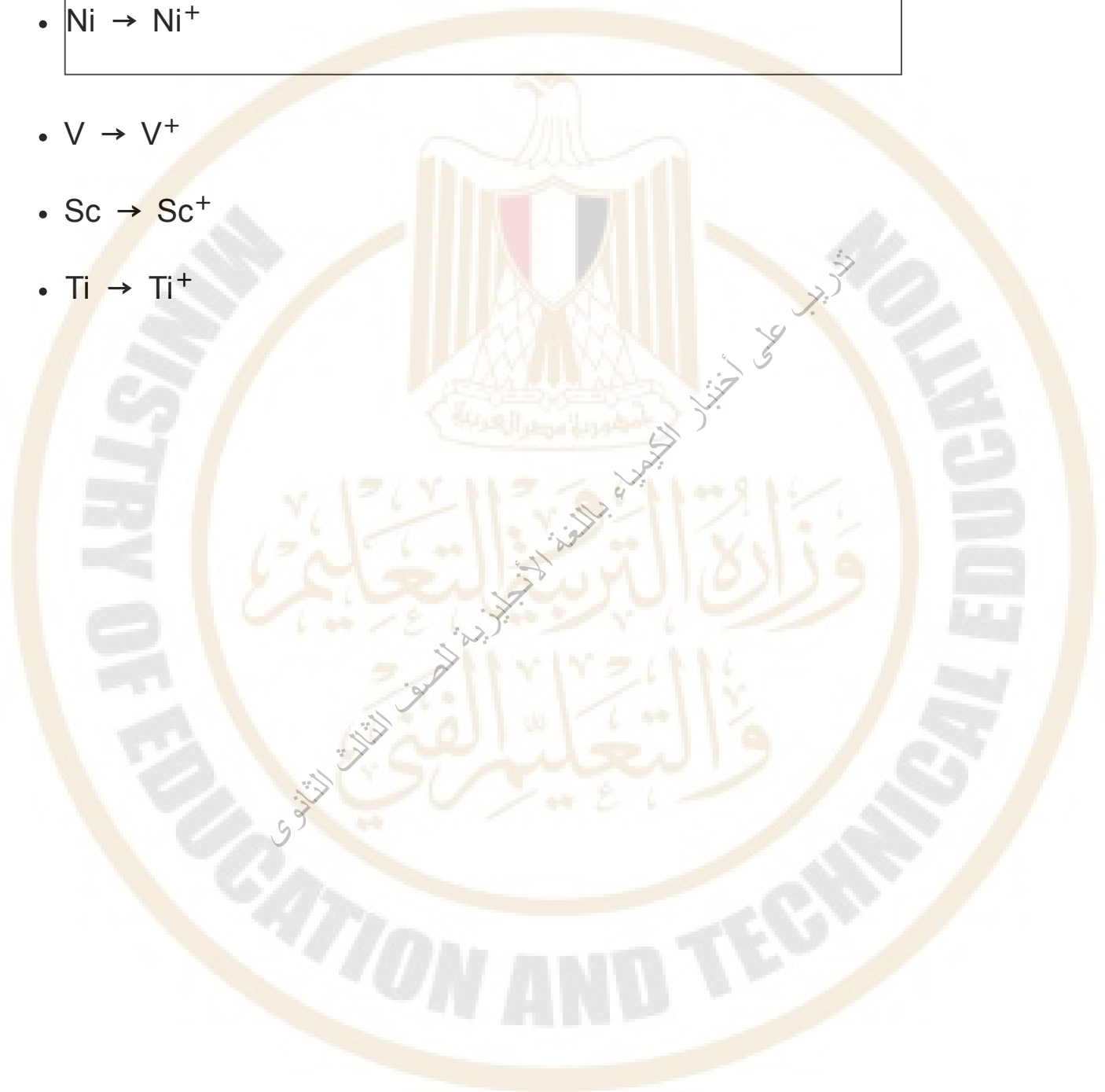
- XCl

- XCl_2

- XCl_3

- XCl_4

2

Which one of the following transition elements has the highest 1st ionization potential ?

- $Ni \rightarrow Ni^+$

- $V \rightarrow V^+$

- $Sc \rightarrow Sc^+$

- $Ti \rightarrow Ti^+$

3

A main transition element , one of its oxidation states (X^{+3}) causes that the sublevel (d) contains two electrons , the ionization potential of this element will be very high in oxidation state …....

- X^{6+}
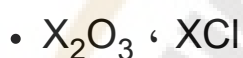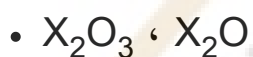
- X^{3+}

- X^{5+}

- X^{4+}

4

**The element (X) is a one of the coinage transition elements , the compounds which proves that it is a transition elements are ....**

- X_2O_3 ، XO

- XCl ، XO

- X_2O_3 ، X_2O

- X_2O_3 ، XCl

5

All of the following processes aim to improve the physical properties of iron ore before reduction process <u>except</u> ....

- oxidation of impurities

- **binding and collecting particles**

- **increase the % of iron in the ore**

- **crushing and grinding rocks of the ore**

6
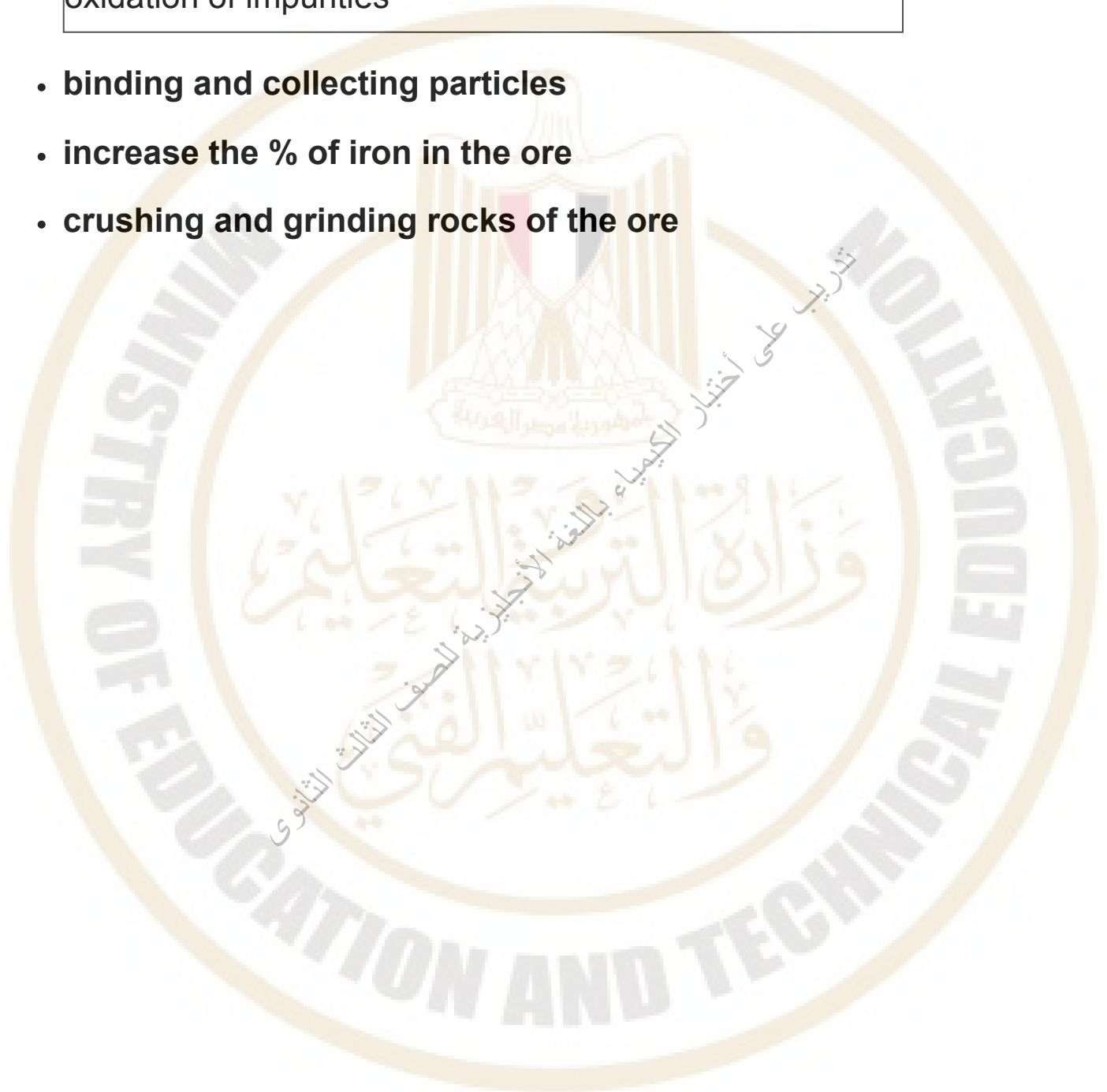
The following graph illustrates the relation between the atomic number of three successive transition elements (X, Y, Z) and their oxidation numbers

,
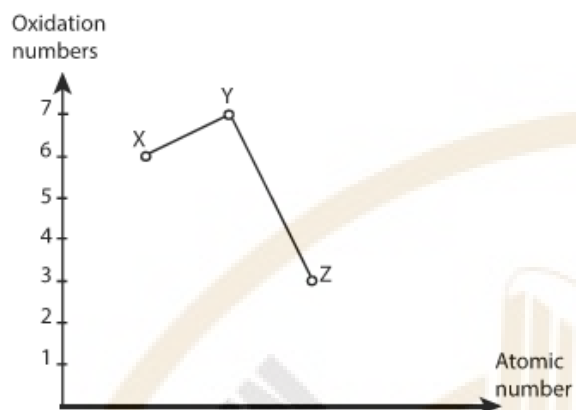
the possible groups they are found in are:

X	Y	Z
VIB	VIIB	VIII

X	Y	Z
IB	IIB	IIIB

- | X | Y | Z |
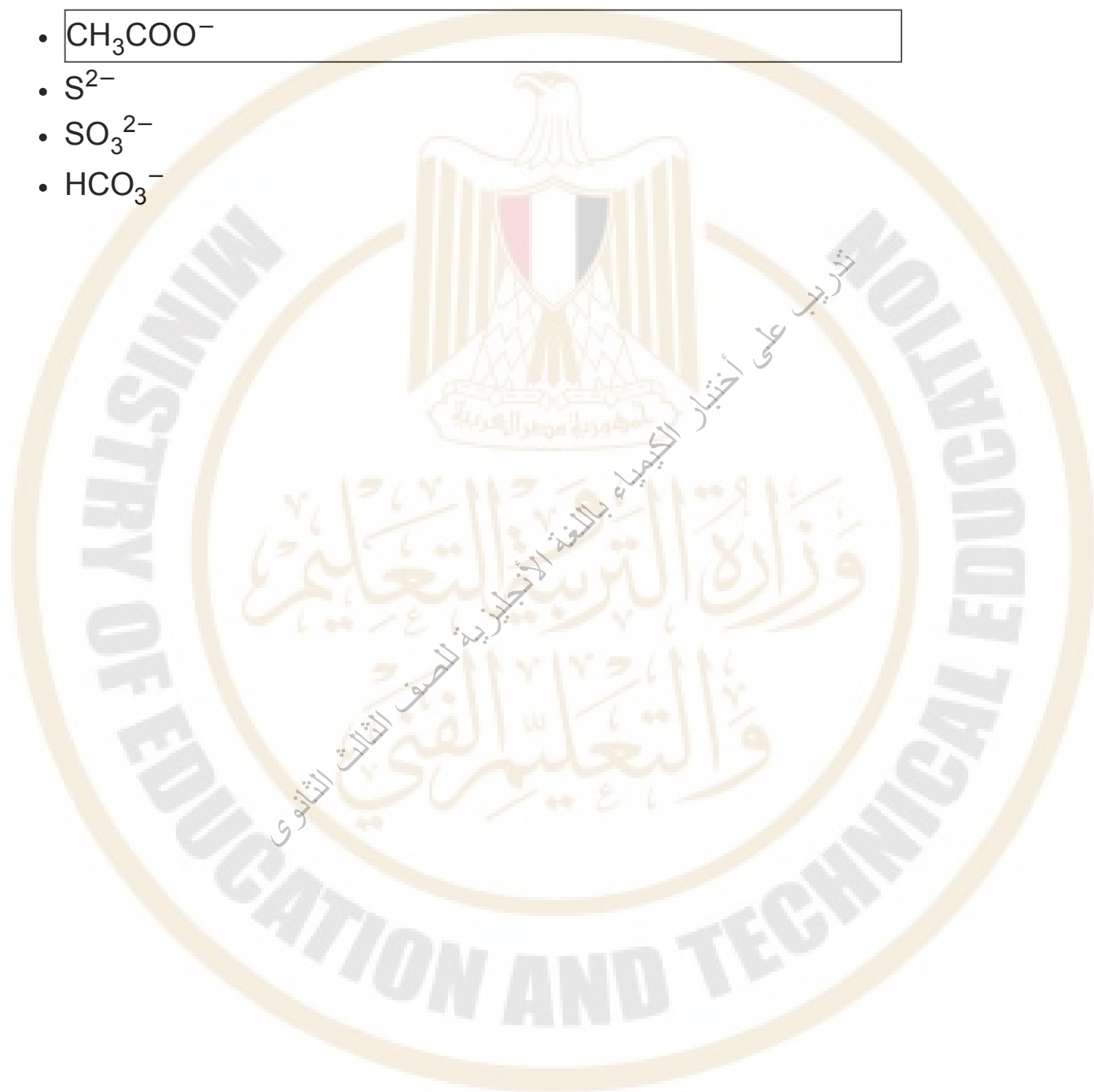 |---|---|---|
  | IVB | VB | VIB |

- | X | Y | Z |
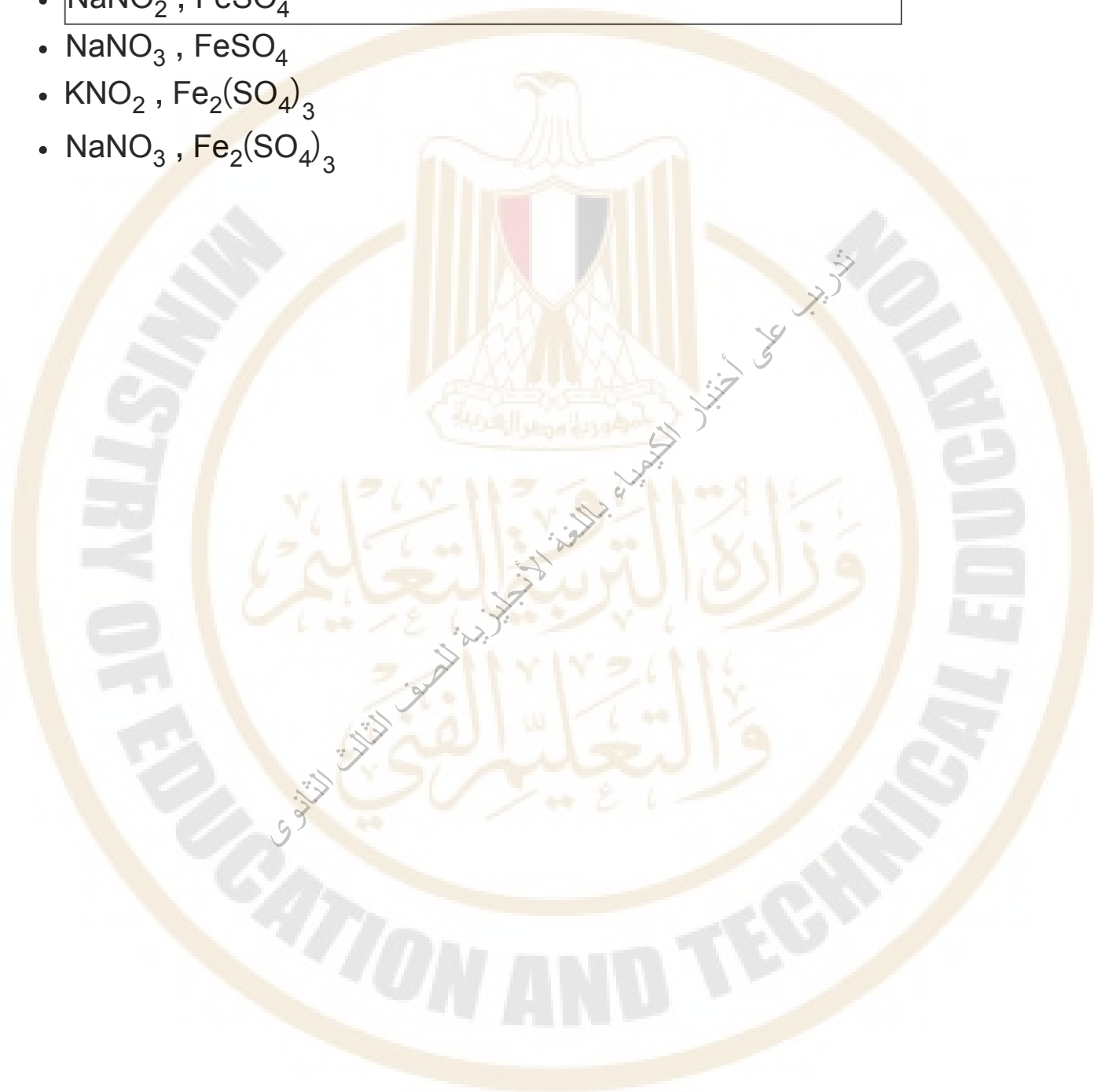 |---|---|---|
  | IIIB | VIB | VB |

7

When diluted HCl is added to solid salt has a chemical formula (A_2X) a gas evolves which forms with wet paper by (Y_2B) solution a black ppt. , the anion (Y) is …...

- CH_3COO^-
- S^{2-}
- SO_3^{2-}
- HCO_3^-

8

If you know that $KMnO_4$ is a very strong oxidizing agent, The colour of acidified $KMnO_4$ is discharged when it is added to ....

- $NaNO_2$, $FeSO_4$
- $NaNO_3$, $FeSO_4$
- KNO_2 , $Fe_2(SO_4)_3$
- $NaNO_3$, $Fe_2(SO_4)_3$

9

If you have a mixture of ($BaSO_4$, $Ba_3(PO_4)_2$) , which of the following is correct?

- They can be separated by adding dil HCl then filtration
- They can be separated by adding water then filtration
- $BaSO_4$ doesn't dissolve in water but it dissolves in dil HCl
- $Ba_3(PO_4)_2$ is soluble in water and dil HCl

10

When silver nitrate solution is added to the two salt solutions (A) and (B) , a precipitate (X) is formed in case of salt solution (A) which soluble quickly in concentrated ammonia solution, and the precipitate (Y) is formed in case of salt solution (B) which soluble slowly in concentrated ammonia solution

The two precipitates (X) and (Y) respectively are :

- X : AgCl , Y : AgBr
- X : AgCl , Y : AgI
- X : AgBr , Y : AgI
- X : AgI , Y : $BaSO_4$

11

A titration process is done by using 20 ml of NaOH solution 0.1M , with HCl solution its concentration 0.1M , if hydrochloric acid is substituted by sulphuric acid its concentration 0.1M , the volume of the used sulphuric acid will be :

- half the volume of HCl
- double the volume of HCl
- equal the volume of HCl
- double the volume of the alkali NaOH

12

4 g of impure sodium chloride dissolved in water and excess of silver nitrate solution is added to it , 3.52g of silver chloride precipitated , so the mass percentage of chloride ion = ...

(Ag = 108 , Cl = 35.5 , Na=23)

- **21.77%**

- **20.8%**

- **22.8%**

- **19.77%**

13

On performing a reaction of active metal (X) with strong mineral acid (Y), What is the modification which can be performed to make the reaction occurs in a shorter time?

- Dividing the metal
- Decreasing the acid volume.
- Decreasing the reaction temperature
- Increasing the pressure

14

In the following reaction:

$N_2O_{4(g)}$ (Colorless) $\rightleftharpoons$ $2NO_{2(g)}$ (Reddish brown)
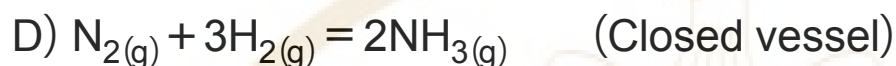
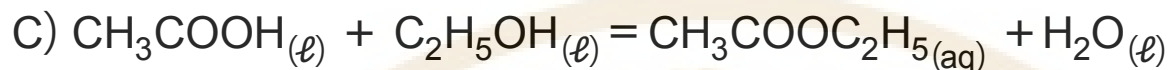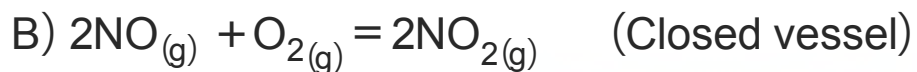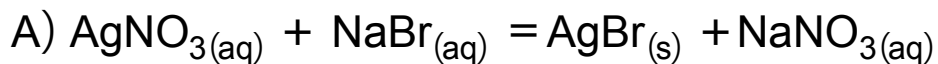On adding excess of N_2O_4

- **The color increases and K_c value remains constant**

- **The color increase and K_C value increases**

- **The color decreases and Kc value remains constant**

- **The color decreases and Kc value decreases**

15

When drops of bromothymol blue added to sodium oxalate solution $Na_2C_2O_4$, the color of the solution is:

- blue
- yellow
- green
- red

16

A) $AgNO_{3(aq)} + NaBr_{(aq)} = AgBr_{(s)} + NaNO_{3(aq)}$

B) $2NO_{(g)} + O_{2(g)} = 2NO_{2(g)}$ (Closed vessel)

C) $CH_3COOH_{(\ell)} + C_2H_5OH_{(\ell)} = CH_3COOC_2H_{5(aq)} + H_2O_{(\ell)}$

D) $N_{2(g)} + 3H_{2(g)} = 2NH_{3(g)}$ (Closed vessel)

Which of the previous reactions is considered a complete reaction?

- A

- **B**

- C

- D

17

When equal concentrations of H_2 and A_2 are mixed, the following equilibrium occurs :

$$H_{2(g)} + A_{2(g)} \rightleftharpoons 2HA_{(g)}$$
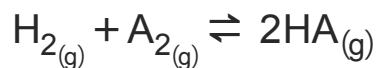
If the value of [HA] = 1.563 M , and the equilibrium constant equals 40 so [A_2] equals ....

- **0.247M**

- **0.039M**

- **62.52M**

- **42.52M**

18

In the following equilibrium reaction : $PCl_{3(g)} + Cl_{2(g)} \rightleftharpoons PCl_{5(g)}$, $K_{p1} = 0.013$

So the value of K_{P_2} for this reaction : $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$ equals :
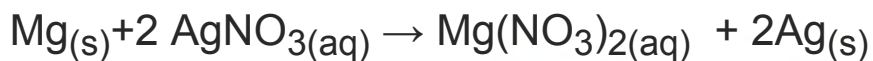
- **76.92**

- **67.29**

- **61.79**

- **82.6**

19

On dipping a magnesium strip in silver nitrate solution, the following reaction is occurred:

$$Mg_{(s)} + 2\,AgNO_{3(aq)} \rightarrow Mg(NO_3)_{2(aq)} + 2Ag_{(s)}$$

Which of the following properly expresses what happens?

- oxidation of magnesium and reduction of silver ions.
- oxidation of magnesium and oxidation of silver.
- reduction of magnesium and of oxidation silver.
- reduction of magnesium and reduction of silver ions.

20

Three rods of different elements (A , B , and C) are put in HCl$_{(aq)}$, (A) and (B) react , while (C) doesn't react , when a rod of element (A) is put in a solution contains ions of element (B) , it is corroded

So the arrangement of these elements according to their oxidation potential is :

- A > B > C
- B > A > C
- C > B > A
- A > C > B

21

If you know that :

$K^+ \rightarrow K^0$, $E^0 = -2.92$ V

$Cu^{2+} \rightarrow Cu^0$, $E^0 = 0.34$ V
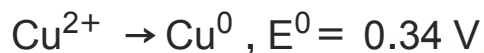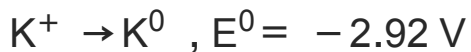
Then the cell diagram which represents the cell formed from the two electrodes is :

- $2K^0 / 2K^+ // Cu^{2+} / Cu^0$

- $Cu^{2+} / Cu^0 // 2K^+ / 2K^0$

- $Cu^0 / Cu^{2+} // 2K^0 / 2K^+$

- $K^+ / K^0 // Cu^0 / Cu^{2+}$

22

The oxidation reduction reactions in the Fuel cell lead to :

- transferring of Hydroxide ions towards Anode.
- transferring of Hydroxide ions towards Cathode
- Oxygen is converting to Hydroxide ion by oxidation
- Hydrogen is converting to water molecules by reduction

23

In lithium ion battery, lithium ions transfers through (LiPF$_6$) as follow:

- **From the negative anode to the positive cathode during discharging**

- **From the negative anode to the positive cathode during charging**

- **From the cathode to the anode during discharging**

- **From the cathode to the anode during charging**

24

In the cell whose electrodes are nickel and cadmium if you know that:

$Cd_{(s)} \rightarrow Cd^{2+}_{(aq)} + 2e-$, $E^0 = +0.402$ V

$Ni^{2+}_{(aq)} + 2e^- \rightarrow Ni_{(s)}$, $E^0 = -0.23$ V
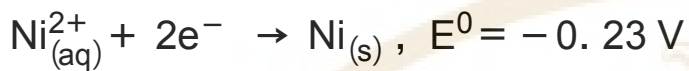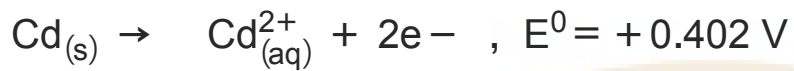
Then the value of e.m.f is:

- **0.172V**

- **-0.632V**

- **0.632V**

- **-0.172V**

25

The following table illustrates the molecular formula of three organic compounds (X) , (Y) , (Z) , So:

The molecular formula	The compound
C_3H_6	X
C_7H_8	Y
C_3H_8	Z

- (X) is a cyclio alkane , (Z) is a normal Alkane , (Y) is an aromatic compound
- (X) is a normal Alkane , (Z) is a cyclo alkane , (Y) is an aromatic compound
- (X) is an alkyne , (Z) is a normal Alkane , (Y) is an aromatic compound
- (X) is an aromatic compound , (Z) is an alkene , (Y) is an alkyne

26

On adding potassium permanganate solution in alkaline medium to the two substances (A) and (B) separately, it is observed that the color disappears with substance (A) only and does not disappear with (B) , which of the following is correct ?

- Compound (A) is 2-methyl-2-pentene , the addition is done to carbon atoms number 2 , 3
- Compound (A) is 2-methyl-2-pentene , the addition is done to carbon atoms number 1, 2
- Compound (B) is propene , the addition is done to carbon atoms number 2 , 3
- Compound (B) is propene , the addition is done to carbon atoms number 1,2

27

Using the following table:

A	B	C	D

$C_2HBrClF_3$ CF_4 CBr_2Cl_2 C_5H_{10}

Which of the following is correct?

- **(D) : is a saturated cyclic compound, (A) : is an alkane derivative**

- **(B) : is an alkene derivative, (C) : is an alkane derivative**

- **(C) : is an alkyne derivative, (D) : is an alkene**

- **(A) : is an alkane derivative, (B) : is an alkene derivative**

28

The formula : $CH_3 = \overset{\overset{\displaystyle CH_3}{|}}{CH} - \overset{\overset{\displaystyle CH_3}{|}}{CH} = CH_3$, After correct rewriting this compound , without changing its molecular formula , it will represent a compound :

- **open chain aliphatic**

- **unsaturated**

- **Alkene**

- **branched alkene**

29

The common name of the compound $(CH_3)_3CCl$ is :

- Tertiary butyl chloride
- Secondary butyl chloride
- 2-chloro – 2 – methyl propane
- 2- Methyl -2- chloro propane

30

The isomer of the compound $C_6H_5COOCH_3$ is called

- **Phenyl Acetate**

- **Methyl Heptanoate**

- **Ethyl Hexanoate**

- **Phenyl Formate**

31

The hydrocarbon aliphatic derivative which contains the group (>CH-OH) , reacts with concentrated strong mineral acid to prepare asymmetric alkene , so the alkene is :

- propene
- 2- butene
- ethene
- 2-methyl propene

32

The correct arrangement of the written compounds according to their boiling points is :

- propanoic acid > propanol > methyl acetate.

- propanol > methyl acetate > propanoic acid
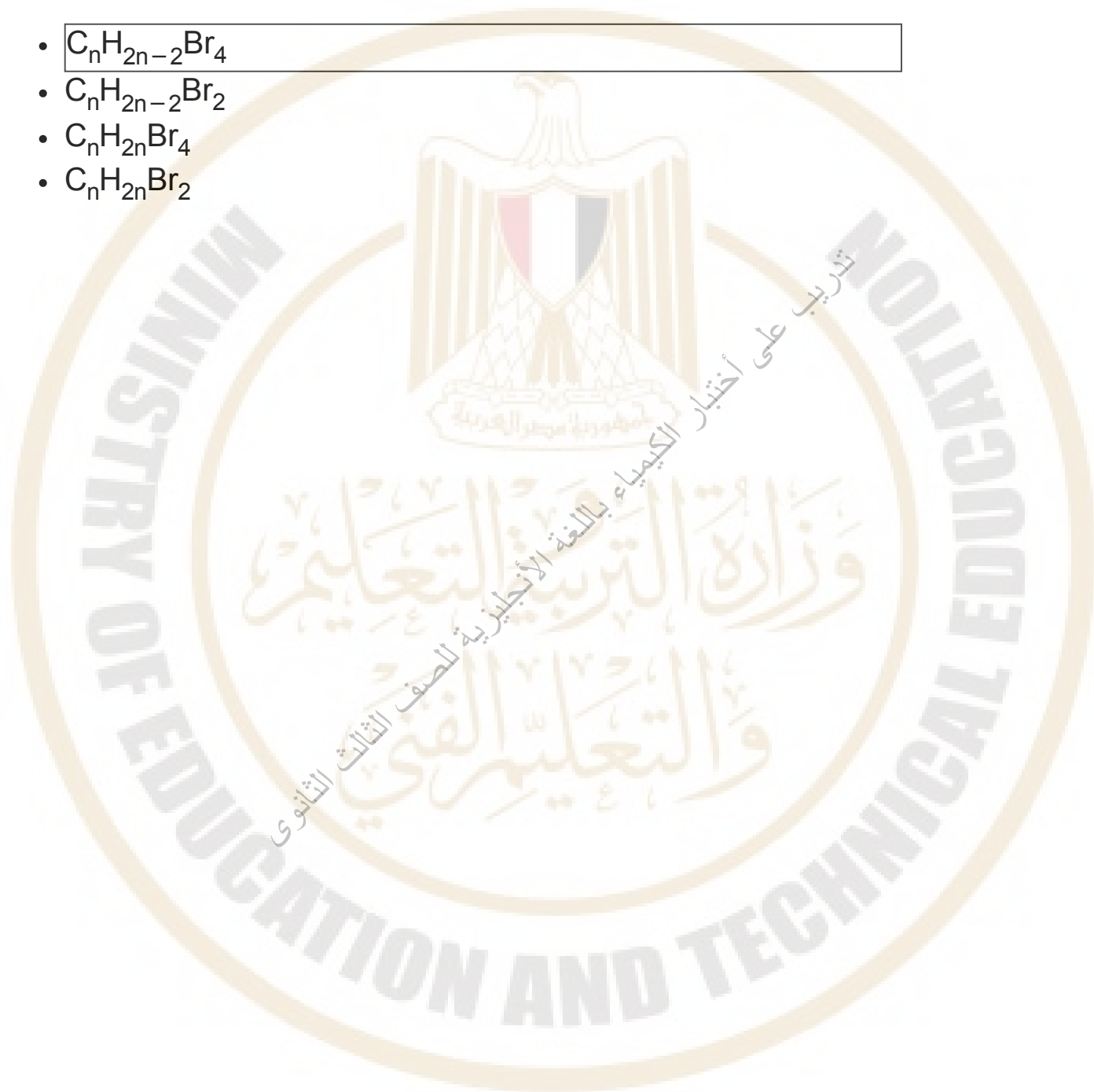
- methyl acetate. > propanol > propanoic acid

- methyl acetate. > propanoic acid> propanol .

33

0.5 mole of Hydrocarbon compound reacts with 1 mole of Bromine dissolved in carbon tetrachloride

The formula of the producing compound is :

- $C_nH_{2n-2}Br_4$
- $C_nH_{2n-2}Br_2$
- $C_nH_{2n}Br_4$
- $C_nH_{2n}Br_2$

34

To obtain cycloalkane from calcium carbide , we will make the following steps:

- **Reaction with water , polymerization , hydrogenation**

- **hydrogenation , polymerization , Reaction with water**

- **Reaction with water , hydrogenation , polymerization**

- **hydrogenation , reaction with water, polymerization**

35

The aromatic compound of molecular formula $C_8 H_{10}$ can be prepared from reaction of:

- Ethyl chloride with benzene in presence of anhydrous aluminum chloride.

- Methyl chloride with benzene in presence of anhydrous aluminum chloride.

- Heating heptane in presence of platinum.

- Heating hexane in presence of platinum.

36

Starting with saturated Aliphatic compound, Benzoic acid can be obtain through :

- Catalytic reforming then Oxidation
- Polymerization then Oxidation
- Polymerization then Hydrogenation
- Oxidation then Halogenation

37

When lactic acid reacts with sodium , the products of the reaction are :

- $CH_3 - CH - COONa \ + \ hydrogen$
  $\quad\quad\quad |$
  $\quad\quad ONa$

- $CH_3 - CH - COONa \ + \ water$
  $\quad\quad\quad |$
  $\quad\quad OH$

- $CH_3 - CH - COONa \ + \ water$
  $\quad\quad\quad |$
  $\quad\quad ONa$

- $CH_3 - CNa - COOH \ + \ hydrogen$
  $\quad\quad\quad |$
  $\quad\quad OH$

38

We can prepare the ester which is the isomer of the compound CH_3COOCH_3 from :

- formic acid with ethyl alcohol

- acetic acid with methyl alcohol

- formic acid with methyl alcohol

- acetic acid with ethyl alcohol

39

The following table shows the atomic radius of four transition elements in the first transition series : (A , B , C , D)

The element	Atomic radius A°
A	1.15
B	1.16
C	1.62
D	1.17

They all can form a substitutional alloy except ....
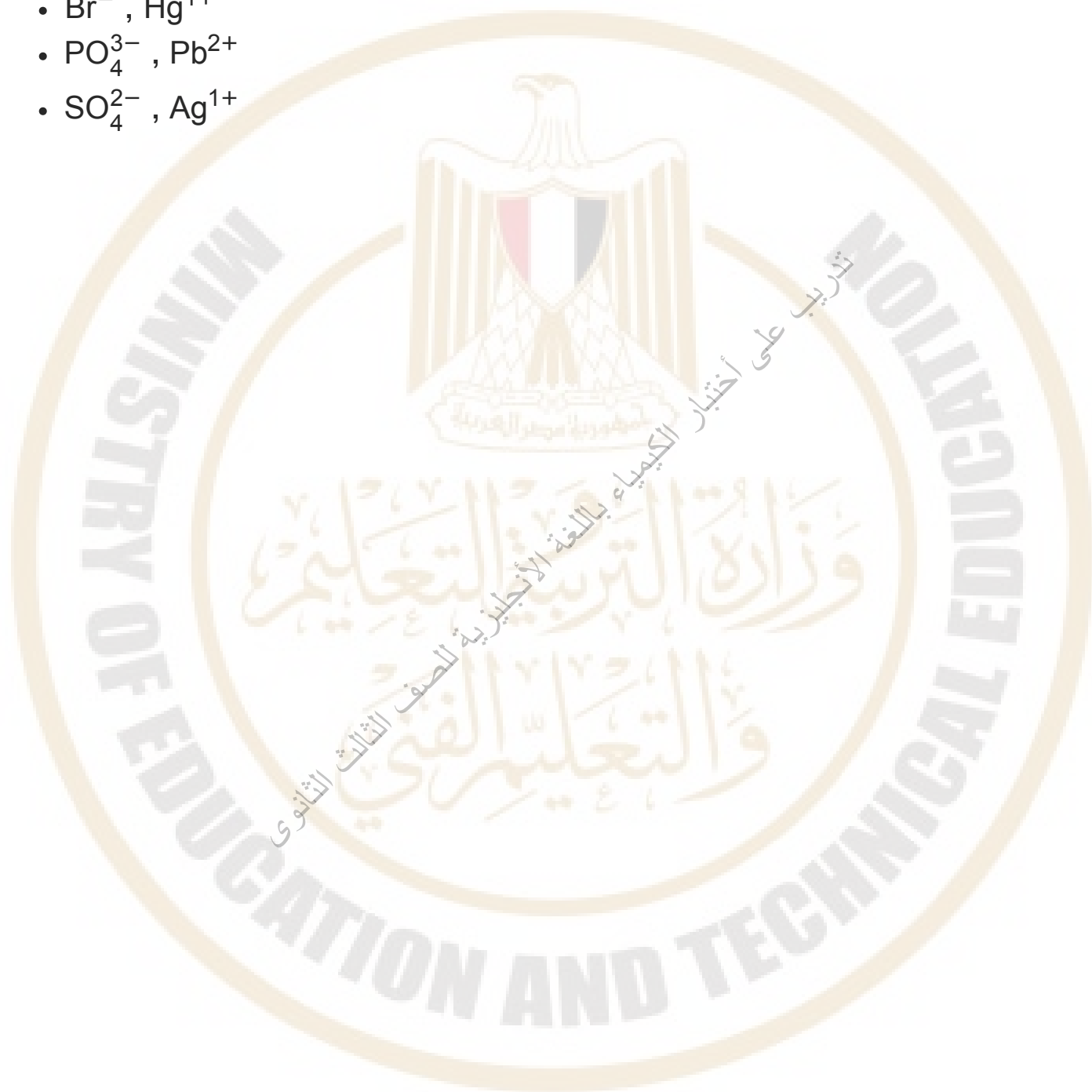
- **A,C**

- **A,B**

- **D,A**

- **B,D**

40

Iron fillings can be used to differentiate between :

- Concentrated sluphuric acid and concentraled nitric acid
- Diluted hydrochloric acid and diluted sulphuric acid
- Iron II sulphate and iron III sulphate
- Iron III oxide and iron III sulphate

41

Dilute HCl can be used to detect both of ……………….

- NO_2^- , Hg^{1+}
- Br^- , Hg^{1+}
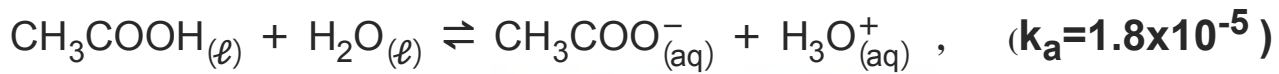- PO_4^{3-} , Pb^{2+}
- SO_4^{2-} , Ag^{1+}

42

During an experiment of detection of a cation of a salt , some of NaOH is added, a ppt. is formed , and on adding excess of NaOH gives:

- $NaAlO_{2(aq)}$
- $BaSO_{4(s)}$
- $NaNO_{3(aq)}$
- $Al(OH)_{3(s)}$

43

In the following equilbrium system :

$$CH_3COOH_{(\ell)} + H_2O_{(\ell)} \rightleftharpoons CH_3COO^-_{(aq)} + H_3O^+_{(aq)} \, , \quad (k_a=1.8\times10^{-5})$$

On adding a drops of $HCl_{(aq)}$ to the reaction, the value of k_a of acetic acid equals:

- 1.8×10^{-5}

- 0.9×10^{-5}

- 3.6×10^{-6}

- 3.6×10^{-4}

44

In the following saturated solution:

$$AgCl_{(s)} \rightleftharpoons Ag^+_{(aq)} + Cl^-_{(aq)}$$

All of the following decrease the solubility of AgCl when they are added to it <u>except</u> :

- $NH_4OH_{(aq)}$

- $AgNO_{3(aq)}$

- $NaCl_{(aq)}$
- $HCl_{(aq)}$

45
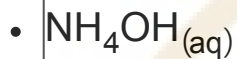
The electrolyte which leads to the corrosion of metals with a high rate is :

- H_2SO_4 (0.5M)

- HCl (0.5M)

- HNO_2 (1M)

- H_2SO_3 (1M)
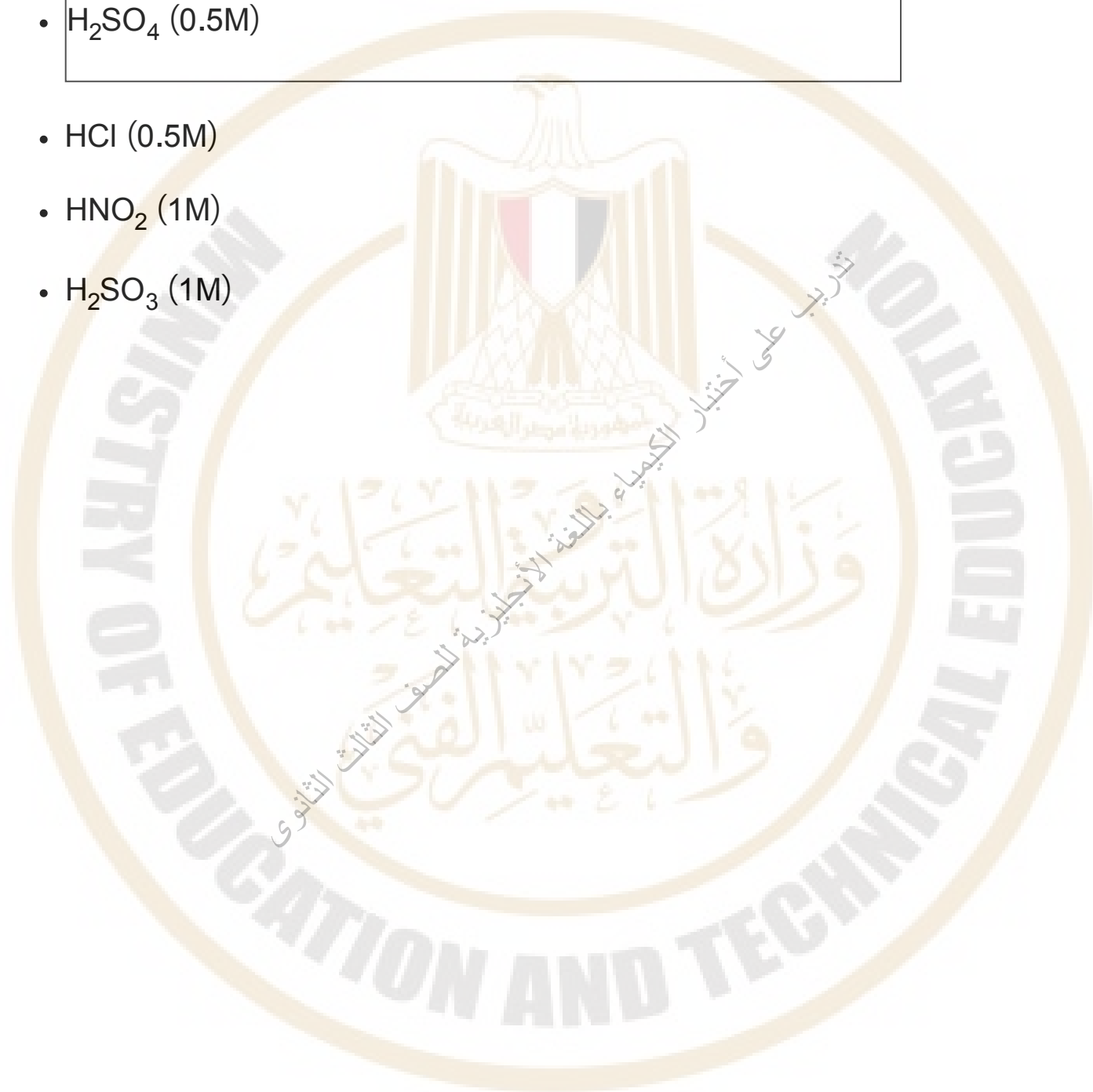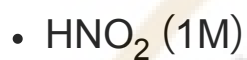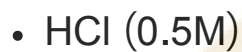
46

To precipitate 10g of element (A) according to the equation :

$A^{2+} + 2e^- \rightarrow A$ $(A = 63.5)$

The quantity of electricity =

- **0.315F**

- **0.675C**

- **15196C**

- **30393F**

47

On alkaline Hydrolysis of the compound C_3H_7Br which doesn't contain methylene group , the produced compound is :

- secondary alcohol only
- primary alcohol only
- primary or secondary alcohol
- primary alcohol or tertiary alcohol

48

By using the following diagram:

A →(Alkaline hydrolysis)→ B →(Oxidation)→ C
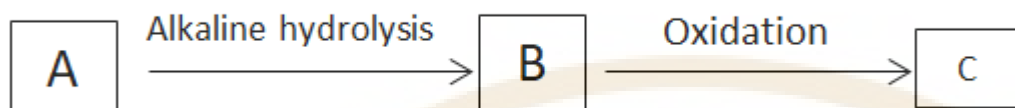
(where one mole of the compound (B) contains 12 moles of atoms)

the compounds (A) , (B) and (C) are

- **(A) is 2 - Bromopropane , (B) isopropyl alcohol , (C) is Acetone**

- **(A) is 2 - Bromopropane , (B) isopropyl alcohol , (C) is propanoic acid**

- **(A) is Ethyl chloride , (B) is Ethyl alcohol, (C) is Acetic acid**

- **(A) is Ethyl chloride , (B) is Ethyl alcohol, (C) is Acetaldehyde**

(A) and (B) are two aromatic organic compounds, the molecular formula of the compound (A) is C_6H_6O, and the compound (B) is $C_7H_6O_3$, so each of the two compounds react with :

- **Sodium hydroxide**

- **Sodium carbonate**

- **Ethyl alcohol**

- **Hydrochloric acid**

50

A, B, and C are 3 compounds: on adding (A) to the compound (C) a food flavor is produced, and on adding sodium hydroxide to (B) or (C) a reaction occurs while on adding it to (A) no reaction occurs, then the three compounds are:

- A: alcohol, B: phenol, C: acid
- A: phenol, B: alcohol, C: acid
- A: acid, B: alcohol, C: phenol
- A: acid, B: phenol, C: alcohol