



**DORAR**  
SENIOR CHEMISTRY TEACHER

# Exam Nights

Chemistry



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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ  
أَهْمُكَ دَرَارُ

اللَّهُمَّ لَا سَهْلَ إِلَّا مَا جَعَلْتَهُ سَهْلًا، وَأَنْتَ تَجْعَلُ الْحَزْنَ سَهْلًا إِذَا شِئْتَ

## خطة ليلة امتحان 2024

Ahmed Dorar is inviting you to a scheduled Zoom meeting.

Topic: Ahmed Dorar's Personal Meeting Room



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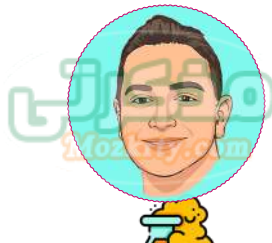
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### جدول الحصص المجانية

Transition metals	9:00 pm 2/7
Iron Extraction and reactions	10:00 pm 2/7
Qualitative analysis	1:00 am 3/7
Quantitative analysis	2:00 am 3/7
Chemical Equilibrium	10:00 am 3/7
Ionic Equilibrium	11:00 am 3/7
Galvanic Cells	7:00 pm 3/7
Electrolytic Cells	8:00 pm 3/7
Hydrocarbons	11:00 pm 3/7
Hydrocarbons	1:00 am 4/7
Hydrocarbons Derivatives	10:00 am 4/7
Hydrocarbons Derivatives	11:00 am 4/7
توقعات هذا العام باذن الله	5/7

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## Basics

- 1 <sup>1st</sup> <sup>23</sup> If the electronic configuration of some cations of transition elements:  $A^{+2}:[_{18}\text{Ar}, 3d^3]$ ,  $B^{+2}:[_{18}\text{Ar}, 3d^5]$ , Which of the following processes easy to take place?...
- (a) reduction of  $(B^{+7})$  to  $(B^{+3})$
  - (b) reduction of  $(A^{+5})$  to  $(A^{+3})$
  - (c) oxidation of  $(B^{+2})$  to  $(B^{+3})$
  - (d) oxidation of  $(A^{+3})$  to  $(A^{+5})$
- 2 <sup>2nd</sup> <sup>22</sup> X is an element from the first transition series and follows the element Z which easy to be oxidized as:  $Z^{2+} \longrightarrow Z^{3+}$ , So the element X is.....
- (a) Fe
  - (b) Mn
  - (c) Co
  - (d) Zn
- 3 <sup>1st</sup> <sup>21</sup> The element (X) is from elements of the first transition series, it is difficult to be reduced it from  $(X^{3+})$  to  $(X^{2+})$  in ordinary conditions. The element (X) is .....
- (a) Fe
  - (b) Mn
  - (c) Co
  - (d) Ni
- 4 <sup>Exp</sup> <sup>23</sup> X When a piece of Zinc is added to diluted sulphuric acid then the evolved gas is passed in four solutions at the suitable conditions. Which of one of the following processes occurs?
- (a)  $Y\text{SO}_4 \longrightarrow Y_2(\text{SO}_4)_3$
  - (b)  $\text{WCl} \longrightarrow \text{WCl}_2$
  - (c)  $Y_2(\text{SO}_4)_3 \longrightarrow Y\text{SO}_4$
  - (d)  $\text{ZCl}_2 \longrightarrow \text{ZCl}_3$
- 5 <sup>1st</sup> <sup>21</sup> The electronic configuration for the ion of a transition element (X) in one of its oxides  $(X_2O_3)$  contain 3 unpaired electrons, this element is found in the periodic table in group number .....
- (a) 9
  - (b) 10
  - (c) 11
  - (d) 12

6 1st<sup>22</sup> Depending on atomic numbers and the possible oxidation states of the following elements ( $_{25}\text{Mn}$ ,  $_{17}\text{Cl}$ ,  $_{22}\text{Ti}$ ,  $_{28}\text{Ni}$ ) which of the following is correct?

- (a) It is hard to obtain  $\text{FeCl}_3$  from  $\text{FeCl}_2$       (b) It is easy to obtain  $\text{MnCl}_2$  from  $\text{MnCl}_3$   
 (c) It is easy to obtain  $\text{NiCl}_2$       (d) It is hard to obtain  $\text{TiCl}_4$

7 2nd<sup>21</sup> Which of the following processes is more difficult to occur ?

- (a)  $\text{Zn}^{2+} \longrightarrow \text{Zn}^{3+}$       (b)  $\text{Ti}^{2+} \longrightarrow \text{Ti}^{3+}$   
 (c)  $\text{V}^{2+} \longrightarrow \text{V}^{3+}$       (d)  $\text{Fe}^{2+} \longrightarrow \text{Fe}^{3+}$

8 2nd<sup>23</sup> If you have the following compounds: ( $\text{KMnO}_4$ ,  $\text{K}_2\text{MnO}_4$ ,  $\text{MnO}_2$ ), it is easy to obtain.... ?

- (a)  $\text{K}_2\text{MnO}_4$  from  $\text{KMnO}_4$  by oxidation      (b)  $\text{KMnO}_4$  from  $\text{K}_2\text{MnO}_4$  by oxidation  
 (c)  $\text{MnO}_2$  from  $\text{KMnO}_4$  by reduction      (d)  $\text{K}_2\text{MnO}_4$  from  $\text{MnO}_2$  by reduction

## Uses

9 1st<sup>21</sup> The transition element, used in process of hydrogenation of oils, the electronic configuration of its ion ( $\text{M}^{3+}$ ) is .....

- (a)  $[\text{Ar}], 3d^7$       (b)  $[\text{Ar}], 3d^8$   
 (c)  $[\text{Ar}], 4s^2, 3d^7$       (d)  $[\text{Ar}], 4s^2, 3d^8$

10 1st<sup>21</sup> Four metals (A), (B), (C), (D) are characterized by :

The element (A) lies in group 3A

The element (B) form with tin bronze alloy

The element (C) used as a catalyst in ammonia industry

The element (D) non transition and found in d block

To cover a metallic object by brass, we will use .....

- (a) (D) and (B)      (b) (C) and (A)      (c) (B) and (A)      (d) (D) and (C)

11 2nd <sup>22</sup> An ion ( $X^{+3}$ ) has electronic configuration  $[_{18}\text{Ar}] 3d^6$ , so element X is used in.....

- (a) car springs (b) dry batteries  
(c) fungicide (d) oil hydrogenation

12 1st <sup>22</sup> X and Y are two transition metals in the first transition series. Both have a compound used as a fungicide, so they are located in the two groups:

- (a) 1B, 7B (b) 1B, 2B (c) 2B, 3B (d) 2B, 7B

13 Exp <sup>23</sup> The electronic configuration of the cation of the two elements X, Y are  $X^{4+}:(_{18}\text{Ar})3d^1$   $Y^{6+}:(_{18}\text{Ar}) 3d^2$ , One of the properties of the alloy formed from Element X and one of alloy of Y with Carbon

- (a) Is light in weight and very hard (b) Resist corrosion and high hardness  
(c) Resist corrosion at high Temperature (d) Maintains its durability at high temperature

## Oxidation states and Ionization Potential

14 1st <sup>23</sup> the element (X) is from elements of the first transition series, its electronic configuration for one of its ions is  $[_{18}\text{Ar}] 3d^5$ , this the element is .....

- (a) Zn (b) V (c) Sc (d) Fe

15 Exp <sup>23</sup> X, Y, Z, L represent four transition elements and their oxides are  $X_2O_5$ ,  $Y_2O_3$ ,  $ZO_2$  and  $L_2O$  the correct arrangement for their oxidation number in these oxides is .....

- (a)  $L < Z < Y < X$  (b)  $L < Y < Z < X$  (c)  $Y < L < Z < X$  (d)  $L < Y < X < Z$

16 Exp <sup>21</sup> The element (X) is a transitional element lies in the fourth period, it has the highest possible oxidation state so, it is possible to form all the following compounds, except .....

- (a)  $XCl$  (b)  $XCl_2$  (c)  $XCl_3$  (d)  $XCl_4$

17 Exp <sup>21</sup> Which one of the following transition elements has the highest 1<sup>st</sup> ionization potential ? .....

- (a)  $Ti \longrightarrow Ti^+$       (b)  $V \longrightarrow V^+$       (c)  $Sc \longrightarrow Sc^+$       (d)  $Ni \longrightarrow Ni^+$

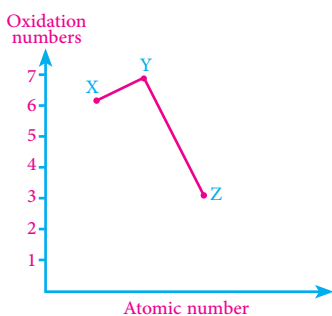
18 Exp <sup>21</sup> A main transition element , one of its oxidation states ( $X^{3+}$ ) causes that the sublevel (d) contains two electrons , the ionization potential of this element was very high in Oxidation state .....

- (a)  $X^{6+}$       (b)  $X^{3+}$       (c)  $X^{5+}$       (d)  $X^{4+}$

19 Exp <sup>21</sup> The element (X) is one of the coinage transition elements , the compounds which proves that it is a transition elements are .....

- (a)  $X_2O_3, XCl$       (b)  $XCl, XO$       (c)  $X_2O_3, X_2O$       (d)  $X_2O_3, XO$

20 Exp <sup>21</sup> The opposite 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
(a)	VIB	VIIB	VIII
(b)	IB	IIB	IIIB
(c)	IVB	VB	VIB
(d)	IIIB	VIB	VB

## General properties

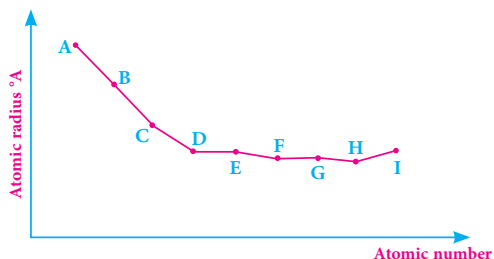
21 1st <sup>21</sup> The transition element which has the highest boiling point and the electronic configuration of its ion is  $[\text{Ar}]$ , its ion will be .....

- (a)  $\text{W}^{2-}$       (b)  $\text{X}^{3+}$       (c)  $\text{Y}^+$       (d)  $\text{Z}^-$

22 2nd <sup>21</sup> The chemically active transition element that contains one single electron in its atomic state is .....

- (a) Ti      (b) Fe      (c) Cu      (d) Sc

23 1st <sup>22</sup> The following graph shows graduation of the radii of the first transition elements in the 4<sup>th</sup> period:

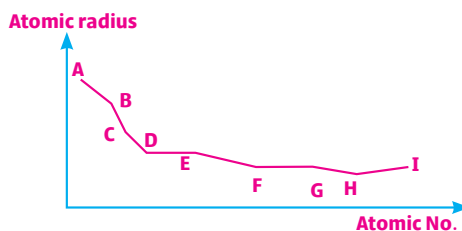


So the element which one of its oxides that is used in dyes Manufacturing is:

- (a) E      (b) C      (c) D      (d) A

24 2nd <sup>22</sup> The following figure represents the graduation in atomic radii of the transition elements in the fourth period which has abnormal atomic mass is .....

- (a) C  
(b) H  
(c) E  
(d) D



25 1st <sup>23</sup> From the following graph: Which of the following is correct?

- (a) element (Z) is less density than element (W)  
(b) element (Y) is less density than element (Z)  
(c) element (W) has highest ionization potential than (X)  
(d) element (X) has highest ionization potential than (Y)

the effective nuclear charge



- 26 2nd <sup>23</sup> The electronic configuration for the cations of elements (X, Y, and Z) in their compounds as in the table..,So the correct arrangement for these elements according to the effective nuclear charge is.....?....

Compound	Electronic configuration
$X_2O_3$	$[_{18}Ar] 3d^3$
$YO_2$	$[_{18}Ar] 3d^3$
$Z_2O_3$	$[_{18}Ar] 3d^1$

- (a)  $X < Y < Z$   
 (b)  $Y < X < Z$   
 (c)  $X < Z < Y$   
 (d)  $Z < X < Y$

- 27 Exp <sup>23</sup> From the following elements which represents the element of the highest density

- (a) has lower atomic mass than the preceding  
 (b) has largest magnetic moment in atomic state  
 (c) its ion is hardly reduced from +3 to +2  
 (d) has the largest atomic size

## Characheric properties

- 28 1st <sup>21</sup> (X) , (Y) , (Z) are three successive transition elements found at the end of the first transition series , the element (X) has the largest atomic number , they form the following compounds :  $ZA_2$  ,  $YA_2$  ,  $XA_2$  , the correct arrangement for these elements according to magnetic momentof their ions is .....

- (a)  $X^{2+} > Z^{2+} > Y^{2+}$                       (b)  $X^{2+} > Y^{2+} > Z^{2+}$   
 (c)  $Z^{2+} > X^{2+} > Y^{2+}$                       (d)  $Z^{2+} > Y^{2+} > X^{2+}$

29  $2nd^{21}$  element (X) its electronic configuration ends with  $3d^7$  so the compound

$XCl_3$  is .....

- a colorless and has zero unpaired electrons
- b colored and has 2 unpaired electrons
- c colored and has 4 unpaired electrons
- d colorless and has 3 unpaired electrons

30  $2nd^{22}$  A transition element from the first transition series, in its oxidation state (2+) it has a greatest magnetic moment. So, the electronic configuration of this element at its oxidation state (3+) is...

- a  $[_{18}Ar] 4s^0, 3d^5$
- b  $[_{18}Ar] 4s^2, 3d^5$
- c  $[_{18}Ar] 4s_0, 3d_3$
- d  $[_{18}Ar] 4s^0, 3d^4$

31  $1st^{22}$  Which of the following compounds attracts the external magnetic field?

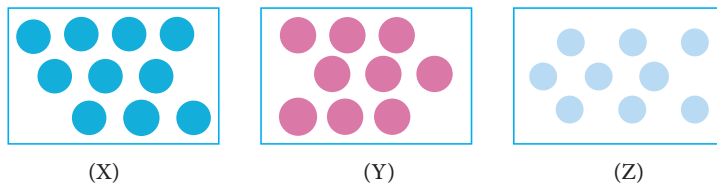
- a  $ScCl_3$
- b  $Ni_2O_3$
- c  $TiO_2$
- d  $ZnCl_2$

32  $2nd^{21}$  The chemical substance that has the lowest magnetic moment is .....

- a  $Fe_2O_3$
- b  $CuO$
- c  $CrO$
- d  $MnO_2$

## Iron Extraction

33 Exp<sup>21</sup> In the following figure : (X) , (Y) and (Z) are three different elements are used to form three different types of alloys :



Alloy (1) : produced by mixing molten (X) with molten (Y)

Alloy (2) : produced by mixing molten (Y) with molten (Z)

Alloy (3) : produced from reaction of (Y) with (Z)

Then the types of alloys are .....

	Alloy (1)	Alloy (2)	Alloy (3)
(a)	Intermetallic	Substitutional	Interstitial
(b)	Substitutional	Intermetallic	Interstitial
(c)	Interstitial	Intermetallic	Substitutional
(d)	Substitutional	Interstitial	Intermetallic

34 Exp<sup>21</sup> All of the following aim to improve the physical properties of iron ore before reduction process , except .....

- (a) increasing the % of iron in the ore
- (b) sintering and collecting particles
- (c) oxidation of the impurities
- (d) crushing and grinding rocks of the ore

35 1st<sup>21</sup> the physical process of iron extraction leads to decrease the mass of ore.....

- (a) roasting
- (b) sintering
- (c) crushing
- (d) surface tension

36 Exp<sup>23</sup> the process of iron extraction that decreases the % of impurities in form of gases is

- (a) sintering      (b) cracking      (c) concentrating      (d) Roasting

37 2<sup>nd</sup> 2<sup>1</sup> element (X) is representative elements lies in the second period the outer shell contains 4 electrons , while element (Y) is a main transitional element found in first transitional series , its atom contains 4 single electrons , by mixing the 2 elements ..... is produced

- (a) intermetallic alloy  
 (b) interstitial alloy  
 (c) Substitutional and interstitial alloy  
 (d) Intermetallic alloy and Substitutional alloy

38 Exp<sup>23</sup> element (X) is one of coniage metals, while element (Y) is representative element locates group 4A , x ,y can make

- (a) substitutional alloy  
 (b) interstitial alloy /substitutional alloy  
 (c) intermetallic alloy  
 (d) interstitial alloy /intermetallic alloy

39 1<sup>st</sup> 2<sup>2</sup> A , B and C are three different alloys As shown in the table

A	It is harder than its elements
B	Its elements have the same crystalline structure
C	its constituent elements are chemically combined

So which is correct

- (a) A: interstitial      B: substitutional      C: intermetallic  
 (b) A: substitutional      B: interstitial      C: intermetallic  
 (c) A : intermetallic      B: substitutional      C: interstitial  
 (d) A : interstitial      B: intermetallic      C: substitutional

40 1st<sup>22</sup> Which of the following plays the same role in both blast and medrix furnaces

- (a)  $\text{CO}_{(g)}$                       (b)  $\text{H}_2\text{O}_{(v)}$                       (c)  $\text{H}_{2(g)}$                       (d)  $\text{CH}_{4(g)}$

41 1st<sup>22</sup> All of the following can be done to iron ore before the furnace stage except:

- (a) The process of converting the grey ore to red  
 (b) Increasing the percentage of iron in ore  
 (c) the reaction with the mixture of (hydrogen and carbon monoxide gases)  
 (d) separation of some impurities by surface tension

42 Exp<sup>22</sup> The opposite table shows the radius of four transition elements in the first transitional series (A) , (B) , (C) , (D) .

The element	Atomic number $A^\circ$
A	1.15
B	1.16
C	1.62
D	1.17

They all can form a substitutional alloy , except .....

- (a) B,D                      (b) A,B                      (c) D,A                      (d) A,C

43 1st<sup>23</sup> The silicon steel is one of the alloys that formed by mixing silicon, chromium and steel This alloy is considered from....

- (a) substitution alloy only  
 (b) interstitial alloy and intermetallic alloy  
 (c) intermetallic alloy only  
 (d) interstitial alloy and substitution alloy

44 2nd<sup>23</sup> You have two elements (X and Y), X is an element from coinage metals but Y is an element forms , So the alloy formed from X and Y is characterized by:

- (a) its elements have the same crystal lattice shape  
 (b) (Y) prevents sliding of (X) layers  
 (c) chemical combination between (X) and (Y)  
 (d) (Y) exists in the intermolecular spaces of element (X)

45 2nd <sup>22</sup> A piece of 2Kg of iron ore becomes 1.8Kg by.....process

- (a) crushing      (b) sintering      (c) concentrating      (d) roasting

46 2nd <sup>22</sup> One of the following alloys used in electric furnace and its type is.....

- (a) nickel chromium - substitutional      (b) gold copper- substitutional  
(c) duralumin- intermetallic      (d) nickel chromium – interstitial

47 1st <sup>23</sup> The process that take place on product from cleaning high furnace to produce interstitial alloy in sequence....

- (a) concentrating-oxidation-reduction  
(b) crushing-reduction-steel production  
(c) sintering- reduction-steel production  
(d) crushing-roasting-reduction

48 Exp <sup>21</sup> All of the following can be done to the iron ore before its reduction except

- (a) converting the unsuitable size particles for reduction into suitable size particles  
(b) reaction with CO gas at high temperature  
(c) Using magnetic separation to reduce its impurities  
(d) expelling humidity and heating it strongly in the air

49 2nd <sup>23</sup> Which of the following chemical processes could be done on limonite ore to get iron?....

- (a) sintering and reduction  
(b) roasting and reduction  
(c) sintering and roasting  
(d) roasting and steel production

50 Exp <sup>23</sup> to convert iron III oxide to an alloy of iron and carbon respectively are ?....

- (a) open furnace then medrix furnace  
(b) oxygen convertor then blast furnace  
(c) blast furnace then medrix furnace  
(d) blast furnace then open furnace

51 2nd <sup>23</sup> An alloy consists of iron and carbon, the correct arrangement of the fur-

naces that used to get this ?....

- a) Midrex furnace then oxygen convertor
- b) blast furnace then Midrex furnace
- c) open furnace then electrical furnace
- d) electrical furnace then blast furnace

## Iron Reactions

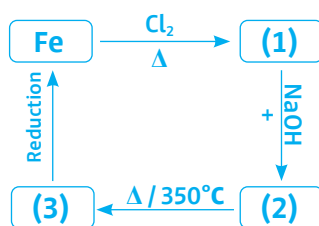
52 1st<sup>21</sup> To obtain magnetic iron oxide from iron (III) chloride , the following processes are done in sequences .....

- a) reaction with hydrochloric acid – oxidation - reduction
- b) reaction with alkaline solution - thermal decomposition - reduction
- c) oxidation - reduction - thermal decomposition
- d) thermal decomposition - oxidation - reaction with alkaline solution

53 Exp<sup>21</sup> Iron fillings can be used to differentiate between .....

- a) iron (II) sulphate and iron (III) sulphate
- b) dil hydrochloric acid and dil sulphuric acid
- c) conc sulphuric acid and conc nitric acid
- d) iron (III) oxide and iron (III) sulphate

54 Exp<sup>21</sup> Study the opposite diagram :



the three compounds 1 , 2 , 3 are respectively .....

	(1)	(2)	(3)
a	FeCl <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	Fe(OH) <sub>3</sub>
b	FeCl <sub>3</sub>	Fe(OH) <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>
c	FeCl <sub>2</sub>	FeO	Fe(OH) <sub>2</sub>
d	FeCl <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	Fe(OH) <sub>3</sub>

55 Exp <sup>21</sup> By heating the following iron compounds ( $\text{FeCO}_3$ ,  $\text{Fe}_3\text{O}_4$ ,  $\text{FeO}$ ) separately strongly in atmospheric air and comparing the mass of solid product after heating, .....

- a The mass of  $\text{FeCO}_3$  increases while the mass of  $\text{FeO}$  decreases. .
- b the mass of  $\text{FeCO}_3$  increases and the mass of  $\text{Fe}_3\text{O}_4$  doesn't change.
- c the mass of  $\text{FeCO}_3$  decreases and the mass of  $\text{Fe}_3\text{O}_4$  increases.
- d the mass of  $\text{FeCO}_3$  and the mass of  $\text{FeO}$  doesn't change.

56 Exp <sup>21</sup> Heating iron (II) oxalate in air strongly gives a solid compound (X), when concentrated hot sulphuric acid is added to compound (X) anther compound (Y) will be formed. by comparing the properties of compounds (X) and (y) it is found that

- a the compound (X) and (Y) have equal magnetic moment and both of them are coloured
- b the compound (X) and (Y) have equal magnetic moment and both of them are uncoloured
- c the compound (X) has higher magnetic moment than (Y) and both of them are coloured
- d the compound (X) has higher magnetic moment than (Y) and one of them is coloured

57 2nd <sup>22</sup> Two chemical compounds: A and B, when compound (A) is heated, it produces a gas that is used in reduction of iron oxides. When compound ( B )is heated, a gas is produced that changes the color of paper wetted with acidified potassium dichromate. Which of the following is a correct expression for compounds A and B?

	Compound (A)	Compound (B)
a	iron II sulfate	iron III hydroxide
b	Iron II Carbonate	Iron III Chloride
c	Iron II oxalate	Iron II sulfate
d	Iron II sulfate	Iron III oxide

58 2nd <sup>21</sup> on adding diluted sulphuric acid to test tube contains a mixture of iron (II) oxide and iron (III) oxide , at the end of reaction the component of the test tube will be .....

- a iron (III) sulphate , iron (III) oxide and hydrogen
- b iron (II) oxide , iron (III) oxide and sulphur dioxide
- c iron (II) sulphate and iron (III) oxide and water
- d iron (III) sulphate , hydrogen and sulphur dioxide

59 Exp <sup>23</sup> Determine the substances X , Y and Z according to the following scheme of reactions

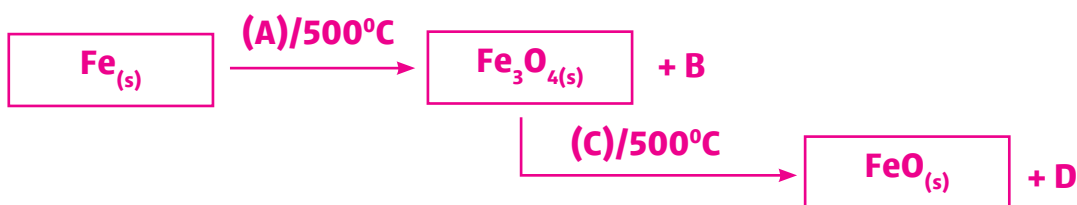


	(X)	(Y)	(Z)
a	FeSO <sub>4</sub>	FeCl <sub>2</sub>	Fe(OH) <sub>3</sub>
b	FeCO <sub>3</sub>	FeCl <sub>3</sub>	Fe(OH) <sub>2</sub>
c	FeCO <sub>3</sub>	FeCl <sub>2</sub>	Fe(OH) <sub>2</sub>
d	FeSO <sub>4</sub>	FeCl <sub>3</sub>	Fe(OH) <sub>3</sub>

60 1st <sup>21</sup> Which of the following is a product of the reaction between conc. sulfuric acid and iron but not with iron mixed oxide ?

- a H<sub>2</sub>O
- b FeSO<sub>4</sub>
- c SO<sub>2</sub>
- d Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>

61 2nd <sup>22</sup> According to the following diagram



The substances (A) ,(B), (C) and (D) are.....

	A	B	C	D
a	H <sub>2</sub> O <sub>(v)</sub>	CO <sub>2(g)</sub>	H <sub>2(g)</sub>	CO <sub>2(g)</sub>
b	O <sub>2(g)</sub>	CO <sub>(g)</sub>	H <sub>2(g)</sub>	H <sub>2</sub> O <sub>(v)</sub>
c	H <sub>2</sub> O <sub>(v)</sub>	H <sub>2(g)</sub>	CO <sub>(g)</sub>	CO <sub>2(g)</sub>
d	O <sub>2(g)</sub>	H <sub>2</sub> O <sub>(v)</sub>	CO <sub>(g)</sub>	CO <sub>2(g)</sub>

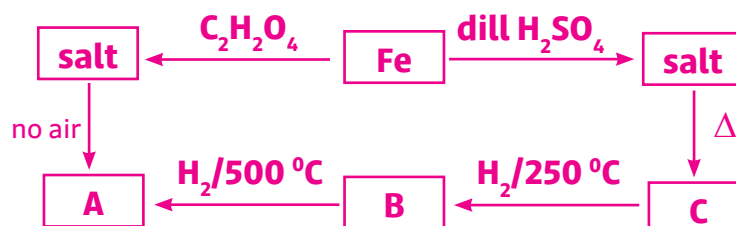
62 2nd<sup>22</sup> According to the following diagram:  $A \xrightleftharpoons[\text{Reduction}]{\text{Oxidation}} B$   
 one of the following is correct for (A) and (B) as iron compounds

- (a) (A)  $Fe_2O_3$ , (B) FeO
- (b) (A)  $FeSO_4$ , (B)  $Fe_2(SO_4)_3$
- (c) (A)  $Fe_3O_4$ , (B) FeO
- (d) (A)  $(COO)_2Fe$ , (B)  $FeSO_4$

63 1st<sup>23</sup> Which of the following processes occurs to the iron (II) oxalate respectively to produce iron?.....

- (a) oxidation - reduction - thermal decomposition
- (b) thermal decomposition - oxidation - reduction
- (c) reduction - oxidation - thermal decomposition
- (d) thermal decomposition - reduction - oxidation

64 1st<sup>23</sup> The following scheme represents the reactions of iron and its oxides at suitable conditions:



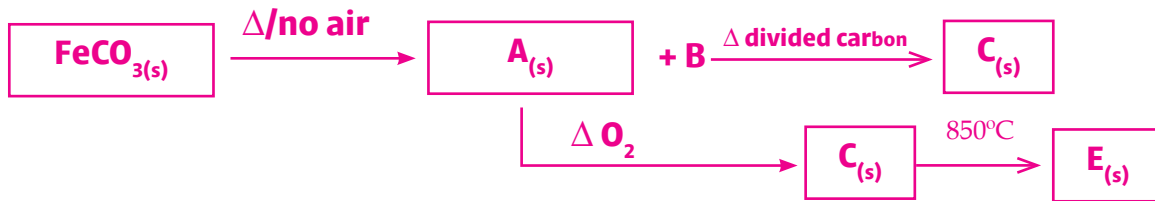
Which of the following illustrates (A) , (B) , (C)

	A	B	C
(a)	$Fe_3O_4$	FeO	$Fe_2O_3$
(b)	FeO	$Fe_3O_4$	$Fe_2O_3$
(c)	FeO	$Fe_2O_3$	$Fe_3O_4$
(d)	$Fe_2O_3$	$Fe_3O_4$	FeO

65 Exp<sup>21</sup> Which of the following processes are suitable to obtain red iron oxide ?

- a Heating iron in air for short time
- b Adding dil sulfuric acid to iron II oxide then heat the product
- c Heating iron II carbonate
- d Passing stream of hot water vapor over red hot iron at 500 C

66 2nd<sup>23</sup> The following scheme represents some of reactions at suitable conditions



- a (A):  $\text{Fe}_2\text{O}_3$  & (C): Fe & (E): FeO
- b (A): FeO & (C):  $\text{Fe}_2\text{O}_3$  & (E): Fe
- c (A):  $\text{Fe}_3\text{O}_4$  & (C): FeO & (E): Fe
- d (A): FeO & (C):  $\text{Fe}_3\text{O}_4$  & (E):  $\text{Fe}_2\text{O}_3$

67 Exp<sup>23</sup> adding dil sulfuric acid to X , salt solution was formed and after a period of time ammonia solution was poured forming ppt which of the following is correct

	X	salt	ppt
a	FeO	$\text{FeSO}_4$	$\text{Fe}(\text{OH})_2$
b	$\text{Fe}_2\text{O}_3$	$\text{Fe}_2(\text{SO}_4)_3$	$\text{Fe}_2\text{O}_3$
c	$\text{Fe}_3\text{O}_4$	$\text{Fe}_2(\text{SO}_4)_3$	$\text{Fe}(\text{OH})_2$
d	FeO	$\text{FeSO}_4$	$\text{Fe}(\text{OH})_3$

Essay :

**68** Exp <sup>23</sup> X,Y from first series the oxide of X used as catalyst of oxygen preparation and Y forms alloy with X which of these oxides has the highest Magnetic moment with explaining

**69** 2nd <sup>22</sup> Study the following table which illustrates the electronic configuration of cations of some elements from the previous cations,

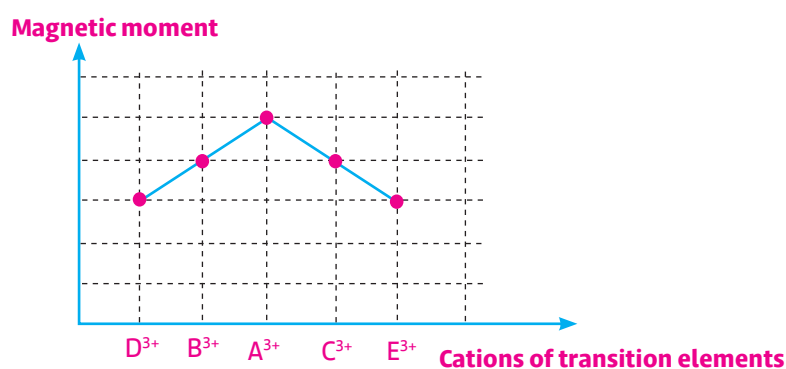
Electronic configuration	Cation
<sup>18</sup> Ar: 3d <sup>7</sup>	A <sup>+2</sup>
<sup>18</sup> Ar: 3d <sup>10</sup>	B <sup>+2</sup>
<sup>18</sup> Ar:	C <sup>+3</sup>
<sup>18</sup> Ar: 3d <sup>4</sup>	D <sup>+3</sup>

1-find: a) element has the highest magnetic moment

b) element has the lowest magnetic moment

2- Which of the previous cations, its all compounds are colorless?

**70** 1st <sup>23</sup> From the following graph which illustrates the relation between magnetic moment and some cations of first transition series in sequence

**Deduce:**

- magnetic properties for cations B<sup>6+</sup> , D<sup>6+</sup>
- the cations which their elements are used to decrease activation energy

# Chapter 2

## Previous Exams until 2024

### Anions detection

1 Exp <sup>21</sup> You have Pairs of the following salts :

- (1) Sodium nitrite and sodium carbonate
- (2) Sodium sulphite and sodium sulphate
- (3) Sodium sulphate and potassium phosphate
- (4) Potassium iodide and copper II sulphate

Which of the previous pairs we can use dilute hydrochloric acid to distinguish between them separately ?

- a (1) and (3)     
  b (1) and (2)     
  c (3) and (4)     
  d (2) and (4)

2 Exp <sup>21</sup> (A) and (B) are 2 solutions of potassium salts , when adding silver nitrate solution to both of them , a yellow precipitate is formed for both of them then by adding dilute nitric acid to the precipitate of both of them , we found that the precipitate formed from (A) solution dissolves in the acid while the precipitate formed from (B) solution does not dissolve in the acid The anions of (A) and (B) salts respectively are .....

Choices	Anion of (A) salt	Anion of (B) salt
<input type="radio"/> a	Phosphate	Iodide
<input type="radio"/> b	Iodide	Phosphate
<input type="radio"/> c	Bromide	Chloride
<input type="radio"/> d	Chloride	Bromide

3 Exp <sup>21</sup> When diluted HCl is added to solid salt has a chemical formula (A<sub>2</sub>X) a gas evolves which forms a black ppt with wet paper by (Y<sub>2</sub>B) solution . The anion (Y) is .....

- a S<sup>2-</sup>     
  b CH<sub>3</sub>COO<sup>-</sup>     
  c SO<sub>3</sub><sup>2-</sup>     
  d HCO<sub>3</sub><sup>-</sup>

4 Exp <sup>21</sup> If you know that KMnO<sub>4</sub> is a very strong oxidizing agent .

The colour of acidified KMnO<sub>4</sub> is discharged when it is added to solution of .....

- a NaNO<sub>3</sub> , Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>     
  b NaNO<sub>3</sub> , FeSO<sub>4</sub>
- c KNO<sub>2</sub> , Fe<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>     
  d NaNO<sub>2</sub> , FeSO<sub>4</sub>

5 Exp <sup>21</sup> If you have a mixture of ( $\text{BaSO}_4$ ,  $\text{Ba}_3(\text{PO}_4)_2$ ) Which of the following is correct ?

- a They can be separated by adding water then filtration
- b They can be separated by adding dil HCl then filtration
- c  $\text{BaSO}_4$  doesn't dissolve in water but it dissolves in dil HCl
- d  $\text{Ba}_3(\text{PO}_4)_2$  is soluble in both of water and dil HCl

6 When silver nitrate solution is added to the 2 salt solutions (A) and (B), 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 conc ammonia solution.

then, the two precipitates (X) and (Y) respectively are .....

Choices	(X)	(Y)
a	AgCl	AgBr
b	AgCl	AgI
c	AgBr	AgI
d	AgI	$\text{BaSO}_4$

7 1st <sup>21</sup> Which one of the following can be used to distinguish between the solid salt of sodium sulphide and sodium sulphate ?

- a  $\text{AgNO}_3(\text{s})$
- b  $\text{Ca}(\text{OH})_2(\text{aq})$
- c  $\text{HCl}(\text{aq})$
- d  $\text{NaOH}(\text{aq})$

8 1st <sup>21</sup>

When silver nitrate solution is added to two salts solution (A) and (B), a ppt is formed with salt solution (A) and no ppt. is formed with salt solution (B), the anions of the 2 salts respectively are .....

Choices	(A)	(B)
a	sulphide	Nitrite
b	Nitrite	Sulphide
c	Bicarbonate	Nitrite
d	Nitrite	Bicarbonate

- 9 1st<sup>21</sup> When conc sulphuric acid is added to two salts , a gas (X) evolves which turns a paper wetted by starch yellow, with the other one : a gas (Y) evolves which turns a paper wetted by starch blue , the two gases are .....

Choices	(X)	(Y)
a	$\text{NO}_{2(g)}$	$\text{I}_{2(v)}$
b	$\text{HBr}_{(g)}$	$\text{HI}_{(g)}$
c	$\text{HCl}_{(g)}$	$\text{Br}_{2(v)}$
d	$\text{Br}_{2(v)}$	$\text{I}_{2(s)}$

- 10 1st<sup>21</sup> When  $\text{AgNO}_3$  solution is added to the salts solutions (X) and (Y) , a yellow precipitate is formed with both of them , when ammonia solution is added to the 2 precipitate , the precipitate disappears in case of salt solution (Y) , and doesn't change in case of salt solution (x) , so the two salts (x) and (y) are .....

Choices	(X)	(Y)
a	$\text{NaI}$	$\text{Na}_3\text{PO}_4$
b	$\text{NaCl}$	$\text{NaBr}$
c	$\text{NaNO}_3$	$\text{Na}_2\text{SO}_4$
d	$\text{NaNO}_2$	$\text{NaNO}_3$

- 11 Exp<sup>21</sup> Dilute HCl can be used to detect both of .....

a  $\text{NO}_2^-$  ,  $\text{Hg}^+$       b  $\text{Br}^-$  ,  $\text{Hg}^+$       c  $\text{PO}_4^{3-}$  ,  $\text{Pb}^{2+}$       d  $\text{SO}_4^{2-}$  ,  $\text{Ag}^+$

- 12 1st<sup>21</sup> When copper II sulphate solution reacts with gas (A) in acidic medium a black precipitate is formed , and when silver nitrate solution reacts with solution (B) a black precipitates is formed too . So (A) and (B) are .....

Choices	(A)	(B)
a	$\text{CO}_2$	$\text{NaBr}$
b	$\text{H}_2\text{S}$	$\text{NaI}$
c	$\text{H}_2\text{S}$	$\text{Na}_2\text{S}$
d	$\text{SO}_2$	$\text{NaCl}$

13 2nd <sup>21</sup> When adding diluted hydrochloric acid to each of 3 solid salts (A, B and C) separately, gas evolves in case of (A), gas evolves and ppt. is formed in case of (B), while no reaction occurs in case of (C), so the anions of A, B and C are .....

- (a) A:  $\text{NO}_2^-$ , B:  $\text{S}_2\text{O}_3^{2-}$ , C:  $\text{SO}_4^{2-}$       (b) A:  $\text{NO}_3^-$ , B:  $\text{S}^{2-}$ , C:  $\text{PO}_4^{3-}$   
 (c) A:  $\text{Cl}^-$ , B:  $\text{S}_2\text{O}_3^{2-}$ , C:  $\text{SO}_4^{2-}$       (d) A:  $\text{CO}_3^{2-}$ , B:  $\text{NO}_3^-$ , C:  $\text{PO}_4^{3-}$

14 2nd <sup>21</sup> Ammonium Carbonate solution is used to distinguish between all the following cations except .....

- (a)  $\text{Na}^+$ ,  $\text{Ca}^{2+}$       (b)  $\text{K}^+$ ,  $\text{Mg}^{2+}$       (c)  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$       (d)  $\text{K}^+$ ,  $\text{Fe}^{2+}$

15 1st <sup>22</sup> Three salt solutions A, B, C, the solution of salt X was added to each separately:

In case of A: formation of white precipitate turns to black by heating

In case of B: formation of yellow precipitate does not dissolve in ammonia solution

In case of C: yellow precipitate dissolves in ammonia solution

- (a) X:  $\text{AgNO}_3$ , A:  $\text{SO}_3^{2-}$ , B:  $\text{PO}_4^{3-}$ , C:  $\text{I}^-$       (b) X:  $\text{KMnO}_4$ , A:  $\text{I}^-$ , B:  $\text{SO}_3^{2-}$ , C:  $\text{PO}_4^{3-}$   
 (c) X:  $\text{Na}_2\text{S}_4\text{O}_6$ , A:  $\text{PO}_4^{3-}$ , B:  $\text{Cl}^-$ , C:  $\text{NO}_3^-$       (d) X:  $\text{AgNO}_3$ , A:  $\text{SO}_3^{2-}$ , B:  $\text{I}^-$ , C:  $\text{PO}_4^{3-}$

16 2nd <sup>21</sup> When adding a strong mineral concentrated acid to two salts (X and Y) separately, a gas evolves in case of salt (X) that has different colour than the colour of the gas evolves in case of (Y) so the choice that doesn't represent this observations is .....

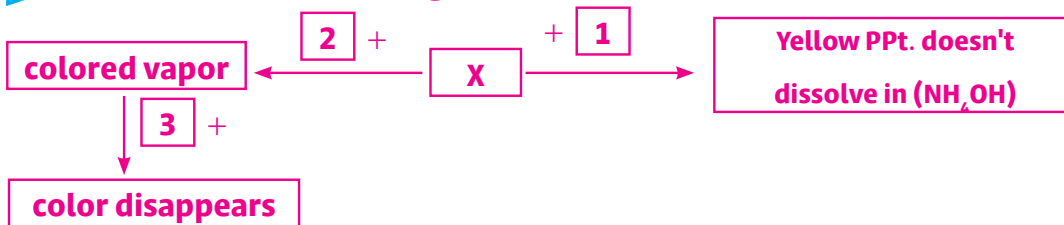
- (a) (X) potassium bromide, (Y): potassium iodide  
 (b) (X) potassium bromide, (Y): potassium nitrates  
 (c) (X) potassium chloride, (Y): potassium carbonate  
 (d) (X) potassium iodide, (Y): potassium nitrates

17 2nd <sup>23</sup> Which of the following ( $\text{NaOH}_{(aq)}$ ,  $\text{BaCl}_{2(aq)}$  and  $\text{HCl}_{(aq)}$ ) is used to distinguish between aluminum sulphate solution and iron II chloride solution?.....

- (a)  $\text{HCl}_{(aq)}$  and  $\text{BaCl}_{2(aq)}$       (b)  $\text{NaOH}_{(aq)}$  only      (c)  $\text{HCl}_{(aq)}$  only      (d)  $\text{NaOH}_{(aq)}$  and  $\text{BaCl}_{2(aq)}$



21 1st<sup>23</sup> All the following reactions occurred at suitable conditions:



Then the compounds: (1), (2) and (3) are.....

- (a) (1):  $AgNO_3$ , (2):  $HCl$ , (3):  $Na_2SO_3$   
 (b) (1):  $K_3PO_4$ , (2):  $HBr$ , (3):  $Na_2S_2O_3$   
 (c) (1):  $AgNO_3$ , (2):  $H_2SO_4$ , (3):  $Na_2S_2O_3$   
 (d) (1):  $Na_3PO_4$ , (2):  $HI$ , (3):  $Na_2SO_3$

22 1st<sup>22</sup> on adding diluted  $HCl$  to two salts A and B separately, with salt (A) a colorless and odorless gas evolved and with (B) a colorless gas evolved which turns into reddish brown at the mouth of the test tube, the anions of A and B are .....

- (a) A:  $HCO_3^-$ , B:  $NO_3^-$                       (b) A:  $SO_3^{2-}$ , B:  $NO_3^-$   
 (c) A:  $CO_3^{2-}$ , B:  $NO_2^-$                       (d) A:  $S^{2-}$ , B:  $NO_2^-$

23 1st<sup>22</sup> When adding calcium chloride solution to two salts X and Y on cold, the solution of salt X forms a white precipitate while the solution of salt Y does not make a precipitate, the two salts are: .....

- (a) X: sodium carbonate, Y: sodium bicarbonate  
 (b) X: sodium nitrite, Y: sodium thiosulfate  
 (c) X: sodium chloride, Y: sodium sulfite  
 (d) X: sodium nitrite, Y: sodium bicarbonate

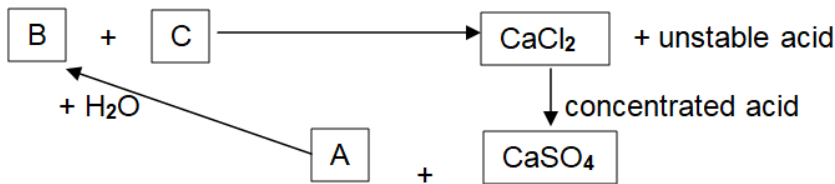
24 2nd<sup>23</sup> In the following diagram



The salt X is.....

- (a)  $Na_2SO_4$     (b)  $Na_2SO_3$     (c)  $Na_2S$     (d)  $Na_2S_2O_3$

25 2nd<sup>23</sup> The following reactions occur at suitable conditions



Then the compounds (A) and (C) are .....

- (a) (A):  $\text{HCl}_{(\text{aq})}$  & (C):  $\text{Ca}(\text{OH})_2$                       (b) (A):  $\text{HCl}_{(\text{g})}$  & (C):  $\text{CaCO}_3$   
 (c) (A):  $\text{HCl}_{(\text{g})}$  & (C):  $\text{Ca}(\text{OH})_2$                       (d) (A):  $\text{HCl}_{(\text{aq})}$  & (C):  $\text{CaCO}_3$

26 1st<sup>21</sup> When the gas (X) is passed through acidified salt solution (Y), a black precipitate is formed and on adding silver nitrate solution to the salt solution Y, a white ppt. is formed So, the gas (X) and the salt (Y) are.....

- (a) (X):  $\text{H}_2\text{S}$  & (Y):  $\text{NaI}$                                       (b) (X):  $\text{CO}_2$  & (Y):  $\text{CuCl}_2$   
 (c) (X):  $\text{NO}_2$  & (Y):  $\text{MgSO}_4$                                 (d) (X):  $\text{H}_2\text{S}$  & (Y):  $\text{CuCl}_2$

27 2nd<sup>22</sup> By adding hot conc.  $\text{H}_2\text{SO}_4$  to the solid salts A, B, C and D individually, the following observations

salt	The gas or fumes evolved
A	Colorless gas forms white cloud with a glass rod wet with $\text{NH}_4\text{OH}$
B	Orange red fumes turns a paper wet with starch yellow
C	Violet fumes turns a paper wet with starch blue
D	Reddish brown fumes increased by adding copper felling

in the table take place: one of the following is correct:

- (a) B: bromide salt & C: nitrate salt  
 (b) A: chloride salt & D: iodide salt  
 (c) D: nitrate salt & C: bromide salt  
 (d) A: chloride salt & D: nitrate salt

28 2nd<sup>21</sup> The anion that forms precipitate with both of ( $\text{Ba}^{2+}$ ,  $\text{Ag}^+$ ) cations is .....

- (a)  $\text{Cl}^-$                       (b)  $\text{HCO}_3^-$                       (c)  $\text{NO}_3^-$                       (d)  $\text{PO}_4^{3-}$

29 Exp <sup>21</sup> Which of the following standard solutions is used to determine the concentration of silver nitrate ?.....

- (a)  $\text{Na}_3\text{PO}_4$       (b)  $\text{NaHCO}_3$       (c)  $\text{HNO}_3$       (d)  $\text{CH}_3\text{COOK}$

30 1st <sup>23</sup> A solution with  $\text{pOH}=11$  is added to two indicators (X and Y), notice that:

(X): colorless, (Y): red color, So the two indicators (X) and (Y) are.....

- (a) (X) is phenolphthalein, (Y) is methyl orange  
(b) (X) is phenolphthalein, (Y) is bromothymol  
(c) (X) is methyl orange, (Y) is litmus.  
(d) (X) is litmus, (Y) is bromothymol

31 Exp <sup>23</sup> Which one from the following salts forming a mixture of gases on adding concentrated sulphuric acid to it?.....

- (a) potassium carbonate  
(b) potassium phosphate  
(c) sodium chloride  
(d) sodium bromide

32 Exp <sup>23</sup> on adding dilute HCl to two different salts individually, two gases evolve that can be oxidised, so the salts are.....

- (a)  $\text{K}_2\text{S}_2\text{O}_3/\text{KHCO}_3$   
(b)  $\text{K}_2\text{S}/\text{KNO}_2$   
(c)  $\text{K}_2\text{CO}_3/\text{KNO}_2$   
(d)  $\text{K}_2\text{SO}_3/\text{KNO}_2$



37 Exp <sup>23</sup> which one of the following salts gives a gas and a precipitate on adding hydrochloric acid at suitable conditions ?

- a)  $\text{NaNO}_2$
- b)  $\text{AgNO}_3$
- c)  $\text{HgNO}_3$
- d)  $\text{Pb}(\text{NO}_2)_2$

38 2nd <sup>21</sup> During an experiment that detects the cation of salt (X) , some of NaOH solution is added . a ppt is formed , then by adding more of the reagent the precipitate disappears , the salt solution (x) is .....

- a)  $\text{Al}(\text{NO}_3)_3$
- b)  $\text{FeSO}_4$
- c)  $\text{FeCl}_3$
- d)  $\text{CuSO}_4$

39 1st <sup>22</sup> Passing hydrogen sulfide gas through an acidic solution of a salt, a black precipitate was formed and when adding barium chloride to a solution of the same salt a white precipitate is formed, the salt is .....

- a)  $\text{Na}_3\text{PO}_4$
- b)  $\text{CuSO}_4$
- c)  $(\text{NH}_4)_3\text{PO}_4$
- d)  $\text{CuCl}_2$

40 1st <sup>21</sup> One of students add ammonium hydroxide reagent to aqueous solution of iron (II) salts , the color of the formed ppt. differs from the expected color. The probable reason is .....

- a) the used reagent is wrong
- b) the reagent is a strong base
- c) the reaction need to be heated
- d) the salt is mixed with other salts

41 2nd <sup>22</sup> On adding potassium hydroxide to a solution of ironII sulphate (it is prepared a long time ago) .....precipitate is formed

- a) white gelatinous
- b) white green
- c) green
- d) reddish brown

42 2nd<sup>22</sup> By using the following table:

Reagent	Solution A	Solution B
Acidified $\text{KMnO}_4$	Color disappears	Color disappears
$\text{NaOH}_{(aq)}$	No precipitate	Precipitate is formed

The salts A & B are.....

- (a) A:  $\text{NaNO}_2$  & B:  $\text{FeSO}_4$
- (b) A:  $\text{NaNO}_3$  & B:  $\text{FeSO}_4$
- (c) A:  $\text{NaNO}_2$  & B:  $\text{Fe}_2(\text{SO}_4)_3$
- (d) A:  $\text{NaNO}_3$  & B:  $\text{Fe}_2(\text{SO}_4)_3$

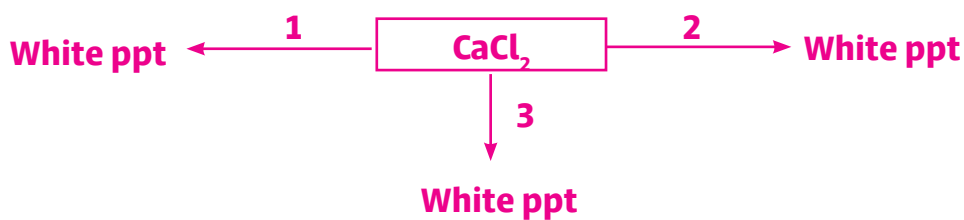
43 1st<sup>23</sup> The following table for some chemical compounds:

(A)	(B)	(C)	(D)
$\text{Al}(\text{NO}_3)_3$	$\text{FeSO}_4$	$\text{NH}_4\text{OH}$	$\text{HCl}$

Which of the following choices is correct?.....

- (a) (D) detects anion of (B), anion of (A)
- (b) (C) detects cation of (B), cation of (A)
- (c) (A) detects anion of (D), anion of (C)
- (d) (B) detects cation of (C), cation of (D)

44 1st<sup>23</sup> From the following scheme:



,So the compounds: (1), (2) and (3) are.....

- (a) (1):  $\text{Pb}(\text{NO}_3)_2$ , (2):  $\text{NaHCO}_3$ , (3):  $\text{Na}_2\text{SO}_4$
- (b) (1):  $\text{Na}_2\text{SO}_4$ , (2):  $\text{NH}_4\text{NO}_3$ , (3):  $\text{K}_2\text{SO}_4$
- (c) (1):  $\text{AgNO}_3$ , (2):  $(\text{NH}_4)_2\text{CO}_3$ , (3):  $\text{Na}_2\text{SO}_4$
- (d) (1):  $\text{AgNO}_3$ , (2):  $\text{K}_2\text{SO}_4$ , (3):  $\text{KHCO}_3$

45 2nd<sup>22</sup> Ammonium carbonate solution can be used to detect all the following cations except...

- (a)  $\text{Ca}^{2+}$                       (b)  $\text{Mg}^{2+}$                       (c)  $\text{Na}^+$                       (d)  $\text{Ag}^{+2}$

46 Exp<sup>21</sup> If you have the following compounds solutions :

- (1) : Aluminum chloride                      (2) : Iron (III) chloride  
(3) : Iron (II) chloride                      (4) : Hydrogen chloride

Which of the following compounds can be used to distinguish between sodium hydroxide and ammonium hydroxide solution ?when the suitable conditions are available ?

- (a) (1) , (2) , (3)                      (b) (1) , (2) , (4)                      (c) (2) , (3)                      (d) (1) , (4)

47 Exp<sup>23</sup> Which of the following solutions is used to distinguish between the salt solutions of  $(\text{NH}_4)_2\text{SO}_4$  and  $\text{MgSO}_4$

- (a)  $\text{NaNO}_3$                       (b)  $\text{KCl}$                       (c)  $\text{Na}_2\text{CO}_3$                       (d)  $\text{Ca}(\text{HCO}_3)_2$

## Problems

48 Exp<sup>21</sup> 14.3 gm of hydrated sodium carbonate  $\text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O}$  dissolved in water , then volume of the solution is completed to 1 Litre , if 25 ml of this solution is neutralized with 25 ml of 0.1 M of hydrochloric acid so , the percentage of water of crystallization will be equal.....

(Na = 23, O = 16, C = 12)

- (a) 31.65 %                      (b) 15.73 %                      (c) 25.87%                      (d) 62.93%

49 Exp<sup>21</sup> A sample of a mixture of sodium chloride and sodium phosphate salts its mass is 10 gm dissolved in water , then an excess of barium chloride solution is added to it , a precipitate is formed its mass is 6 gm so. The percentage of sodium phosphate in this sample will be equal .....

(Ba=137, Na=23, P=31, O=16)

- (a) 65.5%                      (b) 49.05%                      (c) 32.7%                      (d) 16.35%

50 1st <sup>21</sup> 3.4 gm of impure potassium chloride dissolved in water , and excess of silver nitrate solution is added to the solution , 6.7 gm of silver chloride precipitated so percentage of chlorine in the sample is .....

(Ag = 39, Cl = 35.5, Ag = 108)

- (a) 24.5 %      (b) 46.7 %      (c) 48.7 %      (d) 94.1 %

51 Exp <sup>21</sup> Titration process is done by using 20 ml of NaOH solution 0.1 M , with HCl solution its concentration 0.1 M , if hydrochloric acid is replaced by sulphuric acid its concentration is 0.1 M so, The volume of the used sulphuric acid that is used will be .....

- (a) equal the volume of HCl      (b) double the volume of HCl  
(c) half the volume of HCl      (d) double the volume of the alkali NaOH

52 Exp <sup>21</sup> 20 ml of 0.1 mol/L of sodium hydroxide solution is added to 10 ml of 0.2 mol/l sulphuric acid solution , Which of the following choices expresses the type of the resultant solution and its effects on the indicator colour ?

Choices	Type of solution	The effect on indicator colour
(a)	neutral	turns bromothemol blue into green
(b)	Acidic	turns phenol phthaline into red
(c)	Acidic	turns methyl orange into red
(d)	Alkaline	turns litmus solution into blue

53 1st <sup>22</sup> 4 gm of impure sodium chloride dissolved in water and excess of silver nitrate solution is added to it , 3.52 gm of silver chloride precipitated , so the mass percentage of chloride ion in the sample equals .....

(Ag=108, Cl=35.5)

- (a) 20.8 %      (b) 21.77 %      (c) 22.8 %      (d) 19.77 %

54 2nd <sup>22</sup> A sample of impure potassium sulfate has a mass 4g was added to its solution and an excess amount of Barium chloride solution a precipitate was formed with a mass 4.66 g. So, the percentage of impurities in the sample equal:

(Ba = 137 , S = 32 , O = 16 , K = 39 , H = 1 )

- (a) 87% %      (b) 13 %      (c) 67.5 %      (d) 32.5 %

- 55 1st<sup>21</sup> Titration of NaOH solution with diluted sulphuric acid with the same concentration, at the end point the volume of the used acid will be .....
- (a) equal the volume of the alkali solution  
 (b) half the volume of the alkali solution  
 (c) double the volume of the alkali solution  
 (d) four times the volume of the alkali solution
- 56 2nd<sup>22</sup> 3g of a sample of impure iron(III) chloride dissolved in water then adding third analytical group reagent, 1.6g of a precipitate is formed. So, the iron percentage in the sample is.....
- (H=1, Fe=56, Cl=35.5, O=16)
- (a) 80.78%      (b) 62.76%      (c) 27.9%      (d) 33.1%
- 57 2nd<sup>22</sup> 0.4g of a mixture of sodium carbonate and sodium chloride is titrated with 20 ml of 0.05 M Hydrochloric acid, the percentage of sodium chloride in the sample is.....
- (Na=23, O=16, H=1, C=12, Cl=35.5)
- (a) 86.75%      (b) 73.5%      (c) 26.5%      (d) 13.25%
- 58 2nd<sup>21</sup> on adding 200 ml of distilled water to 0.5L of NaOH solution its conc 0.1M so conc of the solution becomes .....
- (a) 0.714 M      (b) 0.0714 M      (c) 7.14 M      (d) 4.17 M
- 59 2nd<sup>21</sup> 2 gm of impure barium chloride dissolved in water, excess of lead(II) nitrate is added to it, the mass of ppt. is 1 gm, so the percentage of chloride ion in the sample equals ..... (Cl = 35.5, Ba = 137, Pb = 207)
- (a) 19.31%      (b) 46.3%      (c) 28.3%      (d) 12.77%
- 60 1st<sup>22</sup> if 4 gm of a mixture of calcium chloride and calcium hydroxide was titrated with 100 ml of 0.5M HCl. Calculate the percentage of calcium hydroxide in the mixture.
- [Ca = 40, O = 16, Cl = 35.5, H = 1]
- (a) 7.5%      (b) 46.25%      (c) 53.57%      (d) 92.5%

61 2nd<sup>23</sup> On adding an excess amount of hot concentrated sulphuric acid to 0.1 mole of magnetic iron oxide then adding excess amount of sodium hydroxide to the products. So, the total mass of the formed precipitates equal.....grams  
 $[\text{Fe}(\text{OH})_2=90, \text{Fe}(\text{OH})_3=107]$

- (a) 30.4                      (b) 19.7                      (c) 152                      (d) 60.8

62 1st<sup>23</sup> (1L) from calcium chloride solution (0.3M) is added to (1L) of sulphuric acid (0.4M). Then barium hydroxide is added to neutralize the excess acid forming precipitate. ,So the number of moles from excess acid and the mass of formed precipitate are...

molar mass of: ( $\text{H}_2\text{SO}_4=98$ ), ( $\text{Ba}(\text{OH})_2=171$ ), ( $\text{Ba}_5\text{O}_4=233$ )

- (a) 0.2 mole, 46.6 g                      (b) 0.1 mole, 93.2 g  
 (c) 0.1 mole, 23.3 g                      (d) 0.3 mole, 69.9 g

63 Exp<sup>23</sup> 0.125 mol from hot conc. sulphuric acid reacts with excess sodium nitrate , the produced nitric acid is neutralized with 200 ml of NaOH so the concentration of sodium hydroxide equals

Molar mass of: ( $\text{H}_2\text{SO}_4=98$ ), ( $\text{Ba}(\text{OH})_2=171$ ), ( $\text{Ba}_5\text{O}_4=233$ )

- (a) 6.25 M                      (b) 0.12 M  
 (c) 0.625 M                      (d) 1.25 M

64 Exp<sup>23</sup> When adding NaOH solution to 10ml of Aluminium sulfate solution 0.1M to obtain a clear solution , the mass of NaOH needed for this reactions is

- (a) 2.4 g                      (b) 320 g  
 (c) 0.32 g                      (d) 0.24 g

# Chapter 3

## Previous Exams until 2024

### Rate

1 *1st*<sup>22</sup> 4 Flasks have equal volumes inside them put the quantities shown in the figure



so the correct arrangement of the reactions according to its rate

- a)  $B > A > C > D$     
 b)  $C > B > D > A$     
 c)  $B > C > A > D$     
 d)  $D > A > B > C$

2 *2nd*<sup>22</sup> One of the following reactions is the faster.....

- a)  $Mg_{(s)}(\text{block}) + 2HCl_{(aq)} = MgCl_{2(aq)} + H_{2(g)}$   
 b)  $FeSO_{4(aq)} + 2NaOH_{(aq)} = Fe(OH)_{2(s)} + Na_2SO_{4(aq)}$   
 c)  $CH_3COOH_{(l)} + CH_3OH_{(l)} = CH_3COOCH_{3(aq)} + H_2O_{(l)}$   
 d)  $Fe_{(s)} + 3/2O_{2(g)} + 3H_2O_{(l)} = 2Fe(OH)_{2(s)}$

3 *1st*<sup>23</sup> In the following equilibrium reaction:  $A_{2(g)} + B_{2(g)} \rightleftharpoons 2AB_{(g)}$

if the rate of formation of AB gas equal (3L/sec) at 25 °C, When the temperature of the reaction is increased to (45 °C), the rate of formation of AB gas is equal to.....

- a) 12 L/sec    
 b) 6 L/sec    
 c) 5.4 L/sec    
 d) 9 L/sec

4 *Exp*<sup>21</sup> On performing a reaction of active metal (X) With strong mineral acid (Y) the reaction takes a specific time, What is the modification which can be performed to make the reaction occurs in a shorter time ?

- a) Dividing the metal  
 b) Decreasing the acid volume  
 c) Decreasing the reaction temperature  
 d) Increasing the pressure

5 Exp <sup>21</sup> In the following reaction:  $\text{Mg}_{(s)} + \text{HCl}_{(aq)} \longrightarrow \text{MgCl}_{2(aq)} + \text{H}_{2(g)}$

Which of the following factors increases the rate of reaction?....

- (a) crushing of magnesium                      (b) decreasing the concentration of HCl  
 (c) cooling    (d) increasing the vessel volume of the reaction

## Types of Reactions

6 Exp <sup>23</sup> One of the following is irreversible reaction....

- (a)  $\text{CH}_3\text{COOH}_{(aq)} + \text{H}_2\text{O}_{(l)} = \text{CH}_3\text{COO}^-_{(aq)} + \text{H}_3\text{O}^+_{(aq)}$   
 (b)  $\text{AgCl}_{(s)} = \text{Ag}^+_{(aq)} + \text{Cl}^-_{(aq)}$  [saturated solution]  
 (c)  $\text{N}_2\text{O}_{4(g)} = 2\text{NO}_{2(g)}$  [closed container]  
 (d)  $\text{Zn}_{(s)} + 2\text{HCl}_{(aq)} = \text{ZnCl}_{2(aq)} + \text{H}_{2(g)}$

7 Exp <sup>21</sup> Study the following four reactions:

- A)  $\text{AgNO}_{3(aq)} + \text{NaBr}_{(aq)} = \text{AgBr}_{(s)} + \text{NaNO}_{3(aq)}$   
 B)  $2\text{NO}_{(g)} + \text{O}_{2(g)} = 2\text{NO}_{2(g)}$  (Closed Vessel)  
 C)  $\text{CH}_3\text{COOH}_{(l)} + \text{C}_2\text{H}_5\text{OH}_{(l)} = \text{CH}_3\text{COOC}_2\text{H}_5_{(aq)} + \text{H}_2\text{O}_{(l)}$   
 d)  $\text{N}_{2(g)} + 3\text{H}_{2(g)} = 2\text{NH}_{3(g)}$  (Closed Vessel)

Which of the previous reactions is considered a Complete reaction ?

- (a) (A)                      (b) (B)                      (c) (C)                      (d) (D)

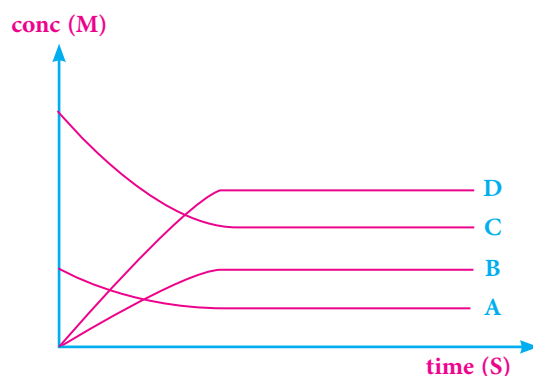
8 2nd <sup>21</sup> All of the following reactions are reversible except .....

- (a)  $\text{CO}_{2(g)} + \text{H}_{2(g)} = \text{CO}_{(g)} + \text{H}_2\text{O}_{(v)}$  (Closed container )  
 (b)  $\text{CH}_3\text{COOH}_{(l)} + \text{C}_2\text{H}_5\text{OH}_{(l)} = \text{CH}_3\text{COOC}_2\text{H}_5_{(aq)} + \text{H}_2\text{O}_{(l)}$   
 (c)  $2\text{Na}_{(s)} + 2\text{HCl}_{(aq)} = 2\text{NaCl}_{(aq)} + \text{H}_{2(g)}$   
 (d)  $2\text{NO}_{2(g)} = \text{N}_2\text{O}_{4(g)}$  ( closed container )

9 2nd <sup>22</sup> Which of the following is a complete reaction ?

- (a)  $\text{CH}_3\text{COOH}_{(l)} + \text{H}_2\text{O}_{(l)} = \text{CH}_3\text{COO}^-_{(aq)} + \text{H}_3\text{O}^+_{(aq)}$   
 (b)  $\text{HCOOH}_{(aq)} + \text{CH}_3\text{OH}_{(aq)} = \text{HCOOCH}_3_{(aq)} + \text{H}_2\text{O}_{(l)}$   
 (c)  $\text{NaOH}_{(aq)} + \text{HCl}_{(aq)} = \text{NaCl}_{(aq)} + \text{H}_2\text{O}_{(l)}$   
 (d)  $\text{NH}_{3(aq)} + \text{H}_2\text{O}_{(l)} = \text{NH}_4^+_{(aq)} + \text{OH}^-_{(aq)}$

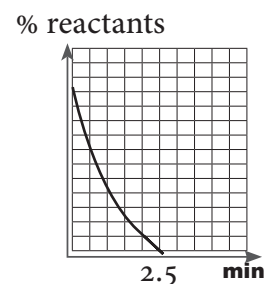
10 1st<sup>22</sup> which of the following choices correctly describes the given graph:



- (a)  $2A + B \rightleftharpoons 2C + 4D$                       (b)  $A + 3C \rightleftharpoons 2B + 4D$   
 (c)  $2A + B \longrightarrow 2C + 4D$                       (d)  $A + 3C \longrightarrow 2B + 4D$

11 Exp<sup>23</sup> Which of the following reactions expresses the opposite graph?

- (a) sodium chloride solution + silver nitrate solution  
 (b) Iron nail covered by oil  
 (c) Iron nail in water  
 (d) Pieces from magnesium + dil. hydrochloric acid



12 Exp<sup>23</sup> Which one of the following represents a complete reaction?....

- (a)  $\text{CH}_3\text{COOH}_{(aq)} + \text{NH}_4\text{OH}_{(aq)} = \text{CH}_3\text{COONH}_{4(aq)} + \text{H}_2\text{O}_{(l)}$   
 (b)  $\text{HCOOH}_{(aq)} + \text{H}_2\text{O}_{(l)} = \text{HCOO}^-_{(aq)} + \text{H}_3\text{O}^+_{(aq)}$   
 (c)  $\text{AgBr}_{(s)} = \text{Ag}^+_{(aq)} + \text{Br}^-_{(aq)}$   
 (d)  $\text{N}_{2(g)} + \text{O}_{2(g)} = 2\text{NO}_{(g)}$



17 2nd<sup>23</sup> In the following reaction:  $\frac{1}{2} \text{N}_{2(g)} + \frac{1}{2} \text{O}_{2(g)} + \text{E} \rightleftharpoons \text{NO}_{(g)}$

It is possible to increase the rate of dissociation of nitric oxide through

- a withdrawing nitrogen and increasing the temperature
- b adding oxygen and increasing the pressure
- c withdrawing nitrogen and decreasing the temperature
- d adding oxygen and decreasing the pressure

18 1st<sup>22</sup> adding HCl to the equilibrium system expressed by the following equation :



Which of the following changes takes place is: .....

- a  $[\text{Ag}^+]$  increases and the amount of  $\text{AgCl}_{(s)}$  decreases
- b The value of  $K_c$  increases
- c The Value of  $K_c$  decreases
- d  $[\text{Ag}^+]$  decreases and the amount of  $\text{AgCl}_{(s)}$  increases

19 Exp<sup>21</sup> The following equation represents a system at equilibrium state :



Which of the following changes takes place by adding drops of lead acetate to that system ?

- a The rate of backward reaction decreases and concentration of silver ions increases
- b The rate of forward reaction increases and concentration of chloride ions decreases
- c The rate of backward reaction increases and concentration of silver ions decreases
- d The rate of forward reaction decreases and concentration of chloride ions increases

20 Exp<sup>21</sup> In the opposite saturated solution :



All of the following decrease the solubility of AgCl when they are added to it except .....

- a  $\text{NH}_4\text{OH}_{(aq)}$
- b  $\text{AgNO}_3_{(aq)}$
- c  $\text{NaCl}_{(aq)}$
- d  $\text{HCl}_{(aq)}$

21 2nd<sup>21</sup> On adding a solution of substance y to a solution of substance X which has a pale yellow color a solution with a certain color appear and on adding excess of solution of substance (y) to the same reaction the produced color increases so the two substance (X) and (y) are .....

- (a) (X) : FeCl<sub>3</sub>      (y) : NH<sub>4</sub>SCN      (b) (X) : NH<sub>4</sub>SCN      (y) : FeCl<sub>3</sub>  
 (c) (X) : NH<sub>4</sub>OH      (y) : FeCl<sub>3</sub>      (d) (X) : FeCl<sub>3</sub>      (y) : NH<sub>4</sub>OH

22 2nd<sup>22</sup> In the following reaction :



So value of Kc increases when .....

- (a) the temperature decreases      (b) conc of H<sub>2</sub> gas increases  
 (c) conc of H<sub>2</sub> gas decreases      (d) temperature increases

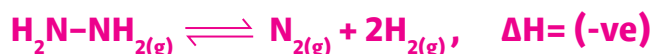
23 1st<sup>21</sup> In the following equilibrium reaction :



The value of equilibrium constant changes with the change of .....

- (a) The pressure and catalyst      (b) The temperature only  
 (c) The concentration and catalyst      (d) The pressure only

24 1st<sup>21</sup> In the following reaction :



The amount of evolved hydrogen gas can be increased by .....

- (a) increasing the temperature  
 (b) increasing the volume of the container  
 (c) adding excess of N<sub>2</sub> to the reaction to medium  
 (d) adding catalyst to the reaction medium

25 1st<sup>23</sup> In the following equilibrium reaction:  $4\text{NH}_{3(g)} + 3\text{O}_{2(g)} \rightleftharpoons 2\text{N}_{2(g)} + 6\text{H}_2\text{O}_{(g)}$ , on adding a few amount from a mixture of ( $\text{O}_2 + 2\text{N}_2$ ) to the reaction, so the reaction is activated to.....

- a) forward and  $[\text{NH}_3]$  is increased
- b) backward and  $[\text{O}_2]$  is decreased
- c) backward and  $[\text{NH}_3]$  is increased
- d) forward and  $[\text{N}_2]$  is decreased

26 Exp<sup>23</sup> adding drops of dil HCl to equilibrium system for sodium acetate solution causes

- a) decreasing the concentration of sodium cations
- b) decreasing the concentration of acetic acid
- c) increasing the concentration of sodium cations
- d) increasing the concentration of sodium acetate

## K- problems

27 Exp<sup>21</sup> When equal concentrations of  $\text{H}_2$  and  $\text{A}_2$  are mixed, the following equilibrium occurs :



If the value of  $[\text{HA}] = 1.563 \text{ M}$ , and the Equilibrium constant equal 40 so  $[\text{A}_2]$  equals

.....

- a) 62.52 M
- b) 0.039 M
- c) 0.247 M
- d) 42.52 M

28 Exp<sup>21</sup> The following equilibrium reaction :



Then value of  $K_{p_2}$  for this reaction :



- a) 67.29
- b) 76.92
- c) 61.79
- d) 82.6

- 29 2nd <sup>23</sup> During preparation of ammonia gas from its elements at a certain temperature, it is found that at Equilibrium

$$K_c = 3.7 \times 10^{-4}, [H_2] = 0.7 \text{ M}, [N_2] = 0.5 \text{ M} \text{ so } [NH_3] = \dots\dots\dots \text{ M}$$

- (a)  $63.36 \times 10^{-6}$       (b)  $7.8 \times 10^{-4}$       (c)  $3.9 \times 10^{-2}$       (d)  $7.96 \times 10^{-3}$

- 30 2nd <sup>21</sup> If value of equilibrium constant for this reaction :



So the value of Kc for the following reaction  $\frac{1}{2} H_{2(g)} + \frac{1}{2} Cl_{2(g)} \rightleftharpoons HCl_{(g)}$  equals

.....

- (a)  $2.2 \times 10^{32}$       (b)  $4.4 \times 10^{32}$   
(c)  $2.1 \times 10^{16}$       (d)  $1.1 \times 10^{16}$

- 31 2nd <sup>21</sup> In the following reaction:



When partial pressure of A, B at equilibrium as follows:

$$A = 0.213 \text{ atm}, \quad B = 0.213 \text{ atm}$$

So value of equilibrium constant for the reaction equals .....

- (a) 0.213      (b) 4.69      (c) 0.426      (d) 0.1065

- 32 1st <sup>21</sup> In the following Equilibrium reaction :  $I_{2(g)} + H_{2(g)} \rightleftharpoons 2HI_{(g)}$  The equilibrium constant for this reaction equals 1.55 and the concentration hydrogen iodide is 1.035 M , so the concentration of hydrogen and iodine respectively equals .....

- (a)  $[H_2] = 0.79\text{M}, [I_2] = 0.83 \text{ M}$       (b)  $[H_2] = 0.83\text{M}, [I_2] = 0.79 \text{ M}$   
(c)  $[H_2] = 0.83\text{M}, [I_2] = 0.83 \text{ M}$       (d)  $[H_2] = 0.135\text{M}, [I_2] = 0.135 \text{ M}$

- 33 1st <sup>21</sup> In the following equilibrium reaction :  $Br_{2(aq)} + H_{2(g)} \rightleftharpoons 2HBr_{(g)}$  If the partial pressure of bromine, hydrogen and hydrogen bromide gases are 0.5 atm, 1 atm, 1.5 atm respectively, So the equilibrium constant for dissociation of hydrogen bromide to its elements equals .....

- (a) 2.2      (b) 0.22      (c) 0.45      (d) 4.5

34 2nd <sup>22</sup> In the following reactions: 1)  $\text{N}_2\text{O}_{4(g)} \rightleftharpoons 2\text{NO}_{2(g)}$ ,  $K_{c1}$



So, the mathematical relation between the equilibrium constants is.....

- (a)  $K_{c1} + K_{c2} = 1$  (b)  $K_{c1} \times K_{c2} = 1$   
 (c)  $K_{c1} \div K_{c2} = 1$  (d)  $K_{c1} - K_{c2} = 1$

35 Exp <sup>23</sup> the following equilibrium reaction:  $4\text{NH}_{3(g)} + 3\text{O}_{2(g)} \rightleftharpoons 2\text{N}_{2(g)} + 6\text{H}_2\text{O}_{(v)}$ ,  $K_p = 15.47$  If you know that partial pressure of : ammonia = 1.5 atm., oxygen = 1.16 atm, water vapor = 2.4 atm.

Calculate the partial pressure of Nitrogen

- (a)  $2.2 \times 10^{32}$  (b)  $4.4 \times 10^{32}$   
 (c)  $2.1 \times 10^{16}$  (d)  $1.1 \times 10^{16}$

36 2nd <sup>22</sup> In the following reaction:  $2\text{H}_2\text{O}_{(l)} + \text{O}_{2(g)} \rightleftharpoons 2\text{H}_2\text{O}_{2(l)}$ ,  $K_p = 0.2$  So, pressure of oxygen = ...

- (a) 0.2 atm. (b) 0.02 atm. (c) 5 atm. (d) 0.5

37 Exp <sup>231</sup> In the following reaction at equilibrium:



if you know the number of moles of  $\text{PCl}_5$ ,  $\text{PCl}_3$ ,  $\text{Cl}_2$  respectively are 0.008, 0.0114, 0.0114 mole in container 10 liter so the equilibrium constant  $K_c$  equals

- (a) 615.5 (b)  $1.62 \times 10^{-3}$  (c)  $16.24 \times 10^{-3}$  (d) 61.55

38 1st <sup>22</sup> In the following equilibrium reaction

$2\text{NO}_{2(g)} \rightleftharpoons \text{N}_2\text{O}_{4(g)}$   $K_p = 20$  The  $K_p$  of decomposition of 2 moles of  $\text{N}_2\text{O}_4$  Equals .....

- (a) 40 (b)  $25 \times 10^{-3}$  (c)  $2.5 \times 10^{-3}$  (d) 400

39 1st<sup>23</sup> In the following equilibrium reaction:  $\text{N}_2\text{H}_{4(g)} \rightleftharpoons \text{N}_{2(g)} + 2\text{H}_{2(g)} + \text{heat}$ ,  $K_c = 0.04$  if  $[\text{N}_2\text{H}_4] = 0.1\text{M}$ ,  $[\text{H}_2] = 0.2\text{M}$ , So  $[\text{N}_2]$  after increasing temperature becomes .....

- (a) 0.08M      (b) 0.2M      (c) 0.3M      (d) 0.1M

40 2nd<sup>23</sup> In the In the following reaction:  $\text{CO}_{(g)} + \text{Cl}_{2(g)} \rightleftharpoons \text{COCl}_{2(g)}$  an amount of  $\text{Cl}_{2(g)}$  is placed in a flask containing  $\text{CO}_{(g)}$  and at equilibrium state, the pressure inside the flask is (1.2 atm), if you know that the partial pressure of the three gases is the same, so the value of  $K_p$  equal.....

- (a) 1      (b) 2.5      (c) 0.4      (d) 0.16

41 2nd<sup>23</sup> In If two liters of solution contains: 0.6 moles of HA, 0.7 moles of BOH, one mole of BA and 100 moles of water then the equilibrium constant for the following reaction equal.....



- (a) 238      (b) 476      (c) 2.38      (d) 4.76

42 Exp<sup>23</sup> The following graph represents equilibrium system



- (a) 6.66  
(b) 14.81  
(c) 0.9  
(d) 15.49

## Ionic Equilibrium

43 2nd<sup>21</sup> The law of mass action can be applied to all of the following , except .....

- (a)  $\text{H}_2\text{SO}_{3(aq)}$       (b)  $\text{HCl}_{(aq)}$       (c)  $\text{HF}_{(aq)}$       (d)  $\text{H}_2\text{CO}_{3(aq)}$

44 1st<sup>22</sup> The aqueous solution of sulphurous acid contains

- (a)  $\text{H}_2\text{SO}_3, \text{HSO}_3^-, \text{SO}_3^{2-}, \text{OH}^-, \text{H}_3\text{O}^+$       (b)  $\text{H}_2\text{SO}_3, \text{OH}^-, \text{H}_3\text{O}^+$   
 (c)  $\text{OH}^-, \text{H}_2\text{SO}_3, \text{H}_3\text{O}^+$       (d)  $\text{H}_2\text{SO}_3, \text{HSO}_3^-, \text{SO}_3, \text{OH}^-, \text{H}_3\text{O}^+$

45 1st<sup>21</sup> on dilution of a weak electrolyte at Constant temperature then .....

- (a) the degree of ionization decreases , and the solution concentration increases  
 (b) the degree of ionization increases, and the solution concentration increases  
 (c) the degree of ionization increases, and the solution concentration decreases  
 (d) the degree of ionization decreases, and the solution concentration decreases

46 2nd<sup>22</sup> The following table illustrates the ionization constant of the some acids.

So, one of the following is correct.....

A	B	C	D
$1.7 \times 10^{-3}$	$1.8 \times 10^{-5}$	$4.4 \times 10^{-7}$	$1.2 \times 10^{-2}$

- (a) B is weaker than C and stronger than A  
 (b) C is weaker than B and stronger than D  
 (c) D is stronger than C & B  
 (d) A is stronger than B & D



## Ostwal Law

50 2nd <sup>21</sup> Dissolving 7.258 of HCN in water, the volume of the solution becomes 100 ml , If you know that  $K_a = 7.2 \times 10^{-10}$  so the degree of acid ionization Equals .....

( H = 1, C = 12 , N = 14 )

- (a)  $2.56 \times 10^{-4}$       (b)  $1.63 \times 10^{-5}$       (c)  $2.56 \times 10^{-6}$       (d)  $1.63 \times 10^{-5}$

51 Exp <sup>21</sup> In the following equilibrium system :



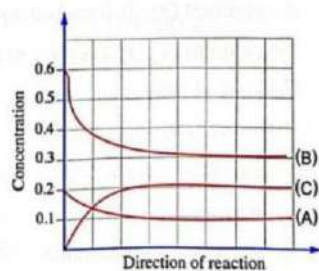
On adding drops of  $\text{HCl}_{(aq)}$  to the Reaction, the value of  $K_a$  of acetic Acidequals .....

- (a)  $1.8 \times 10^{-5}$       (b)  $0.9 \times 10^{-5}$       (c)  $3.6 \times 10^{-6}$       (d)  $3.6 \times 10^{-4}$

52 2nd <sup>22</sup> On dissolving 11g of an acid  $[\text{C}_5\text{H}_{11}\text{COOH}]$  in an amo the solution is 1L. So the ionization constant for the acid =2.94 at 25°C

(H=1, C=12, O=16)

- (a)  $1.39 \times 10^{-5}$       (b)  $1.148 \times 10^{-3}$   
(c)  $1.318 \times 10^{-6}$       (d)  $1.39 \times 10^{-4}$



53 1st <sup>23</sup> if you know the ionization constant ( $K_a$ ) for monoprotic weak acid =  $5.1 \times 10^{-4}$  and its concentration = 0.2M in a solution its volume 200 ml ,So the number of dissociated moles equal.....

- (a)  $0.04 \times 10^{-2}$  mol  
(b)  $1.01 \times 10^{-3}$  mol  
(c)  $5.05 \times 10^{-2}$  mol  
(d)  $2.02 \times 10^{-3}$  mol

## pH

- 54 1st<sup>23</sup> If you know that the concentration of methyl amine solution  $\text{CH}_3\text{NH}_2$  is (0.4M) and, Its pH =9, then the value of  $K_b$  for the compound at 25°C equal.....
- (a)  $2.5 \times 10^{-18}$       (b)  $2 \times 10^{-9}$       (c)  $4.47 \times 10^{-5}$       (d)  $2.5 \times 10^{-10}$
- 55 1st<sup>22</sup> If you know that the ionisation constant Of periodic acid is ( $14.440 \times 10^{-5}$ ) At 25°C and the acid concentration is ( $3.5 \times 10^{-3}$ )M , the pOH value of this acid is .....
- (a) 2.22      (b) 3.13      (c) 10.87      (d) 11.7
- 56 2nd<sup>23</sup> By knowing that: the ionic product of water is changed by changing the temperature.If the value  $K_w$  at certain temperature equal  $0.49 \times 10^{-13}$  ,so pOH of water at this state equal.....
- (a) 5.56      (b) 7      (c) 7.13      (d) 6.65
- 57 2nd<sup>23</sup> By A solution of monoprotic acid contains 0.2 mole in V liter, if the  $K_a$  of the acid =  $3.5 \times 10^{-8}$  and the number of dissociated moles = 0.002 , so the pH value of the acid is....
- (a)  $3.5 \times 10^{-6}$       (b) 5.455      (c) 8.544      (d)  $6.5 \times 10^{-7}$
- 58 Exp<sup>23</sup> If you If the value of pOH for weak acid equal 10 and its equilibrium constant  $K_a = 5.1 \times 10^{-4}$  , so the degree of ionization of the acid equal....
- (a)  $2.5 \times 10^{-18}$       (b)  $2 \times 10^{-9}$       (c)  $4.47 \times 10^{-5}$       (d)  $2.5 \times 10^{-10}$

K<sub>sp</sub>

59 1st<sup>21</sup> If you know that the solubility degree of silver chromate ( $\text{Ag}_2\text{CrO}_4$ ) is  $6.62 \times 10^{-5}$  M, then the solubility product of this compound equals ....

- (a)  $0.58 \times 10^{-12}$                       (b)  $1.16 \times 10^{-12}$   
 (c)  $2.32 \times 10^{-12}$                       (d)  $3.48 \times 10^{-12}$

60 2nd<sup>22</sup> If the solubility product of lead hydroxide [ $\text{Pb}(\text{OH})_2$ ] is  $2.5 \times 10^{-6}$ , so the solubility degree is.....

- (a) 0.27M                      (b) 0.0135M                      (c)  $4.27 \times 10^{-3}$ M                      (d)  $8.54 \times 10^{-3}$ M

61 1st<sup>23</sup> If you know that the solubility product of zinc sulphide ( $K_{sp}$ ) =  $1 \times 10^{-21}$  and its molar mass is 97 g/mol at 25 °C then the mass of zinc sulphide which dissolve in 100 g of pure water is.....

- (a)  $6.034 \times 10^{-10}$  g  
 (b)  $31.6 \times 10^{-12}$  g  
 (c)  $2 \times 10^{-21}$  g  
 (d)  $3.067 \times 10^{-10}$  g

62 1st<sup>21</sup> If the solubility product of  $\text{XY}_2$  salt is  $1.6 \times 10^{-10}$ , then the concentration of [Y<sup>-</sup>] Equals .....

- (a)  $3.41 \times 10^{-4}$  M                      (b)  $6.82 \times 10^{-4}$  M  
 (c)  $2.36 \times 10^{-5}$  M                      (d)  $2.14 \times 10^{-5}$  M

63 2nd<sup>23</sup> If you know the solubility product of silver chloride salt in a saturated solution its volume is 0.1L at certain temperature equals so the mass of dissolved silver chloride in the solution equals  $1.8 \times 10^{-10}$  .....

(Ag = 108 , Cl = 35.3)

- (a)  $1.92 \times 10^{-4}$  g                      (b) 0.0115 g  
 (c)  $2.3 \times 10^{-6}$  g                      (d)  $1.15 \times 10^{-6}$  g

## Salts

64 1st<sup>21</sup> When blue litmus solution was added to potassium nitrate solution, the color of indicator is .....

- (a) blue                      (b) purple                      (c) red                      (d) green
- 

65 1st<sup>23</sup> (A and B) are two salt solutions, the methyl orange is added for each one individually

- the color of indicator changes in the solution (A) into red.
- the color of indicator doesn't change in the solution (B)

Which of the following is correct for (A) and (B)?.....

- (a) A:  $\text{NH}_4\text{NO}_3$ , B:  $\text{Na}_2\text{S}$                       (b) A:  $(\text{NH}_4)_2\text{SO}_4$ , B:  $\text{KNO}_3$   
 (c) A:  $\text{K}_2\text{CO}_3$ , B:  $\text{NaBr}$                       (d) A:  $\text{Na}_2\text{CO}_3$ , B:  $\text{NH}_4\text{HCO}_3$

66 Exp<sup>21</sup> When drops of bromothymol blue were added to sodium oxalate solution,  $\text{Na}_2\text{C}_2\text{O}_4$  the color of the solutions is .....

- (a) yellow                      (b) Blue  
 (c) green                      (d) red
- 

67 2nd<sup>23</sup> Which of the following salts doesn't form molecules of acid during its hydrolysis?....

- (a)  $\text{NH}_4\text{NO}_3(s)$                       (b)  $\text{CH}_3\text{COONa}(s)$   
 (c)  $\text{KHCO}_3(s)$                       (d)  $\text{KNO}_2(s)$

68 2nd<sup>23</sup> To distinguish between two solutions are both blue color, the first has litmus indicator but the second has bromothymol blue indicator. The solution that can be used is.....

- (a)  $\text{NH}_4\text{Cl}$                       (b)  $\text{NH}_4\text{NO}_2$                       (c)  $\text{K}_3\text{BO}_3$                       (d)  $\text{NaCl}$

69 2nd<sup>23</sup> To distinguish between two solutions are both red color, the first has litmus indicator but the second has methyl orange indicator. The solution that can be used is.....

- (a)  $\text{Na}_2\text{CO}_3$                       (b)  $\text{CaCO}_3$                       (c)  $\text{KNO}_3$                       (d)  $(\text{NH}_4)_2\text{SO}_4$
-

Essay :

**70 Exp<sup>23</sup> calculate Ksp of dihydroxide basic compound springly soluble in water its pH = 8**



Chapter  
4

## Previous Exams until 2024

## EMS and EMF

1 1st<sup>21</sup> If you know that :

If a galvanic cell composed of the 2 elements (A) and (B) , Which of the following represents the cell diagram and the value of e.m.f ?

- (a)  $2B^{+} / 2B // A / A^{2+}$  e.m.f = 1.4 V      (b)  $A / A^{2+} // 2B^{+} / 2B$  e.m.f = 1.029 V  
 (c)  $B^{+} / B // 2A / 2A^{2+}$  e.m.f = 0.896 V      (d)  $2A / 2A^{2+} // B^{+} / B$  e.m.f = 0.879 V

2 Exp<sup>21</sup> A galvanic cell its electrodes made of chromium and platinum , if the standard reduction potential as follows :



the diagram which represents this cell is .....

- (a)  $Cr^{0}_{(s)} / Cr^{3+}_{(aq)} // Pt^{2+}_{(aq)} / Pt^{0}_{(s)}$       (c)  $3Pt^{2+}_{(aq)} / 3Pt^{0}_{(s)} // 2Cr^{3+}_{(aq)} / 2Cr^{0}_{(s)}$   
 (b)  $2Cr^{0}_{(s)} / 2Cr^{3+}_{(aq)} // 3Pt^{2+}_{(aq)} / 3Pt^{0}_{(s)}$       (d)  $Pt^{2+}_{(aq)} / Pt^{0}_{(s)} // 2Cr^{0}_{(s)} / 2Cr^{3+}_{(aq)}$

3 Exp<sup>21</sup> On dipping a magnesium strip in silver nitrate solution , the following reaction is occurred :



Which of the following properly expresses what happens ?

- (a) oxidation of magnesium and reduction of silver ions  
 (b) Oxidation of magnesium and oxidation of silver  
 (c) Reduction of magnesium and oxidation of silver  
 (d) Reduction of magnesium and reduction of silver ions

- 4 Exp<sup>21</sup> The following table represents reduction potential for four elements (A, B, C and D) respectively, Which of the previous elements can be used as sacrifying electrode with respect to another element ?

element	A	B	C	D
Reduction potential	-1.66	-2.37	+0.799	-1.26

- (a) C for A      (b) A for B      (c) C for D      (d) B for A

Exp<sup>21</sup>

Element	(A)	(B)	(C)	(D)
Standard Oxidation Potential (Volt)	+2.711	+0.28	-1.2	-2.87

The previous table represents the standard reduction potential of four elements (A), (B), (C), (D). the galvanic cell produces the highest e.m.f is .....

- (a) (D) as an anode, (C) as a cathode  
 (b) (B) as an anode, (D) as a cathode  
 (c) (D) as an anode, (A) as a cathode  
 (d) (A) as an anode, (D) as a cathode

- 6 2nd<sup>21</sup> In the following reaction:



The changes that occur are :.....

- (a)  $\text{Mn}^{4+} / \text{Mn}^{2+}$ ,  $\text{Cl}_2 / 2\text{Cl}^-$       (b)  $\text{Mn}^{4+} / \text{Mn}^{2+}$ ,  $2\text{Cl}^- / \text{Cl}_2$   
 (c)  $\text{Mn}^{2+} / \text{Mn}^{4+}$ ,  $2\text{Cl}^- / \text{Cl}_2$       (d)  $\text{Mn}^{2+} / \text{Mn}^{4+}$ ,  $\text{Cl}_2 / 2\text{Cl}^-$

- 7 2nd<sup>22</sup> In Daniel cell, the zinc half-cell is replaced by silver half-cell. If the oxidation potential of Zn & Ag are: Ag=-0.8V and Zn=0.76 V, one of the following is correct.

- (a) emf. is decreased and the direction of current is not changed  
 (b) emf. is increased and the direction of current is changed  
 (c) emf. is decreased and the direction of current is changed  
 (d) emf. is increased and the direction of current is not changed

8 1st<sup>21</sup> If you know that the electrodes potentials of a secondary galvanic cell are :



To charge this battery completely, it must be connected with a source of electricity its e.m.f equal.....

- (a) 2V                      (b) 1.37V                      (c) 220V                      (d) 1.3V

9 1st<sup>21</sup> On putting a rod of an element (A) is placed in a solution of ions of an element (B) if you know that (A) is divalent , (B) is monovalent .

Which of the following is true ?

- (a) Number of dissolved moles of (A) is double the number of precipitated moles of (B)  
 (b) Number of dissolved moles of (A) is half the number of precipitated moles of (B)  
 (c) Number of dissolved moles of (A) equals the number of precipitated moles of (B)  
 (d) Number of dissolved moles of (A) is three times the number of precipitated moles of (B)

10 Exp<sup>23</sup> On The following reactions occur in galvanic cells at standard conditions:



From the above reactions the value of emf. of the following cell equals.....

- (a) -1.1 V                      (b) 1.1 V                      (c) 0.398 V                      (d) 0.398 V

11 2nd<sup>23</sup> According to the following cell diagrams:



So, the electromotive force for the cell formed from (Y) and (Z) and the anode are....

- (a) 1.2 V , (Y) is anode                      (b) 1.2 V , (Z) is anode  
 (c) 1.6 V , (Y) is anode                      (d) 2 V , (Z) is anode

12 Exp<sup>21</sup> If you know that :



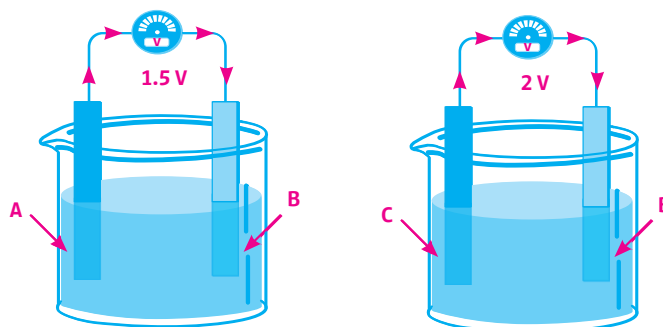
Then the cell diagram which represents the cell formed from the 2 electrodes is .....

- (a)  $\text{K}^+ / \text{K}^0 // \text{Cu}^0 / \text{Cu}^{2+}$                       (b)  $\text{Cu}^0 / \text{Cu}^{2+} // 2\text{K}^0 / 2\text{K}^+$   
 (c)  $\text{Cu}^{2+} / \text{Cu}^0 // 2\text{K}^+ / 2\text{K}^0$                       (d)  $2\text{K}^0 / 2\text{K}^+ // \text{Cu}^{2+} / \text{Cu}^0$

13 1st<sup>22</sup> On Putting metal X in solution of  $\text{YCl}_2$  salt changes the concentration of  $\text{Y}^{2+}$  cations from 0.1M to 0.01M, which of the following exist in the solution?

- (a)  $\text{Cl}^-$ ,  $\text{Y}^{2+}$ ,  $\text{X}^{2+}$  ions  
 (b)  $\text{Cl}^-$ ,  $\text{X}^{2+}$  ions only  
 (c)  $\text{Cl}^-$ ,  $\text{Y}^{2+}$  ions and X precipitate at the bottom  
 (d)  $\text{Cl}^-$  ions and X, Y precipitates at the bottom

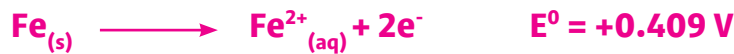
14 1st<sup>23</sup> The following two figures represent two galvanic cells:



if both (A,B) are divalent, and (C) is trivalent, So the cell diagram for this galvanic cell formed from elements (A) and (C) is....

- (a)  $2\text{C}_{(s)} / 2\text{C}^{3+}_{(aq)} // 3\text{A}^{2+}_{(aq)} / 3\text{A}_{(s)}$   
 (b)  $3\text{A}_{(s)} / 3\text{A}^{2+}_{(aq)} // 2\text{C}^{3+}_{(aq)} / 2\text{C}_{(s)}$   
 (c)  $2\text{A}_{(s)} / 2\text{A}^{3+}_{(aq)} // 3\text{C}^{2+}_{(aq)} / 3\text{C}_{(s)}$   
 (d)  $3\text{C}_{(s)} / 3\text{C}^{2+}_{(aq)} // 2\text{A}^{3+}_{(aq)} / 2\text{A}_{(s)}$

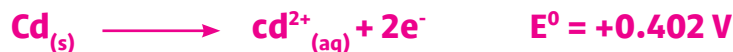
15 1st<sup>21</sup> Galvanic cell is expressed by the following cell diagram :



Then the e.m.f of the cell is .....

- (a) 1.639 V      (b) 0.936 V      (c) 0.396 V      (d) 0.179 V

16 Exp<sup>21</sup> In the cell whose electrodes are nickel and cadmium , if you know that:



Then the value of e.m.f is .....

- (a) 0.172 V      (b) -0.632 V      (c) 0.632 V      (d) -0.172 V

17 2nd<sup>21</sup> If you know that:



The cell diagram of the galvanic cell composed of these two electrodes is .....

- (a)  $\text{Al}^0 / \text{Al}^{3+} // \text{Cu}^{2+} / \text{Cu}^0$       (b)  $3\text{Cu}^0 / 3\text{Cu}^{2+} // 2\text{Al}^{3+} / 2\text{Al}^0$   
 (c)  $2\text{Al}^0 / 2\text{Al}^{3+} // 3\text{Cu}^{2+} / 3\text{Cu}^0$       (d)  $\text{Cu}^{2+} / \text{Cu}^0 // \text{Al}^{3+} / \text{Al}^0$

18 1st<sup>22</sup> A cell consists of two elements (X , Y) its e.m.f equals 0.94 V, if you know that the standard oxidation potential of element X is 0.136 V and electrons transfere from X to Y through the wire, so the standerd oxidation potential of element Y is equal

- (a) +0.8 V      (b) +1.076 V      (c) -0.8 V      (d) -1.076

19 1st <sup>21</sup> Three rods of different elements (A , B , C ) were placed in  $\text{HCl}_{(aq)}$  , (A) and (B) react , while (c) doesn't react , when a rod of element (A) placed in a solution contains ions of element (B) , it is corroded .So the arrangement of these elements according to their oxidation potential is .....

- (a)  $B > A > C$       (b)  $A > B > C$       (c)  $C > B > A$       (d)  $A > C > B$

20 1st <sup>23</sup> If you know that the oxidation potential of  $X = +0.409V$ , the element That can be used as cathodic protection for element (X) is .....

- (a) An element with standard reduction potential is  $-0.76V$   
 (b) An element with standard oxidation potential is  $+1.03V$   
 (c) An element with standard reduction potential is  $-0.136V$   
 (d) An element with standard oxidation potential is  $+0.74V$

21 2nd <sup>22</sup> A galvanic cell consists of chromium (Cr) and gold (Au), if the oxidation potential of chromium is  $+0.41 V$  and reduction potential of gold is  $+1.42 V$  ,So emf. of the cell and its diagram are.....

- (a)  $1.83V, \text{Cr}^0_{(s)} / \text{Cr}^{3+}_{(aq)} \parallel \text{Au}^{3+}_{(aq)} / \text{Au}^0_{(s)}$   
 (b)  $1.01V, \text{Au}^{3+}_{(aq)} / \text{Au}^0_{(s)} \parallel \text{Cr}^0_{(s)} / \text{Cr}^{3+}_{(aq)}$   
 (c)  $1.83V, \text{Cr}^{3+}_{(aq)} / \text{Cr}^0_{(s)} \parallel \text{Au}^0_{(s)} / \text{Au}^{3+}_{(aq)}$   
 (d)  $1.01V, \text{Au}^0_{(s)} / \text{Au}^{3+}_{(aq)} \parallel \text{Cr}^{3+}_{(aq)} / \text{Cr}^0_{(s)}$

22 2nd <sup>23</sup> The following reaction takes place in a galvanic cell:  $2\text{Ag}^+(\text{aq}) + \text{Mn}(\text{s}) \longrightarrow \text{Mn}^{2+}(\text{aq}) + 2\text{Ag}(\text{s})$  Which of the following represents the cell diagram for this galvanic cell and the reducing agent?

- (a)  $\text{Mn}(\text{s}) / \text{Mn}^{2+}(\text{aq}) \parallel 2\text{Ag}^+(\text{aq}) / 2\text{Ag}(\text{s})$  and the reducing agent is Mn  
 (b)  $\text{Ag}(\text{s}) / \text{Ag}^+(\text{aq}) \parallel \text{Mn}^{2+}(\text{aq}) / \text{Mn}(\text{s})$  and the reducing agent is Ag  
 (c)  $\text{Mn}^{2+}(\text{aq}) / \text{MnO}(\text{s}) \parallel \text{Ag}^+(\text{aq}) / \text{Ag}(\text{s})$  and the reducing agent is Mn  
 (d)  $2\text{Ag}^+(\text{aq}) / 2\text{AgO}(\text{s}) \parallel \text{Mn}(\text{s}) / \text{Mn}^{2+}(\text{aq})$  and the reducing agent is Ag

- 23 1st <sup>23</sup> Cell potential formed from element X and standard hydrogen electrode = 0.280V,  
 -Cell potential formed from element X and Y = 2.095V  
 - When putting element Y in a solution of X, no reaction takes place.

Then the potential of the cell formed from element Y and standard hydrogen electrode equal.....

- (a) -2.375V      (b) 2.375V      (c) 1.815V      (d) -1.815V

- 24 2nd <sup>23</sup> If you have a primary galvanic cell consists of two electrodes (X) and (Y) If you know that:  $[X^{2+} / X = + 0.34 \text{ V}]$ ,  $[Y^{2+} / Y = - 0.76 \text{ V}]$  and When the half-cell  $[X^{2+} / X]$  is replaced by the half-cell  $[Z^{2+} / Z = - 2.375 \text{ V}]$  at suitable condition. Which of the following choices is correct?.....

- (a) the direction of electric current is changed and the value of emf. is decreased  
 (b) the direction of electric current is not changed and the value of emf. is decreased  
 (c) the direction of electric current is changed and the value of emf. is increased  
 (d) the direction of electric current is not changed and the value of emf. is increased

## Galvanic Cells

- 25 Exp <sup>21</sup> The oxidation reduction reactions in the fuel cell lead to .....

- (a) oxygen is converting to hydroxide ion by oxidation  
 (b) transferring of hydroxide ions towards cathode .  
 (c) .transferring of hydroxide ions towards anode .  
 (d) hydrogen is converting to water molecules by reduction .

- 26 Exp <sup>21</sup> In lithium ion battery , lithium ions transfers through  $(\text{LiPF}_6)$  as follow :

- (a) from the negative anode to positive cathode during charging  
 (b) from the negative anode to the positive cathode during discharging  
 (c) from the cathode to the anode during discharging  
 (d) from the cathode to the anode during charging

27  $2nd^{22}$  Which of the following is anodic reaction takes place in a primary galvanic cell?.....

- a  $Ag_2O_{(s)} + Zn_{(s)} \longrightarrow ZnO_{(s)} + 2Ag_{(s)}$
- b  $Zn_{(s)} + 2OH^-_{(aq)} \longrightarrow ZnO_{(s)} + H_2O_{(l)} + 2e^-$
- c  $Ag_2O_{(s)} + H_2O_{(l)} + 2e^- \longrightarrow 2Ag_{(s)} + 2OH^-_{(aq)}$
- d  $ZnO_{(s)} + H_2O_{(l)} + 2e^- \longrightarrow Zn_{(s)} + 2OH^-_{(aq)}$

28  $2nd^{22}$  By adding acidified potassium dichromate solution to iron II sulphate solution, the correct equation which represents the oxidation reduction reaction is .....

- a  $Fe^{2+}_{(aq)} + Cr_2O_7^{2-}_{(aq)} + 14H^+_{(aq)} \longrightarrow Fe^{3+}_{(aq)} + 2Cr^{3+}_{(aq)} + 7H_2O_{(l)}$
- b  $6Fe^{2+}_{(aq)} + Cr_2O_7^{2-}_{(aq)} + 14H^+_{(aq)} \longrightarrow 6Fe^{3+}_{(aq)} + 2Cr^{3+}_{(aq)} + 7H_2O_{(l)}$
- c  $Fe^{2+}_{(aq)} + Cr_2O_7^{2-}_{(aq)} + 14H^+_{(aq)} \longrightarrow Fe^{3+}_{(aq)} + 2Cr^{3+}_{(aq)} + 7H_2O_{(l)}$
- d  $6Fe^{2+}_{(aq)} + Cr_2O_7^{2-}_{(aq)} + 14H^+_{(aq)} \longrightarrow 6Fe^{3+}_{(aq)} + 2Cr^{3+}_{(aq)} + 7H_2O_{(l)}$

29  $2nd^{21}$  In the fuel cell, the hydrogen of hydroxide group during the operation of the cell: .....

- a Oxidation takes place to it and it loses 4 electrons
- b Oxidation takes place to it and it loses 2 electrons
- c Neither oxidation, nor reduction takes place for it
- d Reduction takes place to it and it gains 4 electrons

30  $2nd^{22}$  During discharge process of the lead acid battery, which of the following is correct ?

- a The concentration of the acid increases and its density decreases
- b The concentration of the acid decreases and its density increases
- c The oxidation number of cathode material changes from (+4 to +2)
- d The oxidation number of anode material changes from (0 to +4)

31  $1st^{21}$  The cell diagram for the fuel cell expresses by one of the following .....

- a  $H_2 / 2H^+ // O_2 / 2O^{2-}$
- b  $2H_2 / 4H^+ // O_2 / 2O^{2-}$
- c  $2O^{2-} / O_2 // 2H^+ / H_2$
- d  $O_2 / 2O^{2-} // 2H_2 / 4H^+$

32 1st<sup>21</sup> On charging the lead acid accumulator . All the following occur , except .....

- a the concentration of the acid increases
- b the mass of water decreases
- c pOH value decreases
- d pH value decreases

33 1st<sup>23</sup> In the galvanic cell which illustrated by the following diagram:



On adding drops from HCl(aq) to both half cells. Which of the following choices is correct?.....

- a the concentration of Pb<sup>2+</sup>(aq) ions is increased.
- b emf. value for the cell is increased.
- c the time for consuming battery is decreased.
- d the concentration of Zn<sup>2+</sup>(aq) ions is decreased.

34 1st<sup>22</sup> If you know that X is divalent element and precedes Y which is monovalent element in the electromotive series, the cell diagram which represents the formed cell from them is .....

- a  $\text{X}^{2+} / \text{X} \parallel 2\text{Y}^+ / 2\text{Y}$
- b  $\text{X} / \text{X}^{2+} \parallel 2\text{Y}^+ / 2\text{Y}$
- c  $2\text{Y} / 2\text{Y}^+ \parallel \text{X}^{2+} / \text{X}$
- d  $2\text{Y} / 2\text{Y}^+ \parallel \text{X} / \text{X}^{2+}$

35 1st<sup>23</sup> In lead acid battery during discharging process, the following data are recorded, potential of the anode =+0.36V , potential of the cathode =+1.69V hydrometer reading is 1 g/cm<sup>3</sup> . So this battery.....

- a is completely charged and the battery produces 12 volt
- b is required to be recharged and the battery produces 2.05 volt after recharging.
- c is completely charged and the cell produces 12 volt
- d is required to be recharged and the cell produces 2.05 volt after recharging.

36 1st<sup>22</sup> In Mercury cell and fuel cell, which of the following is correct ?

- a) Oxygen ions in mercury cell are oxidized
- b) Oxygen ions in fuel cell are reduced
- c) Neither oxidation nor reduction takes place for oxygen ion in mercury cell
- d) Oxygen ions in fuel cell are oxidized

37 Exp<sup>23</sup> Galvanic cell which represented by the following diagram:  $\text{Ni(s)} / \text{Ni}^{2+}(\text{aq}) // 2\text{Ag}(\text{aq}) + 2\text{Ag(s)}$  choose the correct answer to increase time of working this cell

- a) increasing the concentration of silver ions in half cell of cathode
- b) decreasing the concentration of nickel ions in half cell of anode
- c) decreasing the mass of anode
- d) increasing the mass of cathode

38 2nd<sup>22</sup> During charging of car battery .....

- a) emf. is decreased and concentration of the acid is increased
- b) emf. is increased and concentration of the acid is decreased
- c) the -ve electrode of the outsource of electricity is connected with lead electrode
- d) the +ve electrode of the outsource of electricity is connected with lead electrode

39 1st<sup>21</sup> A galvanic cell its electrodes are tin and silver, if you know that the standard reduction potential of tin = -0.136V and of silver = +0.8V, which of the following expresses the spontaneous reduction reaction in the cell ?

- a)  $2\text{Ag}^+_{(\text{aq})} + 2\text{e}^- \longrightarrow 2\text{Ag}^0_{(\text{s})}$ ,  $E = +0.8\text{V}$
- b)  $2\text{Ag}^0_{(\text{s})} \longrightarrow 2\text{Ag}^+_{(\text{aq})} + 2\text{e}^-$ ,  $E = -1.6\text{V}$
- c)  $2\text{Ag}^+_{(\text{aq})} + 2\text{e}^- \longrightarrow 2\text{Ag}^0_{(\text{s})}$ ,  $E = -0.8\text{V}$
- d)  $2\text{Ag}^0_{(\text{s})} \longrightarrow 2\text{Ag}^+_{(\text{aq})} + 2\text{e}^-$ ,  $E = +1.6\text{V}$

40 Exp<sup>23</sup> During operation of fuel cell: Which of the following is correct?.....

- a) concentration of electrolyte remains constant
- b) decreasing the concentration of electrolyte
- c) decreasing the value of pH of electrolyte
- d) increasing the value of pH of electrolyte

41 Exp<sup>23</sup> On connecting lead accumulator to an external source of electricity its emf. =14 V. Which one of the following choices is correct?.....

- (a) decreasing the pOH value of electrolyte
- (b) decreasing the pH value of electrolyte
- (c) increasing oxidation number of lead at anode
- (d) increasing the quantity of water in battery

42 2nd<sup>23</sup> In the car battery, the electrode at which the following reaction can take place is.... $\text{PbSO}_4 \longrightarrow \text{Pb}^{+4} + 2\text{e}^- + \text{SO}_4^{2-}$

- (a) cathode during discharge
- (b) cathode during recharge
- (c) anode during discharge
- (d) anode during recharge

## Corrosion

43 2nd<sup>23</sup> The following table illustrates the standard reduction potentials of the elements W, X, Y and Z:

The element	(W)	(Z)	(Y)	(X)
Reduction Potential	-2.37 V	-1.66 V	-0.74 V	-0.25 V

One of the following choices expresses anodic protection .....

- (a) The element (Y) is plate by element (Z)
- (b) The element (Y) is plate by element (X)
- (c) The element (W) is plate by element (Z)
- (d) The element (W) is plate by element (X)

44 Exp<sup>21</sup> The electrolyte which leads to the corrosion of metals with a high rate is

- (a)  $\text{H}_2\text{SO}_4$  (0.5 M)
- (b) HCl (0.5 M)
- (c)  $\text{HNO}_2$  (1 M)
- (d)  $\text{H}_2\text{SO}_3$  (1 M)

45 *2nd<sup>22</sup>* The element X is covered with a layer of element Y, if the reduction potential of element X is (-0.409) V and the reduction potential of element Y is (-2.375)V one of the following represents correctly the previous process

- (a) anodic protection and ions of X are reduced
- (b) anodic protection and oxygen of moist air is reduced
- (c) cathodic protection and oxygen of moist air is reduced
- (d) cathodic protection and ions of X are reduced

46 *1st<sup>23</sup>* The standard reduction potential for elements (X), (Y) and (Z) as shown in the table:

elements	X	Y	Z
Reduction potential	-0.28V	+1.2V	-1.029V

Which of the following coatings is the most corrosive for coated metal when scratching?

- (a) plating element X by Z
- (b) plating element Z by Y
- (c) plating element Y by X
- (d) plating element X by Y

47 *1st<sup>21</sup>* To protect the element (A) from corrosion by using element (B) . Which of the following occurs ?

- (a) Withdrawing electrons from (A) to (B) and it represents anodic protection
- (b) Withdrawing electrons from (B) to (A) and it represents anodic protection
- (c) Transferring electrons to the element (A) and it represents cathodic protection
- (d) Transferring electrons between the elements (A) , (B) and (A) represents scarifying electrode

48 *Exp<sup>23</sup>* To From the opposite table: you have four pieces of iron, three of them partially plated first by X, second by Y, third by Z and the fourth one is not plated. Which pieces will rust faster?.....

Element	Fe	X	Y	Z
Reduction potential	-0.409 V	-2.375 V	-1.67 V	-0.23 V

- (a) first
- (b) second
- (c) fourth
- (d) second

49 2nd<sup>23</sup> From the following reaction:  $\text{Ba(s)} + \text{Cr}^{2+}(\text{aq}) \longrightarrow \text{Ba}^{2+}(\text{aq}) + \text{Cr(s)}$  Which of the following is correct to protect both metals from corrosion?...

- (a) covering barium by chromium – cathodic cover
- (b) covering barium by chromium – anodic cover
- (c) covering chromium by barium – cathodic cover
- (d) covering chromium by barium – anodic cover

## Electrolytic cells

50 2nd<sup>22</sup> The following reaction takes place in an electrochemical cell:



,So the previous reaction represents.....

- (a) a galvanic cell and the electrons transfer from Ag to Sn
- (b) an electrolytic cell and the electrons transfer from  $\text{Sn}^{2+}$  to Ag
- (c) an electrolytic cell and the electrons transfer from  $\text{Ag}^{+}$  to Sn
- (d) a galvanic cell and the electrons transfer from Sn to  $\text{Ag}^{+}$

51 Exp<sup>23</sup> If you know that:  $\text{Pb}^{2+} / \text{Pb}^{4+} = -1.69 \text{ V}$  ,  $\text{Hg} / \text{Hg}^{+} = -0.59 \text{ V}$  So, the following reaction is considered as....



- (a) non-spontaneous and emf. = -1.1 V
- (b) spontaneous and emf. = 1.1 V
- (c) non-spontaneous and emf. = -2.28 V
- (d) spontaneous and emf. = 2.28 V

52 Exp<sup>23</sup> If the following reaction occurs in an electrochemical cell:



If you know that oxidation potential of nickel = +0.23 V and that of iron = +0.4 V Which of the following is correct?.....

- (a) the reaction is spontaneous and emf. = - 0.17 V
- (b) the reaction is spontaneous and emf. = + 0.17 V
- (c) the reaction is nonspontaneous and emf. = - 0.17 V
- (d) the reaction is nonspontaneous and emf. = + 0.17 V

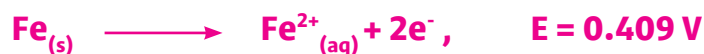
53 1st<sup>23</sup> The purification cell of chromium contains impurities (X) (and (Y), we notice that precipitation of (X) and (Y) in the bottom of beaker after complete purification, and the color of (X) salt solution is changed on adding element (Y) to it. the right arrangement of oxidation potential of (Cr), (Y) and (X) is.....

- (a)  $Y < Cr < X$
- (b)  $Y < X < Cr$
- (c)  $X < Cr < Y$
- (d)  $X < Y < Cr$

54 2nd<sup>23</sup> If the reduction potential of an impure element X equal - 0.7 V, so the galvanic cell which is used to purify the element X is formed from two elements Y and Z their reduction potential are

- (a) Y: + 0.029 V & Z: - 0.402 V
- (b) Y: - 0.23 V & Z: + 0.029 V
- (c) Y: - 1.029 V & Z: - 0.402 V
- (d) Y: - 0.23 V & Z: -1.029 V

55 2nd<sup>21</sup> In the cell whose electrodes are iron and tin, if you know that:



Which of the following is correct ?

- (a) Iron is the anode and the e.m.f of the cell is positive
- (b) Iron is the cathode and the e.m.f of the cell is negative
- (c) Tin is the anode and the e.m.f of the cell is positive
- (d) Tin is the cathode and the e.m.f of the cell is negative

56 2nd<sup>23</sup> In the following reaction that occurred in an electric cell:



If you know that:



Which of the following choices is correct?

- (a) Electrolytic cell, emf = -1.03 V
- (b) Galvanic cell, emf = 1.03 V
- (c) Galvanic cell, emf = 0.564 V
- (d) Electrolytic cell, emf = -0.564 V

57 1st<sup>23</sup> The following equations represent the reactions of two half electric cells:



Then the non-spontaneous oxidation reaction which occurred in the cell is....

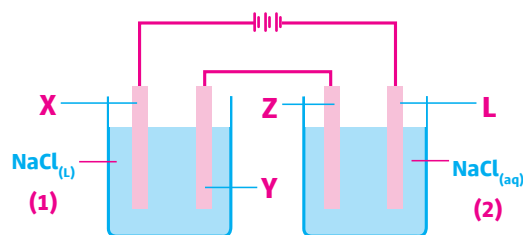
- (a)  $\text{Cd}^0 \longrightarrow \text{Cd}^{2+} + 2e^- \quad , E^0 = +0.402 \text{ V}$
- (b)  $2\text{Ni}^{2+} \longrightarrow 2\text{Ni}^{3+} + 2e^- \quad , E^0 = -0.898 \text{ V}$
- (c)  $\text{Cd}^{2+} + 2e^- \longrightarrow \text{Cd}^0 \quad , E^0 = -0.402 \text{ V}$
- (d)  $2\text{Ni}^{3+} + 2e^- \longrightarrow 2\text{Ni}^{2+} \quad , E^0 = +0.898 \text{ V}$

58 Exp<sup>23</sup> To purify metal its reduction potential 0.8 V, the electrolytic cell is connected to galvanic cell consists of.....

Element	A	B	C
Oxidation potential	+0.52 V	+0.12 V	-0.34 V

- (a) A and C and impure metal connected by A
- (b) B and C and pure metal connected by C
- (c) B and A and pure metal connected by B
- (d) A and C and impure metal connected by C

59 Exp<sup>21</sup> The opposite diagram :



cell (1) contains molten sodium chloride cell (2) contains aqueous solution of sodium chloride

The electrolysis process is made for both of them , the substance formed at the electrodes (X, Y, Z and L) are .....

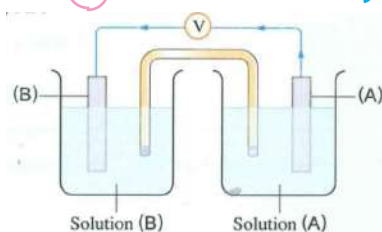
Choices	X	Y	Z	L
a	Cl <sub>2</sub>	Na	H <sub>2</sub>	O <sub>2</sub>
b	Cl <sub>2</sub>	Na	Na	Cl <sub>2</sub>
c	H <sub>2</sub>	Cl <sub>2</sub>	Na	Cl <sub>2</sub>
d	Cl <sub>2</sub>	Na	Cl <sub>2</sub>	H <sub>2</sub>

60 Exp<sup>21</sup> During plating a metallic object by using a pure gold rod immersed in a solution of gold (III) chloride AuCl<sub>3</sub> , Which of the following represents what occurs to the mass of anode and the reaction at cathode ?

Choices	Mass of anode	Reaction at cathode
a	increases	$2Au^0 \longrightarrow 2Au^{3+} + 6e^-$
b	decreases	$6Cl^- \longrightarrow 3Cl_2 + 6e^-$
c	does not change	$3Cl_2 + 6e^- \longrightarrow 6Cl^-$
d	decreases	$2Au^{3+} + 6e^- \longrightarrow 2Au^0$

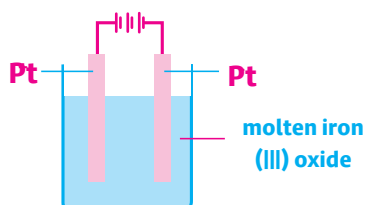
61 Exp<sup>21</sup> in the cell in front of you which of the following is correct

- a The cell is galvanic , and the concentration of solution (A) increases
- b The cell is galvanic , and the concentration of solution (B) increases
- c The cell is Eletcrolytic, and the concentration of solution (A) decreases
- d The cell is Eletcrolytic, and the concentration of solution (B) decreases



## Faraday Laws

- 62 Exp<sup>21</sup> The opposite figure represents an electrolytic cell for molten iron (III) oxide when 10 amperes passed for 2 hours through molten iron (III) oxide so, the volume of evolved gas at anode at (S.T. P) is .....



- (a) 12.51 L      (b) 8.34 L      (c) 4.17 L      (d) 16.68 L
- 
- 63 Exp<sup>21</sup> To precipitate 10 gm of element (A) according to the equation:



The quantity of electricity equal .....

- (a) 15196 C      (b) 0.675 C      (c) 0.315 F      (d) 30393 F
- 64 1st<sup>23</sup> On passing a quantity of electricity through molten magnesium nitride, 48g of magnesium is precipitated at cathode, So the volume of nitrogen gas (at S.T.P) at anode is..... [N=14, Mg=24]
- (a) 14.93L      (b) 22.4L      (c) 44.8L      (d) 33.6L

- 65 1st<sup>21</sup> If the amount of electricity required to precipitate the equivalent mass of a metal equals the amount of electricity needed to precipitate one mole of it , which of the following correctly represents this process

- (a) A mole of metal ion gains 1 mole of electrons  
 (b) A mole of metal ion loses 1 mole of electrons  
 (c) A mole of metal ion gains 2 moles of electrons  
 (d) A mole of metal ion loses 2 moles of electrons

- 66 2nd<sup>21</sup> The amount of electricity in faraday required to precipitate 0.5 g of gold on a metallic medal by electrolysis according to the equation .....



- (a)  $2.53 \times 10^{-3} \text{ F}$     (b)  $7.61 \text{ F}$     (c)  $7.61 \times 10^{-3} \text{ F}$     (d)  $2.53 \text{ F}$

67 *1st<sup>22</sup>* The amount of electricity that required to evolve  $1.204 \times 10^{23}$  molecule of oxygen gas during the electrolysis of acidified water is .....

- (a)  $0.8 \text{ F}$     (b)  $0.4 \text{ F}$     (c)  $9650 \text{ C}$     (d)  $19300 \text{ C}$

68 *2nd<sup>22</sup>* By passing a quantity of electricity of  $5000 \text{ C}$  in the solution of X chloride,  $3.4 \text{ g}$  is precipitated of Element X, So, the equivalent mass of X = .....

- (a)  $32.8 \text{ g}$     (b)  $65.6 \text{ g}$     (c)  $98.4 \text{ g}$     (d)  $196.9 \text{ g}$

Essay :

69 *Exp<sup>23</sup>* When amount of electricity passing through two cells connected in series. The first cell contains  $\text{Pb}(\text{NO}_3)_2$ , Then  $8.28 \text{ g}$  of lead precipitated, while in the second cell the reaction:  $\text{X}^{4+} + 3\text{e}^- \longrightarrow \text{X}^+$  takes place

Calculate the number of moles formed from  $\text{X}^+$  [Pb=207]

# Chapter 5

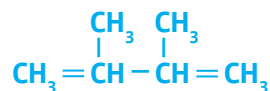
## Previous Exams until 2024

### Alkanes

1 <sup>2nd</sup> <sup>21</sup> the compounds which are similar in their physical state and their chemical Properties are .....

- (a)  $C_8H_{18}, C_{18}H_{38}$       (b)  $C_{20}H_{42}, C_{18}H_{38}$       (c)  $C_3H_4, C_8H_{16}$       (d)  $C_3H_6, C_{16}H_{32}$

2 <sup>Exp</sup> <sup>21</sup> The formula :



After correcting and rewriting this compound , without changing its molecular formula , it will represent .....

- (a) unsaturated compound      (b) Open chain aliphatic  
(c) alkene      (d) branched alkene

3 <sup>Exp</sup> <sup>21</sup> one of the following compounds has only three isomers , which is .....

- (a) pentane      (b) hexane      (c) propane      (d) butane

4 <sup>Exp</sup> <sup>21</sup> by 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 :

- (a) D : is a saturated cyclic compound , A : is an alkane derivative  
(b) B : is an alkene derivative , C : is an alkane derivative  
(c) C : is an alkyne derivative , D : is an alkene  
(d) A : is an alkane derivative , B : is an alkene derivative

5 Exp <sup>21</sup> 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

- (a) X : is a normal alkane , Z : is a cycloalkane , Y : is an aromatic compound  
 (b) X : is a cycloalkane , Z : is a normal alkane , Y : is an aromatic compound  
 (c) X : is an alkyne , Z : is a normal alkane , Y : is an aromatic compound  
 (d) X : is an aromatic compound , Z : is an alkene , Y : is an alkyne

6 1st <sup>22</sup> if you have the following four compounds :

A	B	C	D
$C_3H_8$	$C_6H_6$	$C_8H_{10}$	$C_2H_2$

Which of the following is correct ?

- (a) A is an unsaturated aliphatic compound and C is aromatic compound  
 (b) A is saturated aliphatic compound and D is unsaturated aliphatic compound  
 (c) B is aromatic compound and D is saturated aliphatic compound  
 (d) C is aromatic compound and B is saturated aliphatic compound

7 2nd <sup>22</sup> From the opposite table, one of the following statements

A	B	C	D
$C_3H_4$	$C_{10}H_8$	$C_4H_8$	$C_{10}H_{22}$

represents the substances A,B,C and D

- (a) A:aromatic/ B:alkyne/ C:alkene / D:alkane  
 (b) A:alkane / B:aromatic / C:alkane / D:alkene  
 (c) A:alkyne / B:aromatic / C:alkene / D:alkane  
 (d) A:cyclo alkane/B:aromatic /C:alkane/D:alkane

## Methane

- 8 Exp <sup>21</sup> Dry distillation for sodium pentanoate salt ( $C_4H_9COONa$ ) in presence of Soda lime ..... is produced
- (a) butene      (b) pentene      (c) pentane      (d) butane
- 9 2nd <sup>23</sup> Which of the following compounds produces 2,2-dimethyl propane by dry distillation?.....
- (a) sodium pentanoate  
(b) sodium hexanoate  
(c) 3,3-dimethyl sodium butanoate  
(d) 2,2-dimethyl sodium propanoate
- 10 2nd <sup>21</sup> which of the following processes may produce propane ?
- (a) dry distillation or thermal catalytic cracking  
(b) destructive distillation or oxidation  
(c) polymerization or catalytic hydration  
(d) halogenation or dry distillation
- 11 2nd <sup>22</sup> The following reaction illustrate thermal



catalytic cracking of the compound Y , if the compound B is prepared by dry distillation of the salt  $C_4H_9COONa$ . So, the compounds B and Y are.....

- (a) Y: decane & B: butane      (b) Y: octane & B:butane  
(c) Y: decane & B: pentane      (d) Y: octane & B: pentane
- 12 1st <sup>21</sup> when 1 mol of an alkane (X) , and an alkene (Y) are completely combusted Separately , the number of water vapour moles which are produced from (X) And (Y) are ..... (given that n = the number of carbon atoms)
- (a) from X (n+1) , from Y (n)  
(b) from X (n-1) , from Y (n+1)  
(c) from X  $[(3n+1) / 2]$  , from Y  $[(3n) / 2]$   
(d) from X (3n+1) , from Y (3n)



## Alkenes

13 1st<sup>22</sup> If the number of atoms in the molecule of an olifene is 18 , the number of its unbranched isomers is .....

- (a) 13                      (b) 6                      (c) 4                      (d) 3

14 1st<sup>21</sup> the number methylene groups in ethyl butene equals .....

- (a) 3                      (b) 2                      (c) 4                      (d) 1

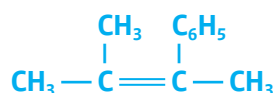
15 2nd<sup>21</sup> the number of methylene groups in 2,2-dimethyl butane is equal to the number Of methyl groups in .....

- (a) propene                      (b) propane                      (c) pentane                      (d) ethyne

16 Exp<sup>21</sup> the correct nomenclature for this compound (2-bromo-5-ethyl-4-hex-ene) According to iupac system is .....

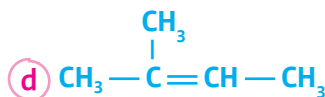
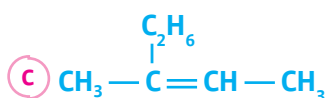
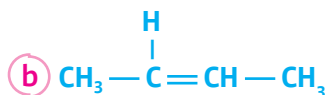
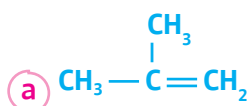
- (a) 6-bromo -3- methyl -3- heptene                      (b) 2-bromo -5- ethyl -4- heptene  
(c) 2-bromo -5- methyl -4- heptene                      (d) 6-bromo -2- ethyl -2- hexene

17 1st<sup>22</sup> the name of the following compound according to IUPAC is .....

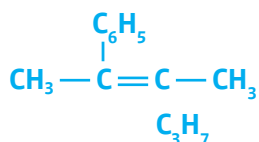


- (a) 2-phenyl-3-methyl-2-butene                      (b) 2,3-dimethyl-2-nonene  
(c) 2-methyl-3-phenyl butene                      (d) 2-methyl-3-phenyl-2-butene

18 2nd<sup>22</sup> Structural formula of the compound 2-methyl-2-butene is.....

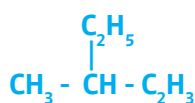


19 Exp <sup>23</sup> The correct name for the opposite compound according to IUPAC system is.....



- a 4,5-dimethyl decane
- b 2-Phenyl -3-methyl-2-hexene
- c 3-methyl -3-Phenyl-2-hexene
- d 2-propyl -3- phenyl butane

20 1st <sup>23</sup> The correct name for the opposite compound



according to IUPAC system is.....

- a 3-methyl 1-pentene
- b 2-methyl butane
- c 2-ethyl butane
- d 2-methyl-4-pentene

21 2nd <sup>21</sup> two organic compound (A) and (B) , they are open chain hydrocarbon compounds , The compound (A) has 3 carbon atoms , the compound (B) has 6 carbon atoms The compound (B) is chemically more active than (A) , the two compounds (A) And (B) are .....

- a A : is gaseous alkane , B : is liquid alkene
- b A : is liquid alkane , B : is liquid alkene
- c A : is gaseous alkane , B : is gaseous alkene
- d A : is gaseous alkane , B : is liquid alkane

22 2nd <sup>21</sup> one mole of ethene reacts with an excess of chlorine , the number of chlorine moles Required to obtain halogenated compound does not contain hydrogen (in suitable conditions for these reactions) equals .....

- a 1 mol
- b 5 mol
- b 2.5mol
- c 1.5 mol



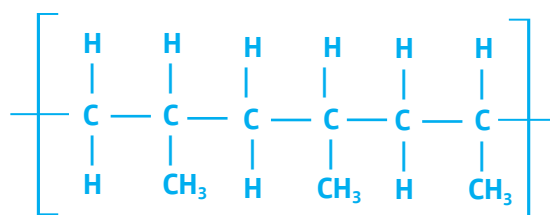
26 2nd <sup>21</sup> the reaction of 1-butene with colorless hydrogen peroxide is considered as a Reaction of .....

- (a) oxidation and reduction , and it is consider as a test for presence of double bond
- (b) oxidation only , and it is consider as a test for presence of double bond
- (c) oxidation and reduction , but not consider as a test for presence of double bond
- (d) oxidation only , and it is consider as a test for presence of double bond

27 2nd <sup>22</sup> The reaction of ethene gas with potassium permanganate in alkaline medium is considered as:

- (a) oxidation reduction and is not used to detect the double bond
- (b) oxidation reduction and is used to detect the double bond
- (c) oxidation only and is used to detect the double bond
- (d) oxidation only and is not used to detect the double bond

28 1st <sup>23</sup> The monomer of the following polymer is considered as isomer to:.....



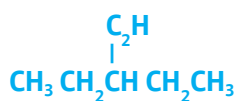
- (a) cyclo propane
- (b) cyclo butane
- (c) propane
- (d) propene

29 2nd <sup>23</sup> The required monomer to produce a polymer which is used in manufacture of the floor insulator can be prepared from one of the following reactions....

- (a) ethyne with  $\text{Cl}_2$
- (b) ethyne with  $\text{HCl}$
- (c) ethene with  $\text{HCl}$
- (d) ethene with  $\text{Cl}_2$

## Alkynes

30 2nd<sup>23</sup> The correct IUPAC name for the following compound is :



- (a) 3-methyl-1-pentene  
 (b) 3-ethyl-1-pentyne  
 (c) 3-methyl pentane  
 (d) 3-ethyl-1-pentene

31 Exp<sup>23</sup> the number of isomerism of alkyne has three carbon atoms ,bromine atm and chloine atom equals

- (a) 5                      (b) 2                      (c) 4                      (d) 3

32 1st<sup>22</sup> the following reactions occurs in suitable conditions to produce the compounds X and Y as follows :



The compound Z is .....

- (a) ethyne bromide                      (b) ethyl bromide  
 (c) 1-bromo ethanol                      (d) vinyl bromide

33 Exp<sup>21</sup> X , Y and Z are three opened chained hydrocarbons , if :

- (X) reacts by addition at two stages  
 (Y) its all bonds are strong sigma bonds  
 (Z) decolourizes the colour of potassium permanganate solution in alkaline medium

Which of the following choices expresses the compound (X , Y and Z)

	X	Y	Z
(a)	Alkane	Alkyne	Alkene
(b)	Alkyne	Alkane	Alkene
(c)	Alkene	Alkane	Alkyne
(d)	Alkyne	Alkene	Alkane

34 1st<sup>21</sup> which of the following expresses saturated hydrocarbon which does not contain methyl group ?

- (a)  $C_3H_{12}$       (b)  $C_6H_{12}$       (c)  $C_7H_6$       (d)  $C_7H_{12}$

35 Exp<sup>21</sup> Adding 2 moles of red bromine dissolved in carbon tetrachloride to 1 mole of the following compounds (2-butyne, pentane, 2-hexene) The correct change that happens to the solution colour .....

	2-butyne	Pentane	2-hexene
(a)	Unchanged	The colour disappears	Unchanged
(b)	The colour disappears	Unchanged	Unchanged
(c)	Unchanged	Unchanged	The colour disappears
(d)	Unchanged	Unchanged	Unchanged

36 Exp<sup>21</sup> 0.5 mole of hydrocarbon compound reacts with 1 mole of bromine dissolved in carbon tetrachloride, the formula of the producing compound is .....

- (a)  $C_nH_{2n-2}Br_4$       (b)  $C_nH_{2n-2}Br_2$       (c)  $C_nH_{2n}Br_4$       (d)  $C_nH_{2n}Br_2$

37 1st<sup>21</sup> The following table represents the molecular formulas for 2 substances (X) and (Y)

(X)	(Y)
$C_2H_2Br_2$	$C_4H_6$

When one mole of bromine dissolved in carbon tetrachloride is added to one mole of each of the 2 substances (X) and (Y), which of the following is Correct ?

- (a) the color of bromine discharges with (X) and does not change with (Y)  
 (b) the color of bromine does not change with both of (X) and (Y)  
 (c) the color of bromine discharges with both of (X) and (Y)  
 (d) the color of bromine does not change with (X) and discharges with (Y)

38 1st<sup>22</sup> from the following diagram :



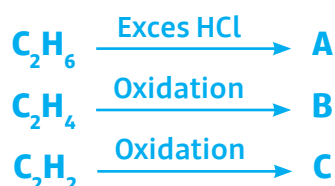
Compounds A , B , C are .....

- (a) A : is alkene derivative , B : alkyne and C : is alkane derivative
- (b) A : is alkyne , B : alkene derivative and C : is alkane derivative
- (c) A : is alkyne derivative , B : alkane derivative and C : is alkene derivative
- (d) A : is alkene derivative , B : alkene derivative and C : is alkane derivative

39 1st<sup>22</sup> the compound up on which the markownnikoffs rule could be applied are .....

- (a)  $\text{CH}_3\text{CCCH}_3$  ,  $\text{CH}_3\text{CHCHCH}_3$
- (b)  $\text{CH}_3\text{CCCH}_3$  ,  $\text{CH}_2\text{CHCH}_2\text{CH}_3$
- (c)  $(\text{CH}_3)_2\text{CCH}_2$  ,  $\text{CH}_3(\text{CH}_2)_2\text{CH}_3$
- (d)  $(\text{CH}_3)_2\text{CHCH}_3$  ,  $\text{CH}_3\text{CCCH}_3$

40 Exp<sup>22</sup> From the following reactions that occur at suitable conditions



The correct arrangement of the molecular mass of compound A,B,C is

- (a)  $\text{C} > \text{B} > \text{A}$
- (b)  $\text{A} > \text{C} > \text{B}$
- (c)  $\text{A} > \text{B} > \text{C}$
- (d)  $\text{B} > \text{C} > \text{A}$

41 1st<sup>22</sup> the product of catalytic hydration of propyne is .....

- (a)  $\text{CH}_3\text{CH}_2\text{CHO}$
- (b)  $\text{CH}_3\text{COCH}_3$
- (c)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
- (d)  $\text{CH}_3\text{CHOHCH}_3$

42 Exp<sup>21</sup> the correct arrangement for the steps of preparing alkane from alkyne is .....

- (a) Oxidation – dry distillation – neutralization by NaOH – catalytic hydration
- (b) neutralization by NaOH – dry distillation – catalytic hydration – Oxidation
- (c) dry distillation – neutralization by NaOH – catalytic hydration – Oxidation
- (d) catalytic hydration – Oxidation – neutralization by NaOH – dry distillation

43 1st<sup>22</sup> The processes which lead to obtain acetic acid from sodium acetate in suitable Conditions are .....

- (a) strong heating then rapid quenching – combustion – catalytic hydration – reduction
- (b) dry distillation - strong heating then rapid quenching - catalytic hydration -oxidation
- (c) dry distillation - catalytic hydration – reduction
- (d) strong heating - catalytic hydration – oxidation

44 Exp<sup>21</sup> to obtain hexachloroethane from ethyne , the following processes are carried out:

- (a) adding chlorine then eliminating hydrogen
- (b) adding hydrogen then adding chlorine
- (c) adding chlorine then substituting hydrogen
- (d) adding chlorine then adding hydrogen

45 2nd<sup>23</sup> (A) and (B) are unsaturated aliphatic hydrocarbons don't belong to the same homologous series, on adding bromine water to both of them separately, the produced compounds may be .....

- (a)  $C_2H_2Br_2$  &  $C_2H_5Br$
- (b)  $C_2H_3Br$  &  $C_2H_5Br$
- (c)  $C_2H_2Br_2$  &  $C_2H_4Br_2$
- (d)  $C_2H_3Br$  &  $C_2H_4Br_2$

46 2nd<sup>22</sup> An alcohol can be obtained from ethyne at certain condition by.....

- (a) hydration then oxidation
- (b) polymerization then nitration
- (c) polymerization then alkylation
- (d) hydration then reduction

47 One of the following processes used to obtain ethanoic acid from the simplest aliphatic compound..

- (a) heating then fast cooling / catalytic hydration / reduction
- (b) halogenation / hydrolysis / oxidation
- (c) heating then fast cooling / catalytic hydration / oxidation
- (d) halogenation / hydration / reduction

## Cycloalkanes

48 1st<sup>23</sup> The molecular formula ( $C_5H_{10}$ ) represents three saturated aliphatic hydrocarbons compounds A, B, and C:

- (A) doesn't contain methyl groups
- (B) contains only one methylene group
- (C) contains only one methyl group

The right arrangement for these compounds according to their activity is:.....

- (a)  $A < C < B$
- (b)  $A < B < C$
- (c)  $B < C < A$
- (d)  $C < A < B$

49 1st<sup>21</sup> which of the following properties of cyclobutane is correct ?

- (a) less active than cyclopentane
- (b) more stable than normal pentane
- (c) faster in combustion than cyclopentane
- (d) slower in combustion than normal pentane

50 1st<sup>21</sup> All the following are correct for cyclohexane except....

- (a) saturated cyclic compound
- (b) can be obtained from aromatic compound
- (c) stable alkane
- (d) its molecule contains 12 atoms

51 1st<sup>23</sup> The following steps takes place to convert a compound its general formula  $C_nH_{2n+2}$  to a compound its general formula  $C_nH_{2n}$  except:.....

- (a) strong heat then quick cooling - polymerization - hydrogenation
- (b) reforming - alkylation - hydrogenation
- (c) halogenation - alkaline hydrolysis - dehydration
- (d) strong heat then quick cooling - catalytic hydration - reduction

## Benzene

52 1st<sup>22</sup> The number of hydrogen moles needed to be added to one mole of diphenylacetylene to convert it to a saturated compound is equal to

- a) 4 mol.
- b) 5 mol
- c) 6 mol.
- d) 8 mol.

53 Exp<sup>23</sup> The number of hydrogen moles needed to be added to 2 moles from phenyl acetylene

- a) 5 mol.
- b) 10 mol
- c) 4 mol.
- d) 6 mol.

54 Exp<sup>23</sup> by using the following diagram :



The process (1) and the compound (A) are .....

- a) 1: Polymerization (A) :Cyclohexane
- b) 1: Hydrogenation (A) :Cyclohexane
- c) 1: Hydrogenation (A) :hexene
- d) 1: Polymerization (A) :Hexane

55 2nd<sup>22</sup> One of the following processes can be used to obtain an aliphatic compound used as insecticide from calcium carbide...

- a) dropping water / polymerization / halogenation by addition
- b) dropping water / hydrogenation / oxidation
- c) dropping water / hydrogenation / reduction
- d) dropping water / polymerization / halogenation by substitution

56 Exp<sup>23</sup> One of the following processes can be used to obtain insecticide with 18 atoms from alkane with 5 atoms...

- (a) strong heating then fast cooling then halogenation then polymerization
- (b) polymerization then halogenation then strong heating then rapid quenching
- (c) strong heating then fast cooling then polymerization then halogenation
- (d) Halogenation then strong heating then rapid quenching then polymerization

57 Exp<sup>21</sup> the aromatic compound of molecular formula  $C_8H_{10}$  can be prepared From reaction of .....

- (a) Methyl chloride with benzene in presence of anhydrous aluminum chloride
- (b) Ethyl chloride with benzene in presence of anhydrous aluminum chloride
- (c) Heating heptane in presence of platinum
- (d) Heating hexane in presence of platinum

58 1st<sup>23</sup> From the opposite scheme:



,So both (A) and (B) are:.....

- (a) (A): secondary propyl chloride , (B): 1-phenyl propane
- (b) (A): primary propyl bromide , (B): 1-phenyl propane
- (c) (A): secondary propyl chloride , (B): 2-phenyl propane
- (d) (A): primary propyl bromide , (B): 2-phenyl propane

59 1st<sup>22</sup> When nitration of the opposite compound, So, the product is .....

- (a) ortho nitro benzaldehyde
- (b) para nitro benzaldehyde
- (c) meta nitro benzaldehyde
- (d) mixture of ortho and para nitro benzaldehyde



60 1st<sup>21</sup> one performing nitration process to the compound produced from thermal

Catalytic reforming of normal heptane gives .....

- a) an insecticide
- b) an artificial detergent
- c) an explosive substance its molecular formula  $C_5H_2N_3O_7$
- d) an explosive substance its molecular formula  $C_7H_5N_3O_6$

61 2nd<sup>21</sup> metachlorobenzoic acid can be obtained from ethyne by the following processes .....

- a) polymerization → oxidation → halogenation → alkylation
- b) polymerization → alkylation → oxidation → halogenation
- c) alkylation → polymerization → halogenation → oxidation
- d) oxidation → polymerization → halogenation → alkylation

62 1st<sup>21</sup> to obtain the simplest aromatic compound from the aromatic compound which have the formula  $C_7H_8$ , the correct arrangement for the required process are .....

- a) Neutralization, oxidation, dry distillation
- b) oxidation, dry distillation, Neutralization
- c) Neutralization, dry distillation, oxidation
- d) oxidation, Neutralization, dry distillation

63 2nd<sup>21</sup> to obtain an organic monobasic aromatic acid from aromatic compound so, the required steps in sequence are :

- a) reduction, alkylation then oxidation
- b) nitration, alkylation then reduction
- c) reduction, halogenation then hydrolysis
- d) nitration, halogenation then oxidation

64 Exp <sup>21</sup> to obtain cycloalkane from calcium carbide , we will do the following Steps

- .....
- a) reaction with water , hydrogenation , polymerization
  - b) hydrogenation , polymerization , reaction with water
  - c) reaction with water , polymerization , hydrogenation
  - d) hydrogenation , reaction with water , polymerization

65 2nd <sup>22</sup> According to the following diagram:



Which of the following is correct?....

- a) (X) toluene, (Z) methyl chloride
- b) (X) toluene, (Z) benzoic acid
- c) (Z) sodium benzoate, (Y) benzoic acid
- d) (X) methane, (Y) sodium acetate

66 Exp <sup>21</sup> starting with saturated aliphatic compound , benzoic acid can be obtain Through .....

- a) oxidation then halogenation
- b) polymerization then oxidation
- c) polymerization then hydrogenation
- d) catalytic reforming then oxidation

67 2nd <sup>23</sup> Study the given diagram then answer

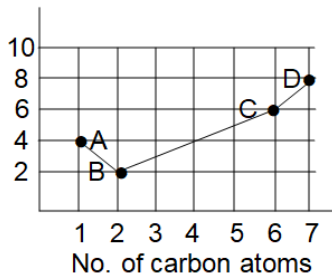


Which of the following is correct for X and Y?....

- a) X and Y react by addition
- b) X and Y react by substitution
- c) Y reacts by addition only
- d) X reacts by substitution only

68 2nd<sup>23</sup> from the given graph How to obtain The compound (D) from compound (A).....?.....

No. of hydrogen atoms

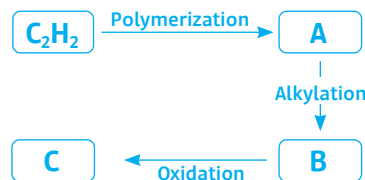


- (a) strong heating and rapid quenching - alkylation - polymerization
- (b) strong heating and rapid quenching - polymerization - alkylation
- (c) polymerization - alkylation - strong heating and rapid quenching
- (d) polymerization - strong heating and rapid quenching - alkylation

69 hydrogenation of the compound produced from reduction of phenol , in suitable conditions leads to from .....

- (a) picric acid
- (b) aliphatic compound
- (c) vinyl chloride
- (d) aromatic compound

70 1st<sup>21</sup> from the following diagram :



then, the compound (C) is .....

- (a)  $C_6H_6O_2$
- (b)  $C_7H_6O_2$
- (c)  $C_7H_6O_3$
- (d)  $C_6H_8O_3$

## Alcohols

71 2nd<sup>21</sup> the molecular formula  $C_3H_6O$  may represent .....

- (a) primary alcohol or ether                      (b) secondary alcohol or ketone  
(c) aldehyde or ketone                              (d) aldehyde or ether

72 1st<sup>22</sup> the molecular formula  $C_4H_8O$  expresses .....

- (a) butanoic or butanal                              (b) 2-methyl propanal or butanone  
(c) butanol or butanone                              (d) butanoic or 2-methyl propanol

73 Exp<sup>23</sup> the molecular formula  $C_5H_{10}O$  expresses .....

- (a) Ethyl propyl ether and pentanal  
(b) Butanoic acid and 3-pentanol  
(c) Pentanoic acid and 3-methyl butanone  
(d) 2-methyl butanal and pentanone

74 Exp<sup>21</sup> the common name of the compound  $(CH_3)_3CCl$  is .....

- (a) 2-methyl -2-chloro propane                      (b) secondary butyl chloride  
(c) 2-chloro -2-methyl propane                      (d) tertiary butyl chloride

75 Exp<sup>21</sup> When alkaline hydrolysis occurs for  $C_3H_7Br$  which doesn't contain methyl-ene group so, the produced compound is .....

- (a) secondary alcohol only                              (b) primary alcohol only  
(c) primary or secondary alcohol                      (d) primary or tertiary alcohol

76 1st<sup>21</sup> When alkaline hydrolysis occurs for  $C_3H_7Br$  the produced compound is

- (a) secondary alcohol only                              (b) primary alcohol only  
(c) primary or tertiary alcohol                              (d) primary or secondary alcohol

77 2nd<sup>21</sup> alkaline hydrolysis for primary alkyl halide forms the compound (A) and Alkaline hydrolysis for secondary alkyl halide forms the compound (B) , the Compound (A) and (B) are .....

- (a) A : 2-butanol , B : isobutyl alcohol
- (b) A : 1-butanol , B : 2-methyl-2-propanol
- (c) A : 2-methyl-2-propanol , B : 1-butanol
- (d) A : 2-methyl-1-propanol , B : 2-butanol

78 2nd<sup>22</sup> The following reactions at suitable conditions used to obtain the compounds B, C, and D



So, A ,C and D are:

- (a) A:sodium butanoate ,C: 1-chloropropane , D: primary alcohol
- (b) A:sodium butanoate ,C: 1-chloropropane , D: secondary alcohol
- (c) A:sodium propanoate ,C: 1-chloropropane , D: primary alcohol
- (d) A:sodium propanoate ,C: 2-chloropropane , D: secondary alcohol

79 Exp<sup>23</sup> Which of the following reaction results doesn't remove the color of alkaline potassium permanganate solution ?

- (a) adding one mole of hydrogen to one mole of propyne
- (b) adding one mole of HBr to one mole of 2-methyl-2-butene
- (c) Removing water from 1-butanol
- (d) Removing water of 2-methyl-2-propanol

80 1st<sup>21</sup> if you have 2 compound (A) and (B) , the compound (A) is an opened chain Alkane , its molecular mass is 58 , the compound (B) is saturated monohydric alcohol its molecular mass is 60 , so the 2 compound (A) and (B) are ..... (C = 12, H = 1, O = 16)

- (a) (A) is a gas , (B) has less boiling point than (A)
- (b) (A) is a liquid , (B) has higher boiling point than (A)
- (c) (A) is a gas , (B) has higher boiling point than (A)
- (d) (A) is a liquid , (B) has less boiling point than (A)

81 Exp <sup>21</sup> by using the following figure :



Where one mole of the compound (B) contains 12 moles of atoms, then The compounds (A) , (B) and (C) are .....

	(A)	(B)	(C)
a	2-bromo propane	propyl alcohol	propanoic acid
b	2-bromo propane	isopropyl alcohol	acetone
c	ethyl chloride	ethyl alcohol	acetic acid
d	ethyl chloride	ethyl alcohol	acetaldehyde

82 1st <sup>22</sup> in the following reaction diagram (at suitable conditions) :



Compound B is .....

- a aromatic acid    b ester    c ketone    d aliphatic acid

83 1st <sup>21</sup> by using the following figure :



Where one mole of the compound (C) contains 5 mole atom then The compound (A) , (B) and (C) are .....

	(A)	(B)	(C)
a	methyl chloride	methanol	formic acid
b	methyl chloride	ethanol	acetic acid
c	methyl chloride	methanol	formaldehyde
d	ethyl chloride	ethanol	acetaldehyde

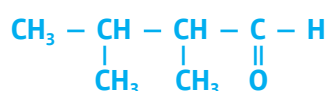
84 2nd<sup>22</sup> According to the following diagram:



So, one of the following is correct.....

- (a) A: bromo ethane, B: ethanol
- (b) A: 1,1-dibromo ethane, B: ethylene glycol
- (c) A: 1,2-dibromo ethane, B: ethylene glycol
- (d) A: bromo ethane, B: ethanal

85 1st<sup>21</sup> oxidation of the following compound gives .....



- (a) 2,3-dimethyl propanoic acid
- (b) 2,3-dimethyl butanoic acid
- (c) 2,3-diethyl butanoic acid
- (d) 2,4-diethyl propanoic acid

86 2nd<sup>21</sup> (A) and (B) are hydrocarbon derivatives , the compound (A) is produced from Reduction of compound (B) , then (A) and (B) are .....

- (a) A:  $\text{CH}_3 - \overset{\text{O}}{\parallel} \text{C} - \text{CH}_3$  , B:  $(\text{CH}_3)_2\text{CHOH}$
- (b) A:  $(\text{CH}_3)_2\text{CHOH}$  , B:  $\text{CH}_3\text{CHO}$
- (c) A:  $(\text{CH}_3)_2\text{CHOH}$  , B:  $\text{CH}_3 - \overset{\text{O}}{\parallel} \text{C} - \text{CH}_3$
- (d) A:  $\text{CH}_3\text{COOH}$  , B:  $\text{CH}_3\text{CH}_2\text{OH}$

87 Exp<sup>23</sup> A,B,C are three organic compounds , A,C change the color of acidified potassium dichromate but B doesn't change the color of acidified potassium dichromate Which of the following choices is correct ?

- (a) (A) :  $\text{C}_2\text{H}_5\text{COCH}_3$  (C) :  $\text{C}_4\text{H}_9\text{OH}$
- (b) (B) :  $\text{C}_3\text{H}_7\text{CHO}$  (A) :  $\text{C}_2\text{H}_5\text{COCH}_3$
- (c) (A) :  $\text{C}_3\text{H}_7\text{COOH}$  (C) :  $\text{C}_3\text{H}_7\text{OH}$
- (d) (A) :  $\text{C}_3\text{H}_7\text{CHO}$  (B) :  $\text{C}(\text{CH}_3)_3\text{OH}$

88 Exp<sup>23</sup> X,Y,Z are three organic compounds , (X) : Can be oxidised and reduced (Y) : is isomer for alcohol (Z) : is produced by the reaction of acid and alcohol?

- (a) (X) : aldehyde (Y) : ether
- (b) (X) : ketone (Z) : ester
- (c) (X) : aldehyde (Z) : ether

(d) (X) : alcohol (Y) : ester

89 Exp <sup>23</sup> A,B,C are three organic compounds, (A) : is organic solvent (B) : is used to prepare a gas used in midrex furnace (C) : is prepared by removing water from tertiary alcohol ?

- (a) (A) : Alcohol (B) : Ethane (c) : diethyl ether  
 (b) (A) : Benzene (B) : Methane (c) : Branched alkene  
 (c) (A) : Branched alkene (B) : Benzene (c) : Methane  
 (d) (A) : Benzene (B) : Methane (c) : Branched alkane

90 Exp <sup>23</sup> : all the following reactions produces water ,except

- (a) Burning of ethane  
 (b) reaction of propanoic acid with methanol  
 (c) adding Acidified  $\text{KMnO}_4$  to 1- propanol  
 (d) polymerization of propene

91 1st <sup>23</sup> Three organic compounds from hydrocarbon derivatives:

-the compound (A) cannot be oxidized.

-the compound (B) cannot form hydrogen bonds between its molecules.

-the compound (C) cannot react by addition.

Then the compounds (A), (B) and (C) are:.....

- (a) (A):  $\text{C}(\text{CH}_3)_3\text{OH}$ , (B):  $\text{CH}_3\text{-O-CH}_3$ , (C):  $\text{C}_3\text{H}_5(\text{OH})_3$   
 (b) (A):  $\text{C}_3\text{H}_7\text{COOH}$ , (B):  $\text{C}_2\text{H}_5\text{OH}$ , (C):  $\text{C}_6\text{H}_5\text{OH}$   
 (c) (A):  $\text{C}_2\text{H}_5\text{CO-CH}_3$ , (B):  $\text{CH}_3\text{COOCH}_3$ , (C):  $\text{C}_6\text{H}_5\text{OH}$   
 (d) (A):  $\text{CH}_3\text{CHOHCH}_3$ , (B):  $\text{CH}_3\text{-O-CH}_3$ , (C):  $\text{C}_3\text{H}_5(\text{OH})_3$

92 1st <sup>23</sup> From the following table:

The compound	A	B	C
Solubility in water at 25°C	soluble	insoluble	Sparingly soluble

- (a) (A): ethene, (B): benzene, (C): carbolic acid  
 (b) (A): ethene, (B): carbolic acid, (C): cyclohexane  
 (c) (A): isopropyl alcohol, (B): ethene, (C): carbolic acid  
 (d) (A): ethyl alcohol, (B): acetic acid, (C): cyclohexane

93 2nd<sup>23</sup> A and B are two organic compounds, general formula of A is  $(C_nH_{2n})$  and that of B is  $(C_nH_{2n-2})$  when catalytic hydration then complete oxidation takes place for both separately producing a compound its general formula is



94 2nd<sup>23</sup> The correct IUPAC name for the compound which has a molecular formula  $[C_4H_{10}O]$  is....

(a) 2-methyl-2-propanol

(b) butanone

(c) butanal

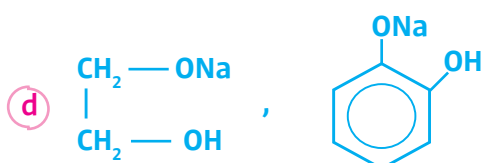
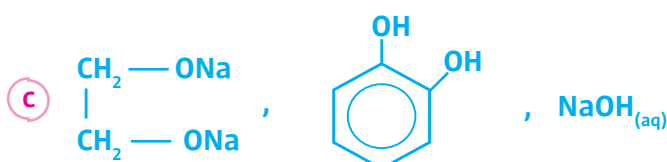
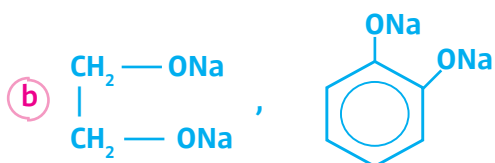
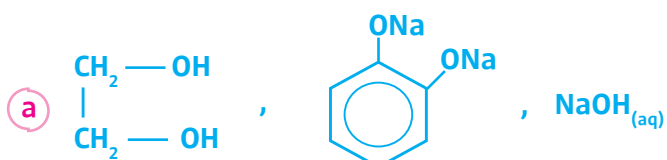
(d) 2-methyl propanal

## Phenols

- 95 1st <sup>21</sup> (A) and (B) are hydrocarbons derivatives , they have some chemical properties where : (A) can be used as fuel (B) enter is preparation of one of plastic products Then (A) and (B) are .....
- (a) A : alcohol , B : alkyl halide      (b) A : phenol , B : acid  
 (c) A : ester , B : aldehyde      (d) A : alcohol , B : phenol

- 96 2nd <sup>21</sup> iron III chloride is added to hydroxyl compounds (A) and (B) separately , A violet color is produced with (A) , but no change occurs with the compound (B) Which of the following correctly represents the bonds energy ?
- (a) (O - H) in the compound (A) is more than (O - H) in the compound (B)  
 (b) (O - H) in the compound (A) is less than (O - H) in the compound (B)  
 (c) (C - O) in the compound (B) is more than (C - O) in the compound (A)  
 (d) (C - O) in the compound (B) is equal to (C - O) in the compound (A)

- 97 1st <sup>23</sup> On adding excess amount of caustic soda to a mixture of (1mol) ethylene glycol and (1mol) of catechol. the compounds which are present in the solution are.....

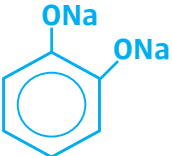


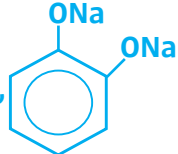
98 1st <sup>22</sup> on hydrolysis of benzene halide in alkaline medium , then nitration to the product all the following are formed , except .....

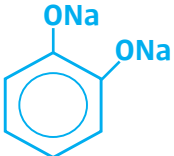
- (a) nitrobenzene
- (b) poly nitro acidic compound
- (c) explosive substance
- (d) disinfectant

99 2nd <sup>23</sup> On adding a piece of sodium to a mixture of catechol and methanol solution. So, the compounds present in the solution are.....

(a)  $\text{CH}_3\text{ONa}$  ,  $\text{NaOH}_{(\text{aq})}$

(b)  $\text{CH}_3\text{OH}$  ,  $\text{NaOH}$ , 

(c)  $\text{CH}_3\text{ONa}$  ,  $\text{NaOH}$ , 

(d)  $\text{CH}_3\text{ONa}$  , 

## Carboxylic acids

100 2nd<sup>23</sup> (A):  $C_2H_4O_2$ , (B):  $C_3H_5(OH)_3$ , (C):  $C_2H_2O_4$ , So, the correct arrangement of (A), (B) and (C) according to the number of hydrogen bonds between each two molecules is.....

- (a)  $A < C < B$                       (b)  $C < B < A$   
(c)  $B < A < C$                       (d)  $A < B < C$

101 Exp<sup>23</sup> : Two organic compounds  $C_6H_6O_2/C_8H_6O_4$  both reacts with

- (a) NaOH  
(b)  $Na_2CO_3$   
(c)  $C_2H_5OH$   
(d) HCl

102 Exp<sup>23</sup> When 2-methyl propanoic acid reacts with Sodium metal, then the product is heated with soda lime producing a compound of .....

- (a) 2-methyl propane                      (b) Butane  
(c) 2-methyl butane                      (d) propane

103 Exp<sup>23</sup> The general formulas of organic acids



Which of the following choices is correct? .....

- (a) Boiling point of B more than Boiling point of A  
(b) Reduction of A produces the simplest alcohol  
(c) Reduction of B produces compound used in thermometer  
(d) Solubility of A in water more than the solubility of B

104 2nd<sup>22</sup> The following table shows different observations on reacting 3 organic compounds A, B and C with 3 different solutions.

	solution	Observation
Compound A	$\text{KMnO}_4, \text{H}_2\text{SO}_4$	Violet disappears
Compound B	$\text{Br}_2, \text{CCl}_4$	White ppt is formed
Compound C	$\text{NaHCO}_3$	Effervescence, $\text{CO}_2$

So, one of the following is correct....

- (a) (A) propanol, (B) carbolic acid      (b) (A) carbolic acid, (B) propanol  
 (c) (B) carbolic acid, (C) propanol      (d) (A) phenol, (C) propanoic acid

105 1st<sup>23</sup> Which of the following processes takes place on mono basic carboxylic acid to convert it to neutral compound contains same number of carbon and oxygen?

- (a) complete reduction - dehydration - oxidation  
 (b) neutralization - dry distillation - halogenation  
 (c) complete reduction - dehydration - catalytic hydration  
 (d) esterification - alkaline hydrolysis - dry distillation

106 1st<sup>22</sup> three solution having the same concentrations

A	B	C
Terephthalic acid	Hydroiodic acid	Ethanoic acid

The correct arrangement of these solutions according to concentration hydrogen ions of is .....

- (a)  $C > A > B$       (b)  $B > A > C$       (c)  $A > C > B$       (d)  $A > B > C$

107 Exp<sup>23</sup> (A) and (B) are two aromatic organic compounds, the molecular formula of the compound (A) is  $\text{C}_6\text{H}_6\text{O}$ , and the compound (B) is  $\text{C}_7\text{H}_6\text{O}_3$ . So each of the 2 compounds can react with .....

- (a) Hydrochloric acid      (b) sodium carbonate  
 (c) Ethyl alcohol      (d) sodium hydroxide

132 2nd<sup>22</sup> According to:  $A + B \longrightarrow C$ , if the substances A & C react with caustic soda but the Substance B doesn't react with caustic soda, One of the following is correct.....

- (a) B: methanoic acid & C: methyl methanoate
- (b) A: phenol & B: methanoic acid
- (c) A: ethanol & B: propanoic acid
- (d) A: benzoic acid & C: methyl methanoate

133 Exp<sup>23</sup> According to the following diagram:



So, A,B are used in .

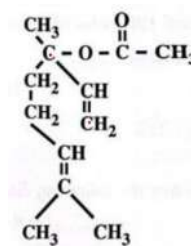
- (a) A: Fuel , B: electric insulator
- (b) A: Drugs industry , B: Car radiator
- (c) A: Car radiator, B:Heart valve
- (d) A: Heart valve , B: substitute the spoiled arteries

134 2nd<sup>21</sup> Which of the following pairs of compounds is not isomers?...

- (a) phenyl acetate & ethyl benzoate
- (b) phenyl acetate & methyl benzoate
- (c) para- chloro toluene & chloro phenyl methane
- (d) phenyl formate & benzoic acid

135 2nd<sup>23</sup> So, The opposite formula represents the chemical structure of basil ester when this compound is saturated then hydrolysis in acidic medium, the products are....

- (a) acetic acid & 3,7-dimethyl-3-octanol
- (b) ethanol & 3,7-dimethyl octanoic
- (c) acetic acid & 2,6-dimethyl-6-octanol
- (d) methanol & 3,7-dimethyl octanoic



136 2nd<sup>22</sup> The following table shows different methods to obtain the compounds A, B and C.

reactant	process	product
Ethene	oxidation	A
Ethene	Catalytic hydration	B
Triglyceride ester	Alkaline hydrolysis	C + salt of acid

So, one of the following order is correct for the boiling points of A, B and C

- (a)  $A < B < C$       (b)  $C < A < B$       (c)  $B < A < C$       (d)  $A < C < B$

137 2nd<sup>22</sup> The following table illustrates some of functional groups of the compounds A, B and C.

Compound	A	B	C
Functional group	-COOR	-COOH	-OH

So, the correct order for the number of hydrogen bonds between each 2 molecules of the same compound is.....

- (a)  $B < A < C$       (b)  $C < A < B$       (c)  $C < B < A$       (d)  $A < C < B$

138 2nd<sup>21</sup> According to the following diagram



So, the compounds (A) & (B) are....

- (a) (A): aromatic acid & (B): phenol  
 (b) (A): aromatic acid & (B): alcohol  
 (c) (A): aliphatic acid & (B): alcohol  
 (d) (A): aliphatic acid & (B): phenol

139 2nd<sup>22</sup> The following table shows different methods to obtain the compounds A, B and C.

reactant	process	product
Ethene	oxidation	A
Ethene	Catalytic hydration	B
Triglyceride ester	Alkaline hydrolysis	C + salt of acid

So, one of the following order is correct for the boiling points of A, B and C

- (a)  $A < B < C$       (b)  $C < A < B$       (c)  $B < A < C$       (d)  $A < C < B$

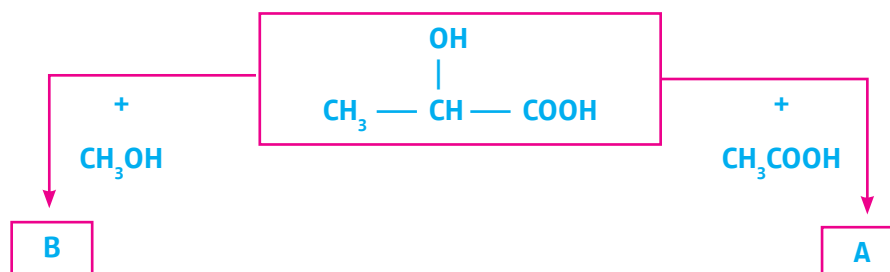
140 2nd<sup>22</sup> The following table illustrates some of functional groups of the compounds A, B and C.

Compound	A	B	C
Functional group	-COOR	-COOH	-OH

So, the correct order for the number of hydrogen bonds between each 2 molecules of the same compound is.....

- (a)  $B < A < C$       (b)  $C < A < B$       (c)  $C < B < A$       (d)  $A < C < B$

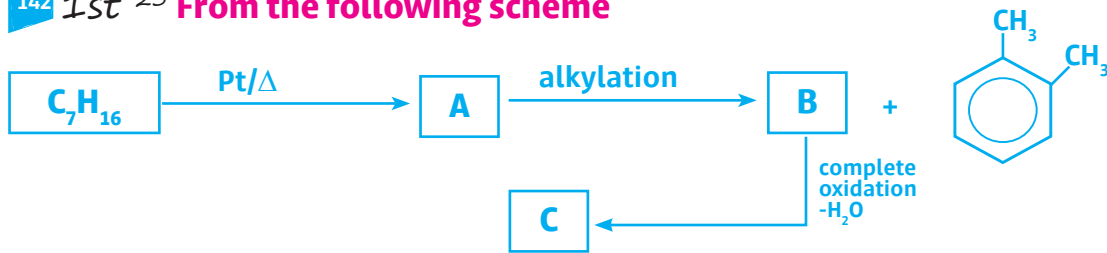
141 1st<sup>23</sup> From the following scheme:



Which of the following choices is correct?

- (a) compound A doesn't cause effervescence on adding sodium carbonate to it  
 (b) compound B forms acetamide on ammonolysis of it  
 (c) compound A removes the violet color of acidified potassium permanganate  
 (d) compound B removes the violet color of acidified potassium permanganate

142 1st<sup>23</sup> From the following scheme



Which of the following choices is correct?.....

- (a) (A): used to prepare benzoic acid , (C): is a primary substance to prepare bakelite
- (b) (A): used to prepare explosive , (C): primary substance to manufacture artificial heart valve
- (c) (A): aromatic acid ,(C): primary substance to prepare Dacron textile
- (d) (A): aliphatic hydrocarbon , (C): aromatic carboxylic acid

143 2nd<sup>21</sup> According to the following diagram



So, the compounds (A) & (B) are.....

- (a) (A): aromatic acid & (B): phenol
- (b) (A): aromatic acid & (B): alcohol
- (c) (A): aliphatic acid & (B): alcohol
- (d) (A): aliphatic acid & (B): phenol

144

2nd<sup>21</sup> ester (A) is a derivative of the product of toluene oxidation, by am-  
monolysis of this ester the two compounds (B), (C) are produced, the com-  
pound (C) is aromatic with acidic properties, which of the following choices is  
correct?

- (a) compound A is phenyl benzoate, compound B is benzamide
- (b) compound A is phenyl benzoate, compound B is benzyl alcohol
- (c) compound A is methyl benzoate, compound B is benzamide
- (d) compound A is methyl benzoate, compound B is benzyl alcohol

145

2nd<sup>22</sup> By acidic hydrolysis for butyl ethanoate, one of the following is cor-  
rect for one of the isomers of the produced alcohol

- (a)  $C_3H_7CHO$
- (b)  $C_2H_5COCH_3$
- (c)  $C_3H_7COOH$
- (d)  $C_3H_7OCH_3$

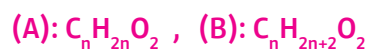
146

2nd<sup>21</sup> an organic compound (A) reacts with an organic compound (B) to pro-  
duce a chemical substance that has a role in the treatment of heart diseases, so the two  
compounds (A) and (B) are:

- (a) A: terephthalic acid, B: ethylene glycol
- (b) A: phenol, B: formaldehyde
- (c) A: phenol, B: ethylene glycol
- (d) A: glycerol, B: sulfuric acid

251

1st<sup>23</sup> The general formulas for some kinds of hydrocarbon derivatives are:



Which of the following choices is correct?.....

- (a) (A): dihydric alcohol, (B): carboxylic acid.
- (b) (A): carboxylic acid (B): dihydric alcohol.
- (c) (A): ester, (B): carboxylic acid.
- (d) (A): ester, (B): monohydric alcohol.

148 2nd<sup>21</sup> ester (A) is a derivative of the product of toluene oxidation , by ammolyis Of this ester the two compounds (B) , (C) are produced , the compound (C) is Aromatic with acidic properties , which of the following choices is correct ?

- a) compound A is phenyl benzoate , compound B is benzamide
- b) compound A is phenyl benzoate , compound B is benzyl alcohol
- c) compound A is methyl benzoate , compound B is benzamide
- d) compound A is methyl benzoate , compound B is benzyl alcohol

149 2nd<sup>22</sup> By acidic hydrolysis for butyl ethanoate, one of the following is correct for one of the isomers of The produced alcohol

- a)  $C_3H_7CHO$
- b)  $C_2H_5COCH_3$
- c)  $C_3H_7COOH$
- d)  $C_3H_7OCH_3$

150 2nd<sup>21</sup> an organic compound (A) reacts with an organic compound (B) to produce A chemical substance has a role in treatment of heart diseases , so the two Compounds (A) and (B) are :

- a) A : terphthalic acid , B : ethylene glycol
- b) A : phenol , B : formaldehyde
- c) A : phenol , B : ethylene glycol
- d) A : glycerol , B : sulfuric acid

152 1st<sup>22</sup> from the following diagram of reactions :



- (a) A : catechol , B : aspirin
- (b) A : marokh oil , B : aspirin
- (c) A : salicylic acid , B : methyl salicylate
- (d) A : benzoic acid , B : methyl benzoate

153 1st<sup>22</sup> all following compounds have hydrogen bonds among their molecules

Except .....

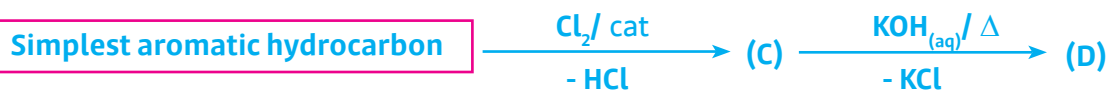
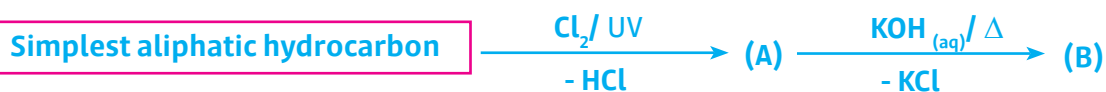
- (a) acetic acid
- (b) ethanol
- (c) dihydroxy ethane
- (d) ethyl ethanoate

154 1st<sup>22</sup> we can prepare phenyl methanoate (in suitable conditions) from reaction of .....

- (a) benzoic with methanoic acid
- (b) formic with picric acid
- (c) formic with carbolic acid
- (d) benzoic with ethanoic acid

# Essay

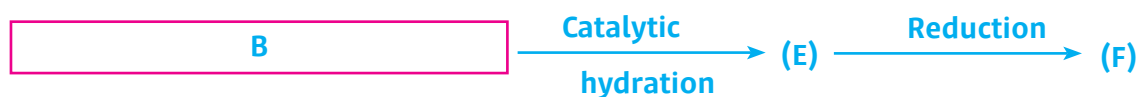
1 From the following scheme:



Deduce:

- the product of reduction of both (D), (B)
- the effect of adding hydrochloric acid to both (B) and (D) separately

2 According to the following reactions at suitable conditions::



By knowing that:

- (D) is used in treatment of burns
- (F) is used in sterilizing mouth and teeth

Write the names of the compounds: A, B, C and E

