This question paper contains 5 printed pages]

# V—39—2017

## FACULTY OF SCIENCE

## B.Sc. (First Semester) EXAMINATION

## OCTOBER/NOVEMBER, 2017

## (CBCS/CGPA Pattern)

## CHEMISTRY

Paper I

(Organic and Inorganic Chemistry)

(MCQ + Theory)

**(Thursday, 12-10-2017)** **Time : 10.00 a.m. to 12.00 noon**

*Time*—2 *Hours* *Maximum Marks*—40

*N.B.* :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Use OMR sheet for question No. 1.

(*iv*) Calculator is allowed.

(*v*) Only one answer sheet should be used for Sections A and B.

### MCQ

1. Select the correct answer for each of the following multiple choice questions :

(1) The IUPAC name of

$$CH_3 - CH_2 - CH_2 - CHO$$

is ..... .

(A) Butanol (B) Butanone

(C) Butanal (D) Butane

P.T.O.

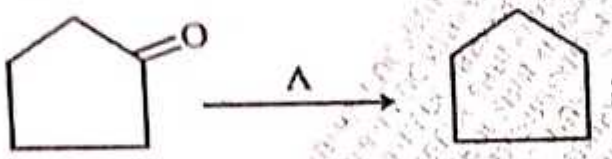
(2) Hyperconjugation effect is also known as ..... .

(A) No bond resonance

(B) Baker-Nathan effect

(C) Both (A) and (B)

(D) Inductive effect

(3)  ; A = ?

(A) $LiAlH_4$ (B) $NaBH_4$

(C) Zn-Hg/HCl (D) $KMnO_4$

(4) 1, 3-Butadiene is ..... diene.

(A) Isolated (B) Conjugated

(C) Cumulated (D) All of these

(5) ..... is used for test of unsaturation and known as ..... test.

(A) $Br_2/H_2O$; Baeyers

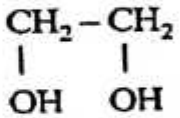
(B) alk.$KMnO_4$, Baeyers

(C) $H_2SO_4$, Baeyers

(D) HBr, Markovnikovs

(6) $CH_2=CH_2+O_2 \xrightarrow{Ag} ?$

(A) 

(B) 

(C) $CH_3–CH_2–OH$

(D) $CH_3–CHO$

(7) Free radical have ..... charge.

(A) Negative (B) Positive

(C) No (D) Both (A) and (B)

(8) The electronic configuration of the most electronegative elements is ..... .

(A) $ns^2np^3$ (B) $ns^2np^4$

(C) $ns^2np^5$ (D) $ns^2np^6$

(9) The most common oxidation state of *f*-block element is ..... .

(A) +2 (B) +3

(C) +1 (D) None of these

(10) β-quinol forms a stable clathrate with ..... .

(A) Kr (B) He

(C) Ne (D) None of these

## Theory

## Section A

## (Organic Chemistry)

2. Answer any *two* of the following :

(*a*) Give the differentiation between electrophiles and nucleophiles.

(*b*) What are cycloalkanes ? Explain Baeyer's strain theory.

(*c*) Predict the product of the following reactions :

(*i*) $2CHI_3 \xrightarrow{Ag} ?$

(*ii*) $Br-CH_2-CH_2-CH_2-CH_2-Br \xrightarrow{alc.KOH} ?$

(*iii*) $CH_3-CH_2-C\equiv C-H \xrightarrow{Pd/CaCO_3} ?$

(*iv*) $CH_2=CH-CH=CH_2 + CH_2=CH_2 \xrightarrow{\Delta} ?$

(*v*) $H-C\equiv C=H \xrightarrow{2HBr} ?$

(*d*) What are alcohols ? Give their classification with suitable example.

P.T.O.

## Section B

## (Inorganic Chemistry)

4. Answer any *two* of the following :

(*a*) Define Ionization Potential. Explain the factores affecting on it.

(*b*) Define the following terms :

(*i*) Periodicity

(*ii*) Atomic radius

(*iii*) Ionic radius

(*iv*) Covalent radius

(*v*) van der Waals radius.

(c) (*i*) Why the electron affinity of nitrogen (N) is almost zero while that of Fluorine (F) is very high ?

(*ii*) Write the electronic configuration of noble gases.

(*d*) Give the preparation and any *four* properties of $XeF_4$. Explain its structure.

This question paper contains 5 printed pages]

# W—42—2018

## FACULTY OF SCIENCE

## B.Sc. (First Year) (First Semester) EXAMINATION

## OCTOBER/NOVEMBER, 2018

## (CBCS/CGPA Pattern)

## CHEMISTRY

## Paper I

## (Organic and Inorganic Chemistry)

## (MCQ+Theory)

**(Friday, 12-10-2018)** **Time : 10.00 a.m. to 12.00 noon**

*Time—2 Hours* *Maximum Marks—40*

*N.B.* :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Use OMR sheet for Question No. 1.

(*iv*) Calculator is allowed.

(*v*) Only one answer-sheet should be used for Sections A and B.

### (MCQ)

1. Select the *correct* answer for each of the following multiple choice questions :

(*i*) The IUPAC momenclature of ether is .....

(A) Alkyl alkanoate (B) Alkoxyalkane

(C) Alkanol (D) Alkanal

(*ii*) The correct order of selection of parent chain is .....

(A) Functional group > Multiple bond > Substituent

(B) Functional group > Substituent > Multiple bond

(C) Multiple bond > Substituent > Functional group

(D) Multiple bond > Functional group > Substituent

P.T.O.

(iii) Which of the following is an electrophile ?

(A) $\ddot{N}H_3$ (B) $H_2\ddot{O}$

(C) $BF_3$ (D) $OH^-$

(iv) Breaking of carbon-carbon bond at high temperature in the absence of air is known as .....

(A) oxidation (B) reduction

(C) hydrolysis (D) pyrolysis

(v) ..... is an example of cumulated diene.

(A) 1, 3-butadiene (B) 1, 4-pentadiene

(C) 1, 2-propadiene (D) all of these

(vi) Conversion of but-1-yne to but-1-ene is ..... reaction.

(A) Addition (B) Elimination

(C) Substitution (D) Rearrangement

(vii) $CH_3-\underset{\diagdown O \diagup}{CH}-CH_2 \xrightarrow[CH_3OH]{H^+} ?$

(A) $CH_3-\underset{\displaystyle OCH_3}{\underset{|}{CH}}-CH_2-OH$

(B) $CH_3-\overset{\displaystyle OH}{\overset{|}{CH}}-CH_2-OCH_3$

(C) $CH_3-\overset{\displaystyle OH}{\overset{|}{CH}}-CH_3$

(D) $CH_3-CH_2-CH_2-OH$

(viii) Generally in a period atomic size of an atom .....

(A) Increases (B) Decreases

(C) Remains same (D) None of these

(ix) Highest ionization potential will be of .....

(A) *s*-block elements (B) *d*-block elements

(C) Halogens (D) Inert gases

(x) The no. of bond pairs and lone pairs of electron in $XeF_2$ molecule :

(A) 2 and 3 (B) 3 and 2

(C) 2 and 2 (D) 3 and 3

## (Theory)

## Section A

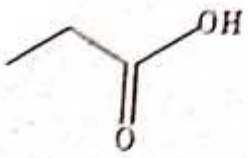
## (Organic Chemistry)

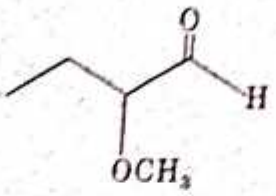
2. Answer any *two* of the following :

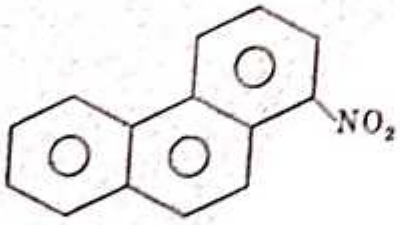
(a) Give the IUPAC names of the following :

(i) 

(ii) 

(iii) 


(iv) 


(v) 


(b) Define the following terms :

(i) Substrate

(ii) Reagent

P.T.O.

(iii) Nitrene

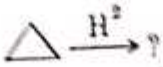
(iv) Homolytic fission

(v) Heterolytic fission.

(c) Predict the product of the following reactions :

(i) $CH_3—Mg—Br \xrightarrow{H_2O} ?$

(ii) $2CH_3COONa \xrightarrow[H_2O]{\text{Electrolysis}} ?$

(iii)  $\xrightarrow{H^+} ?$

(iv)  $\xrightarrow{\text{Raney Ni}} ?$

(v) $H—C\equiv C—H \xrightarrow{HBr} ?$

(d) What is the action of the following on 1-propene ?

(i) HBr

(ii) $Hg(OCOCH_3)_2/H_2O$, $NaBH_4$

(iii) $Cl_2/H_2O$

(iv) alk. $KMnO_4$

(v) HBr, $H_2O_2$

3. Answer any two of the following :

(a) Write a brief note on inductive effect and hyperconjugation effect.

(b) How will you convert the following :

(i) 1, 3-butadiene to cyclohexene

(ii) 1, 4-butane diol to 1, 3-butadiene

(iii) Ethene to glycol

(iv) Calcium carbide to ethyne

(v) Calcium adipate to cyclopentane.


This question paper contains 4 printed pages]

**Y—47—2019**

**FACULTY OF SCIENCE**

**B.Sc. (First Year) (First Semester) (Backlog) EXAMINATION**

**OCTOBER/NOVEMBER, 2019**

**CHEMISTRY**

Paper I

(Organic and Inorganic Chemistry)

(MCQ + Theory)

**(Wednesday, 16-10-2019)** **Time : 10.00 a.m. to 12.00 noon**

*Time—2 Hours* *Maximum Marks—40*

*N.B.* :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Use OMR sheet for question No. 1.

(*iv*) Only one answer sheet should be used for Sections A and B.

**MCQ** 10

1. Select the correct answer for each of the following multiple choice questions :

(*i*) The IUPAC name of $H_2C{=}CH{-}CH{=}CH_2$ is :

(A) 1, 4-pentadiene (B) 1, 3-butadiene

(C) 1, 2-propadiene (D) None of these

(*ii*) Which of the following carbocations will be more stable ?

(A) $\overset{\oplus}{C}H_3$ (B) $CH_3\overset{\oplus}{C}H_2$

(C) $(CH_3)_2\overset{\oplus}{C}H$ (D) $(CH_3)_3\overset{\oplus}{C}$

(*iii*) The angle strain in cyclopropane is :

(A) +24° 44′ (B) +9° 44′

(C) –5° 44′ (D) +0° 44′

P.T.O.

(iv) When electrolysis of sodium acetate is carried out, we get :

(A) Methane (B) Ethylene

(C) Ethane (D) Acetylene

(v) Ethylene on oxidation with alkaline $KMnO_4$ gives :

(A) Ethanol (B) Ethylene glycol

(C) Ethane 1, 2 diol (D) Both (B) and (C)

(vi) The reaction

$$CH_2CH = CH_2 + HBr \xrightarrow[\text{Peroxide}]{\text{Benzoyl}}$$

mainly gives :

(A) 2-bromobutane (B) 1-bromopropane

(C) 2, 2-dibromopropane (D) 1, 2-dibromopropane

(vii) Which of the following is per acids ?

(A) $CH_3COOOH$ (B) $C_6H_5COOOH$

(C) $CF_3COOOH$ (D) All of these

(viii) Which of the following statements is correct in case of electron affinity ?

(A) Electron affinity decreases along the group

(B) Electron affinity increases across the period

(C) Bath (A) and (B)

(D) None of the above

(ix) The most electromagnetic element amongst the following :

(A) F (B) Cl

(C) Br (D) I

(x) The number of lone pairs and bonded pairs present in $XeF_2$ respectively are :

(A) 2, 3 (B) 3, 2

(C) 2, 2 (D) 3, 4

## Theory

## Section-A

## (Organic Chemistry)

2. Answer any *two* of the following : 10

(a) Explain the terms electrophile and nucleophile.

(b) Write notes on :

(i) Kolbe's synthesis

(ii) Corey-House synthesis

(c) How will you prepare 1,3-butadiene from :

(i) 1,4-dibromobutane

(ii) 1, 4-butanediol.

(d) Explain ring opening reaction of epoxide by using :

(i) Acidic reagent

(ii) Basic reagent.

3. Answer any *two* of the following : 10

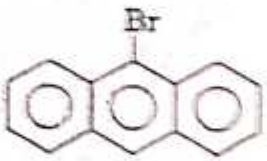
(a) How will you prepare ethyne from methane ? Explain addition of H-Br to ethyne with mechanism.

(b) What are carbocation ? Explain the formation and stability of carbocation.

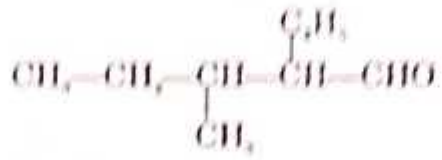
(c) Write the correct IUPAC names of the following compounds :

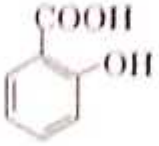
(i) $H_2C=CH—C\equiv CH$

(ii) 

(iii) 


P.T.O.

(iv) 

(v) 

(d) (i) What are alcohols ? How are they classified ?

(ii) Write the correct structure of the following :

(1) Benzyl alcohol

(2) Ethyl ethanoate.

## Section B

## (Inorganic Chemistry)

4. Answer any *two* of the following : 10

(a) Define Ionization Energy. Give any *three* factors affecting it and explain why second I.P. is greater than first I.P.

(b) Give the applications of electronegativity to bond properties.

(c) (i) Write any *five* general characteristics of *d*-block elements.

(ii) Explain the formation of compounds of inert gases under excited condition.

(d) Give any *two* methods of preparation and any *four* properties and structure of $XeF_2$.

This question paper contains 2 printed pages]

# X—28—2019

## FACULTY OF SCIENCE AND TECHNOLOGY

## B.Sc. (First Semester) (Regular) EXAMINATION

## OCTOBER/NOVEMBER, 2019

**(New Course)**

CHEMISTRY

Paper-I (CCC-I)

(Organic + Inorganic Chemistry)

**(Wednesday, 16-10-2019)** **Time : 10.00 a.m. to 12.00 noon**

*Time*—2 *Hours* *Maximum Marks*—40

*N.B.* :—Attempt *All* questions.

1. Solve any *three* of the following : 15

   (*a*) Define electronegativity. Explain the factors affecting on it.

   (*b*) Define the following terms :

   (*i*) van der Waals radius

   (*ii*) Covalent radius

   (*iii*) Periodicity

   (*iv*) Ionic radius

   (*v*) Atomic radius.

   (*c*) Explain long form of periodic table.

   (*d*) Give the preparation and any *four* properties of $XeF_2$. Explain its structure.

   (*e*) Define noble gases elements. Explain clathrates of noble gases.

2. Solve any *three* of the following : 15

   (*a*) Explain hyper-conjugation effect with suitable examples.

   (*b*) (*i*) Explain the electrophilic addition of HBr to propene with mechanism.

   (*ii*) How will you prepare ethane from sodium salt of carboxylic acid ?

   (*c*) What is carbanion ? Give structure and stability of carbanion.

   (*d*) Define the Alkynes. Explain electrophilic addition of $Br_2$ to ethyne.

   (*e*) Explain the homolytic and heterolytic fission with suitable example.

P.T.O.

10

3. Solve any *two* of the following :

(*a*) How will you prepare 1, 3-butadiene from :

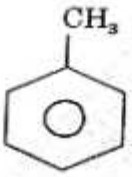
(*i*) 1, 4-dibromobutane

(*ii*) 1, 4-butanediol.

(*b*) Give the IUPAC names of the following :

(*i*) $CH_3—CH_2—\underset{\displaystyle CH_3}{\underset{|}{CH}}—CH_2—Cl$

(*ii*) $CH_3—\underset{\displaystyle NH_2}{\underset{|}{CH}}—CH_2—COOH$

(*iii*) 

(*iv*) $CH_3—CH_2—COCl$

(*v*) 

(*c*) What is Saches Mohr theory of strainless ring ?

(*d*) Draw the structures of the following compounds :

(*i*) 3-methyl butanoic acid

(*ii*) propan-2-ol

(*iii*) 1, 2-dichlorobenzene

(*iv*) Ethanoic anhydride

(*v*) Cyclopentane.



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Swami Ramanand Teertha Marathwada University, Nanded

Faculty of Science

B.Sc. First year (First Semester)

Winter -2020

Subject- Chemistry

Paper No. - I

Paper-Organic and Inorganic Chemistry (MCQ)

Cluster Code-SD

Date: 08/04/2021 Time: 10:00 Am to 11:00 Am (Marks- 40 Marks)

Note - 1. Attempt all the Questions
2. Each question carries one marks
3. No negative marking system
4. Use black ball pen to darken the circle of correctly choice in OMR answer sheet.
5.Circle once darken is final. No change is permitted.

1. In a chemical reaction, the reactant molecules undergoing attack is /are referred as .....

a) Reagent b) product c) substrate d) none of the above

2. Which of the following is not an electrophile?

a) carbonium ion b $SO_3$ c) carbene d) thioalcohol

3. Heterolytic bond fission of C-C bond producers:

a) two free radicals b) two carbanions
c) Two carbonium ion d) One cation and one anion

4. Which one species among the following carbocation is least stable?

a) $CH_3^+$ b) $CH_3CH_2^+$ c) $^+CH(CH_3)_2$ d) $^+C(CH3)_3$

Nanded

5. A free radical is a/an ....
a) short lived species
b) neutral in nature
c) paramagnetic
d) all of these

6. An electrophilic reagent is.....
a) electron rich species
b) electron deficient species
c) Lewis acid
d) both 'b' and 'c'

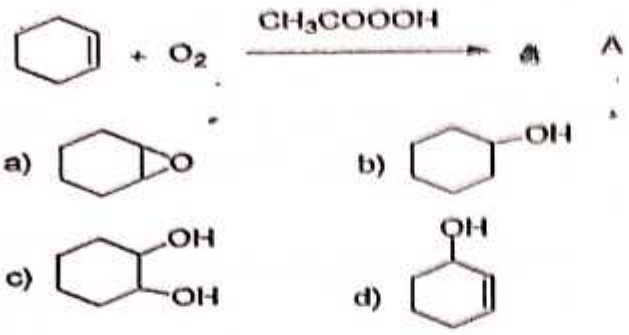
Q)

arks)

7. The IUPAC name of the compound $CH_3-\overset{O}{\overset{\|}{C}}-CH_2-CH_3$ is
a) n- propyl methyl ketone
b) 3 -pentanone
c) 4 -pentanone
d) 2 -pentanone

oice in

8. Where A is?




ng attack

e above

oalcohol

e anion

least

)3

9. The thermal decomposition of alkanes known as .....
a) Pyrrolysis
b) isomerization
c) Dehydration
d) none of the above

10. Aromatization is the process which involve conversion of .....
a) higher hydrocarbons to the lower ones
b) Alkanes to aromatic compounds
c) mixing of aromatic Hydrocarbons
d) none of the above

11. Which one of the following cycloalkanes is least stable ....
a) cyclopropane
b) cyclobutene
c) cyclopentane
d) cyclohexane

12. ..... is obtained when Iodoform is heated with Ag powder.

a) $CH_4$ b) $C_2H$ c) $C_2H_6$ d) $C_2H_2$

13. Dienes taking part in Diels-alder reaction is
a) isolated
b) cumulated
c) conjugated
d) all of these

14. All the Carbon atoms in 1,3- butadiene is ..... hybridized
a) $sp^2$ b) $sp^3$ c) sp d) none of these

15. Addition of HBr to 1-propene in the presence of peroxide follow..... rule
a) Markownikoff's'
b) Anti-Markownikoff's
c) Saytzeff's
d) Hofmann's

16.Cyclohexanol on dehydration with conc. $H_2SO_4$.....is obtain
a) hexane 1,2-diol
b) Hexene
c) epoxy hexane
d) All the above

17. Cyclic hydrocarbon containing one double bond are known as....
a) Alkanols b) Cycloalkenes c) oxonium d) Cycloalkanes

18. Hydrolysis of Calcium carbide yield .....
a) Acetylene b) Ethyne c) Eth ne d) Both a and b

19. The IUPAC name of HO-$CH_2$-$CH_2$- OOH
a) 2- hydroxy ethanoic acid b) - hydroxy propanoic a
c) 1- hydroxy ethanoic acid d) 1- hydroxy propanoic aci

20. The general formula of unsaturated hydrocarbons having ca carbon triple bonds in their molecule is .....
a) $C_nH2_{n+2}$ b) $nH_{2n-2}$
c) $C_nH_{2n}$ d) $nH_{2n+1}$

21. Formula of propanenitrile is
a) $CH_3CN$ b) $C_2H_5CN$ c) $C_3H_7CN$ d) $C_2H_5NC$

22. The Inductive effect is a ..... bond effect.
a) $\pi$ b) $\sigma$
c) both a and b d) none of the above

23. One of the groups is written as 'pref ' according to IUPAC
a) -OH b) CHO
c) $-NO_2$ d) None of these

24. Accordingto IUPACnomenclatureth suffix used for alcohol is.....
a) -one b) al
c) -ol d) both b and c

25. The IUPAC name of the $CH_3$-CO-O $H_2$-$CH_3$structure is ....
a) n- propyl methyl ketone b) ethyl ethanoate
c) 4- pentanone d) - pentanone

Swami Ramanand Teertha Marathwada University, Nanded

Faculty of Science

B.Sc. First year (First Semester)

Winter -2020

Subject- Chemistry

Paper No. - I

Paper-Organic and Inorganic Chemistry (MCQ)

Cluster Code-SD

Date 08/04/2021 ) Time: 10:00 Am to 11:00 Am (Marks- 40 Marks)

**Note -** 1. Attempt all the Questions
2. Each question carries one marks
3. No negative marking system
4. Use black ball pen to darken the circle of correctly choice in OMR answer sheet.
5.Circle once darken is final. No change is permitted.

1. In a chemical reaction, the reactant molecules undergoing attack is /are referred as .....

a) Reagent b) product c) substrate d) none of the above

2. Which of the following is not an electrophile?

a) carbonium ion b $SO_3$ c) carbene d) thioalcohol

3. Heterolytic bond fission of C-C bond producers:

a) two free radicals b) two carbanions
c) Two carbonium ion d) One cation and one anion

4. Which one species among the following carbocation is least stable?

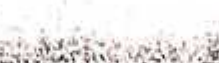
a) $CH_3^+$ b) $CH_3CH_2^+$ c) $^+CH(CH_3)_2$ d) $^+C(CH3)_3$

5. A free radical is a/an ....

a) short lived species
b) neutral in nature
c) paramagnetic
d) all of these

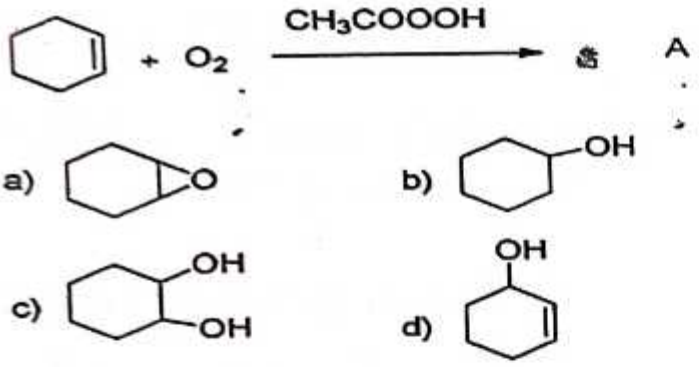
6. An electrophilic reagent is.....

a) electron rich species
b) electron deficient species
c) Lewis acid
d) both 'b' and 'c'

7. The IUPAC name of the compound  is

a) n- propyl methyl ketone
b) 3 -pentanone
c) 4 -pentanone
d) 2 -pentanone

8. Where A is?




9. The thermal decomposition of alkanes known as .....

a) Pyrrolysis
b) isomerization
c) Dehydration
d) none of the above

10. Aromatization is the p ocess which involve conversion of ....
a) higher hydrocarbons t the lower ones
b) Alkanes to aromatic co npounds
c) mixing of aromatic Hy lrocarbons
d) none of the above

11. Which one of the follc wing cycloalkanes is least stable ....
a) cyclopropane
b) cyclobutene
c) cyclopentane
d) cyclohexane

12. ..... is obtained whe Iodoform is heated with Ag powder.

a) $CH_4$ b) $C_2H$ c) $C_2H_6$ d) $C_2H_2$

13. Dienes taking part in I iels-alder reaction is
a) isolated
b) cumulated
c) conjugated
d) all of these

14. All the Carbon atoms 1 1,3- butadiene is ..... hybridized
a) $sp^2$ b) $sp^3$ ) sp d) none of these

15. Addition of HBr to 1- ropene in the presence of peroxide follow..... rule
a) Markownikoff's'
b) Anti-Markownikoff's
c) Saytzeff's
d) Hofmann's

16.Cyclohexanol on dehyc ation with conc. $H_2SO_4$.....is obtain
a) hexane 1,2-diol
b) Hexene
c) epoxy hexane
d) All the above

17. Cyclic hydrocarbon co taining one double bond are known as...
a) Alkanols b) Cycloa kenes c) oxonium d) Cycloalkanes

18. Hydrolysis of Calcium carbide yield .....
a) Acetylene b) Ethyne c) Ethene d) Both a and b

19. The IUPAC name of $HO-CH_2-CH_2-COOH$
a) 2- hydroxy ethanoic acid b) 2- hydroxy propanoic a
c) 1- hydroxy ethanoic acid d) 1- hydroxy propanoic aci

20. The general formula of unsaturated hydrocarbons having ca
carbon triple bonds in their molecule is
a) $C_nH_{2n+2}$ b) $C_nH_{2n-2}$
c) $C_nH_{2n}$ d) $C_nH_{2n-4}$

21. Formula of propanenitrile is
a) $CH_3CN$ b) $C_2H_5CN$ c) $C_3H_7CN$ d) $C_3H_5NO$

22. The Inductive effect is a ..... bond effect
a) $\pi$ b) $\sigma$
c) both a and b d) none of the above

23. One of the groups is written as 'prefix' according to IUPAC
a) -OH b) CHO
c) $-NO_2$ d) None of these

24. Accordingto IUPACnomenclatureth suffix used for alcohol is.....
a) -one b) -al
c) -ol d) both b and c

25. The IUPAC name of the $CH_3-CO-O$ $H_2-CH_3$ structure is —
a) n- propyl methyl ketone b) ethyl ethanoate
c) 4- pentanone d) 2- pentanone

**Swami Ramanand Teertha Marathwada University, Nanded**

**Faculty of Science**

**B.Sc. First year (First Semester)**

**Winter -2020**

**Subject- Chemistry**

**Paper No. - I**

**Paper-Organic and Inorganic Chemistry (MCQ)**

**Cluster Code-SD**

**Date: 08/04/2021 ) Time: 10:00 Am to 11:00 Am (Marks- 40 Marks)**

**Note -** 1. Attempt all the Questions
2. Each question carries one marks
3. No negative marking system
4. Use black ball pen to darken the circle of correctly choice in OMR answer sheet.
5.Circle once darken is final. No change is permitted.

1. In a chemical reaction, the reactant molecules undergoing attack is /are referred as .....

a) Reagent b) product c) substrate d) none of the above

2. Which of the following is not an electrophile?

a) carbonium ion b $SO_3$ c) carbene d) thioalcohol

3. Heterolytic bond fission of C-C bond producers:

a) two free radicals b) two carbanions
c) Two carbonium ion d) One cation and one anion

4. Which one species among the following carbocation is least stable?

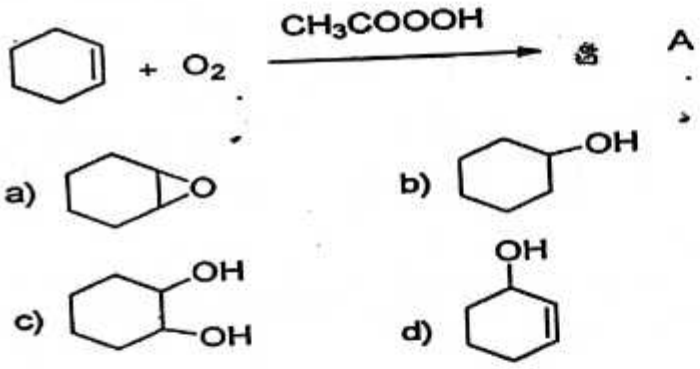
a) $CH_3^+$ b) $CH_3CH_2^+$ c) $^+CH(CH_3)_2$ d) $^+C(CH3)_3$

5. A free radical is a/an ....
a) short lived species
b) neutral in nature
c) paramagnetic
d) all of these

6. An electrophilic reagent is.....
a) electron rich species
b) electron deficient species
c) Lewis acid
d) both 'b' and 'c'

7. The IUPAC name of the compound $H_3C-\overset{O}{\overset{\|}{C}}-CH_2-CH_3$ is
a) n- propyl methyl ketone
b) 3 -pentanone
c) 4 -pentanone
d) 2 -pentanone

8. Where A is?




9. The thermal decomposition of alkanes known as .....
a) Pyrrolysis
b) isomerization
c) Dehydration
d) none of the above

10. Aromatization is the p ocess which involve conversion of .....
a) higher hydrocarbons t( the lower ones
b) Alkanes to aromatic co npounds
c) mixing of aromatic Hy lrocarbons
d) none of the above

11. Which one of the foll( wing cycloalkanes is least stable ....
a) cyclopropane b) cyclobutene
c) cyclopentane d) cyclohexane

12. ..... is obtained whe Iodoform is heated with Ag powder.

a) $CH_4$ b) $C_2H$ c) $C_2H_6$ d) $C_2H_2$

13. Dienes taking part in I iels-alder reaction is
a) isolated b) cumulated
c) conjugated d) all of these

14. All the Carbon atoms 1 1,3- butadiene is ..... hybridized
a) $sp^2$ b) $sp^3$ :) sp d) none of these

15. Addition of HBr to 1- ropene in the presence of peroxide follow..... rule
a) Markownikoff's' b) Anti-Markownikoff's
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16.Cyclohexanol on dehyc ation with conc. $H_2SO_4$.....is obtain
a) hexane 1,2-diol b) Hexene
c) epoxy hexane d) All the above

17. Cyclic hydrocarbon co taining one double bond are known as....
a) Alkanols b) Cycloa kenes c) oxonium d) Cycloalkanes

18. Hydrolysis of Calcium carbide yield .....
a) Acetylene b) Ethyne c) Eth ne d) Both a and b

19. The IUPAC name of $HO-CH_2-CH_2-$ COOH
a) 2- hydroxy ethanoic acid b) - hydroxy propanoic a
c) 1- hydroxy ethanoic acid d) 1- hydroxy propanoic aci

20. The general formula of unsaturated hydrocarbons having ca carbon triple bonds in their molecule is ....
a) $C_nH2_{n+2}$ b) $CnH_{2n-2}$
c) $C_nH_{2n}$ d) $CnH_{2n+1}$

21. Formula of propanenitrile is
a) $CH_3CN$ b) $C_2H_5CN$ c) $C_3H_7CN$ d) $C_2H_5N($

22. The Inductive effect is a ..... bond effect.
a) π b) σ
c) both a and b d) none of the above

23. One of the groups is written as 'pref' according to IUPAC
a) -OH b) CHO
c) $-NO_2$ d) None of these

24. Accordingto IUPACnomenclatureth suffix used for alcohol is.....
a) -one b) al
c) -ol d) both b and c

25. The IUPAC name of the $CH_3-CO-O($ $H_2-CH_3$structure is ....
a) n- propyl methyl ketone b) ethyl ethanoate
c) 4- pentanone d) - pentanone

This question paper contains 8 printed pages]

V—48—2017

FACULTY OF SCIENCE

B.Sc. (First Semester) EXAMINATION

OCTOBER/NOVEMBER, 2017

(CBCS/CGPA Pattern)

CHEMISTRY

Paper (CCC1)

(Physical and Inorganic Chemistry—II)

**(Saturday, 14-10-2017)** **Time : 10.00 a.m. to 12.00 noon**

*Time—Two Hours* *Maximum Marks—40*

*N.B.* — (*i*) Attempt *all* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Use OMR sheet for question No. 1.

(*iv*) Calculator and logarithmic table is allowed.

(*v*) Only one answer sheet should be use for section 'A' and 'B'.

**MCQ** 10

1. Select the correct answer for each of the following multiple choice questions.

(*i*) The value of $\log_{10} (10^{-4})$ is equal to :

(*a*) 4 (*b*) –4

(*c*) 3 (*d*) –3

(*ii*) $\int \sec^2 x \, dx = ?$

(*a*) $\sin x$ (*b*) $\cos x$

(*c*) $\tan x$ (*d*) $\text{cosec } x$

P.T.O.

(iii) Langmuir isotherm holds at low pressures but fails at :

(a) High pressure (b) Low temperature

(c) Intermediate pressure (d) None of these

(iv) The critical temperature of $CO_2$ gas is :

(a) 21°C (b) 25°C

(c) 31°C (d) 50°C

(v) At constant temperature, which of the following pairs of gas molecules have the same RMS velocity ?

(a) CO and $O_2$ (b) CO and $N_2$

(c) $N_2$ and $CO_2$ (d) $CO_2$ and CO

(vi) The ratio of spacing in case of sodium chloride (NaCl) crystal is :

(a) 1 : 0.704 : 1.136 (b) 0.705 : 1.50 : 1.136

(c) 1 : 0.504 : 0.78 (d) None of these

(vii) If the intercepts along axes are a, 3b and 2c, then Miller indices for a plane are :

(a) (2, 6, 3) (b) (1, 2, 3)

(c) (6, 2, 3) (d) (6, 3, 2)

(viii) Which of the following imparts brick red colour to the flame ?

(a) Ca (b) Ba

(c) Sr (d) None of these

(ix) $Li_2CO_3$ is ..... .

(a) Soluble in $H_2O$ (b) Sparingly soluble in $H_2O$

(c) Insoluble in $H_2O$ (d) None of these

(x) Oxidation number of 'S' in $Na_2S_4O_6$ is ..... .

(a) + 1 (b) − 1

(c) + 2 (d) − 2

## Theory

### (Physical Chemistry)

2. Answer any *two* of the following :

(a) Derive the relationship between critical constants and ven der Waals constants.

(b) Define 'Centre of Symmetry.'

Derive Bragg's equation, $n\lambda = 2d \sin \theta$.

(c) State Freundlich adsorption isotherm. Give the difference between physical adsorption and chemical adsorption.

(d) Give the relation between pH and pOH. Calculate pOH of 0.025 M NaOH solution.

3. Answer any *two* of the following :

(a) State the law of constancy of interfacial angles. Explain various types of cubic lattices.

(b) Define 'Compressibility factor'. Calculate the RMS velocity of $CO_2$ molecule at 273 K. ($R = 8.314\ JK^{-1}\ mol^{-1}$).

(c) (i) What are the factors affecting adsorption ?

(ii) Discuss 'Claude's method' of liquification of gases.

(d) (i) Find the equation of straight line passing through a point (3, 4) having slope 6.

(ii) Evaluate ${}^5P_4$.

### (Inorganic Chemistry)

4. Answer any *two* of the following :

(a) Explain the anomolous behaviour of lithium.

(b) Discuss the basic strength of hydroxides of *s*-block elements.

(c) (i) Explain the complex of alkali metal with salicylaldehyde.

(ii) Define Oxidation, Reduction, Oxidizing agent and reducing agent by Oxidation number concept.

(d) Discuss the balancing of redox reaction by ion-electron method with suitable example.



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This question paper contains 8 printed pages]

AO—47—2018

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

MARCH/APRIL, 2018

(CBCS) (UG) Courses

CHEMISTRY

Paper II

(Physical and Inorganic Chemistry)

(MCQ & Theory)

(Friday, 23-03-2018) Time : 10.00 a.m. to 12.00 noon

Time—2 Hours Maximum Marks—60

N.B. — (i) Attempt *all* questions.

(ii) *All* questions carry equal marks.

(iii) Use OMR sheet for question No. 1.

(iv) Calculator and logarithmic table is allowed.

## MCQ

1 Select the correct answer for each of the following multiple choice questions :

(i) The characteristic of $\log_{10}(0.0058)$ is :

(a) 4 (b) $\bar{4}$

(c) $\bar{3}$ (d) 2

(ii) The relation between $\sin^2 x$ and $\cos^2 x$ is given by relation :

(a) $\sin^2 x + \cos^2 x = 1$ (b) $\sin^2 x - \cos^2 x = 1$

(c) $\sin^2 x \times \cos^2 x = 1$ (d) $\frac{\sin^2 x}{\cos^2 x} = 1$

(iii) In Freundlich adsorption isotherm, when a graph is plotted between $\log \frac{x}{m}$ and $\log p$, slope of line is given by the value of :

(a) $\log n$ (b) $\log k$

(c) $\log p$ (d) $\frac{1}{n}$

P.T.O.

(*iv*) At constant temperature, which of the following pairs of gas molecules have same RMS velocity ?

(*a*) $O_2$ and CO (*b*) $N_2$ and CO

(*c*) $N_2$ and $CO_2$ (*d*) CO and $CO_2$

(*v*) In van der Waals' equation, the term which accounts for intermolecular forces is :

(*a*) RT (*b*) $V - b$

(*c*) $P + \frac{a}{V^2}$ (*d*) All of these

(*vi*) Which of the following is a non-crystalline solid ?

(*a*) ZnS (*b*) Rubber

(*c*) KCl (*d*) PbI

(*vii*) The ratio of spacing in case of potassium chloride (KCl) crystal is :

(*a*) 1 : 0.704 : 1.136 (*b*) 0.707 : 0.571 : 1

(*c*) 1 : 0.707 : 0.575 (*d*) None of these

(*viii*) Calcium imparts.....colour to the flame.

(*a*) Brick red (*b*) Crimson

(*c*) Grassy green (*d*) Crimson red

(*ix*) Which of the following elements does not react directly with hydrogen to form its hydride ?

(*a*) Be (*b*) Ca

(*c*) Mg (*d*) Sr

(*x*) Oxidation number of sulphur in $H_2SO_4$ is :

(*a*) + 5 (*b*) + 6

(*c*) + 7 (*d*) – 6

## Theory (Physical Chemistry)

2. Answer any *two* of the following :

(*a*) State and explain combination. Evaluate the value of $^8C_4$.

(*b*) What is Adsorption Isotherm ? Discuss Langmuir adsorption isotherm.

(*c*) Derive the relationship between critical constants and van der Waals' constants.

(*d*) What are the types of cubic lattices ? Derive Bragg's equation, $n\lambda = 2d \sin \theta$.

3. Answer any *two* of the following :

(*a*) Define an ideal gas. Explain the deviation of gases from ideal behaviour.

(*b*) Explain the crystal structure of sodium chloride (NaCl) by Bragg's X-ray diffraction method.

(*c*) (*i*) Give the difference between physical adsorption and chemical adsorption.

(*ii*) Calculate the RMS velocity of $N_2$ molecule at 37°C. (R = 8·314 $JK^{-1}$ $mol^{-1}$)

(*d*) What is S.I. unit of 'Pressure' and 'Volume' ?

Find the equation of straight line passing through two points (4, 5) and (6, 9).

## (Inorganic Chemistry)

4. Answer any *two* of the following :

(*a*) Give the general characteristics of *s*-block elements.

(*b*) Explain in brief oxides of *s*-block elements.

(*c*) (*i*) Write a note on complex of calcium with EDTA.

(*ii*) Define oxidation and reduction according to electronic concept.

(*d*) Balance the following equation by ion electron method :

$$FeCl_3 + SnCl_2 \longrightarrow FeCl_2 + SnCl_4$$

This question paper contains 3 printed pages]

W—52—2018

FACULTY OF SCIENCE

B.Sc. (First Year) (First Semester) EXAMINATION

OCTOBER/NOVEMBER, 2018

(CBCS/CGPA Pattern)

CHEMISTRY

Paper II

(Physical and Inorganic Chemistry)

(MCQ+Theory)

(Monday, 15-10-2018) Time : 10.00 a.m. to 12.00 noon

*Time—2 Hours* *Maximum Marks—40*

*N.B.* :— (*i*) Attempt *all* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Use OMR sheet for question No. 1.

(*iv*) Calculator and logarithmic table is allowed.

(MCQ)

1. Select the correct answer for each of the following multiple choice questions :

(*i*) The characteristic of $\log_{10}$ (0.00078) is :

(A) 4 (B) $\bar{4}$

(C) $\bar{3}$ (D) 3

(*ii*) The intercept form of the line is given by equation :

(A) $\frac{x}{a}+\frac{y}{b}=1$ (B) $y=mx+c$

(C) $2x+3y=1$ (D) $x+2y=2$

(*iii*) Chemisorption generally ..... with temperature.

(A) increases (B) decreases

(C) remains the same (D) None of these

P.T.O.

(iv) Excluded volume is ..... times the actual volume of gas molecules.

(A) $\frac{1}{2}$ (B) two

(C) three (D) Four

(v) Which of the following is *correct* relation ?

(A) $Vc = 3b$ (B) $Pc = \frac{a}{27b^2}$

(C) $Tc = \frac{8a}{27Rb}$ (D) All of these

(vi) The number of atoms in a unit cell of face centred cubic lattice is :

(A) 2 (B) 4

(C) 6 (D) 8

(vii) Sodium chloride (NaCl) is an example of :

(A) Crystalline Solid (B) Ionic Solid

(C) Both (*a*) & (*b*) (D) Metallic Solid

(viii) Which of the following elements does *not* form peroxide ?

(A) Be (B) Mg

(C) Ca (D) Sr

(ix) Sodium imparts ..... colour to the flame.

(A) Crimson red (B) Golden yellow

(C) Violet (D) Green yellow

(x) Oxidation number of 'Mn' in $KMnO_4$ is :

(A) +4 (B) +5

(C) +6 (D) +7

## (Theory)

## Section A

## (Physical Chemistry)

2. Answer any *two* of the following :

(*a*) State and explain permutation. Evaluate the value of $^{10}P_2$.

(*b*) Discuss the factors affecting adsorption.

(*c*) Define 'Compressibility factor' and 'Critical temperature'. Calculate the RMS Velocity of $CO_2$ molecule at 227°C (R = 8.314 $JK^{-1}$ $mol^{-1}$)

(*d*) Explain the law of rational indices and write a note on 'Miller Indices'.

3. Answer any *two* of the following :

(*a*) State the postulates of Kinetic thoery of gases.

(*b*) Explain the crystal structure of Potassium chloride (KCl) by Bragg's X-ray diffraction method.

(*c*) Define Freundlich adsorption isotherm. Describe Claude's method of liquefaction of gases.

(*d*) What is SI unit of 'Force' and 'Density' ? Calculate $[H^+]$ of a solution having pH = 5.8.

## Section B

## (Inorganic Chemistry)

4. Answer any *two* of the following :

(*a*) Discuss the diagonal relationship between Li and Mg.

(*b*) Explain in brief hydrides of s-block elements.

(*c*) (*i*) Give the formation of complex of sodium with Salicylaldehyde.

(*ii*) Define oxidation and reduction according to classical concept.

(*d*) Give the rules for assigning oxidation number.

This question paper contains 2 printed pages]

# X—29—2019

## FACULTY OF SCIENCE

**B.Sc. (First Year) (First Semester) (Regular) EXAMINATION**

**OCTOBER/NOVEMBER, 2019**

**(New Course)**

CHEMISTRY

Paper II

(Physical and Inorganic Chemistry)

**(Wednesday, 16-10-2019)** **Time : 10.00 a.m. to 12.00 noon**

*Time—2 Hours* *Maximum Marks—40*

*N.B.* :— (*i*) Attempt *All* questions.

(*ii*) Calculator and logarithmic table are allowed.

1. Answer any *three* of the following : 15

   (*a*) Give the general characteristics of *s*-block elements.

   (*b*) What is Diagonal relationship ? Explain the Diagonal relationship between Li and Mg.

   (*c*) Write a note on Wrap around complexes.

   (*d*) Give the rules for assigning oxidation number.

   (*e*) Discuss the balancing of redox reaction by ion electron method.

2. Answer any *three* of the following : 15

   (*a*) State the postulates of kinetic theory of gases.

   (*b*) State and explain 'Permutation and Combination' with example.

   (*c*) What is adsorption isotherm ? Explain Langmuir Adsorption isotherm.

   (*d*) Define an 'Unit Cell'. Derive Bragg's equation, $n\lambda = 2d \sin \theta$.

   (*e*) What is 'Compressibility Factor' ? Calculate Root Mean Square (RMS) velocity of $CO_2$ molecule at 27°C. ($R = 8.314\ JK^{-1}\ mol^{-1}$)

P.T.O.

3. Answer any *two* of the following : 10

(*a*) Derive an expression for critical constants in terms of Van der-Waal's constants '*a*' and '*b*'.

(*b*) Explain the factors affecting adsorption.

(*c*) Discuss the various types of elements of symmetry.

(*d*) Derive the relationship between pH and pOH.

Calculate the pH of 0.005 M. Solution of HCl.

This question paper contains 3 printed pages]

# Y—59—2019

## FACULTY OF SCIENCE

## B.Sc. (First Year) (First Semester) (Backlog) EXAMINATION

## OCTOBER/NOVEMBER, 2019

CHEMISTRY

Paper II

(Physical and Inorganic Chemistry)

(MCQ & Theory)

**(Friday, 18-10-2019)** **Time : 10.00 a.m. to 12.00 noon**

*Time—2 Hours* *Maximum Marks—40*

*N.B.* :— (*i*) Attempt *all* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Use OMR sheet for Question No. **1**.

(*iv*) Calculator and logarithmic table are allowed.

(*v*) Only one answer sheet should be used for sections A & B.

### MCQ

1. Select the correct answer for each of the following multiple choice questions :

(*i*) The slope of line passing through two points (4, –5) and (6, 7) is :

(*a*) 4 (*b*) 5

(*c*) 6 (*d*) 7

(*ii*) The S.I. unit of 'Pressure' is :

(*a*) Pa (*b*) $Nm^{-2}$

(*c*) $Kgm^{-1}s^{-2}$ (*d*) All of these

(*iii*) Longmuir isotherm holds at low pressures but fails at.....

(*a*) high pressures (*b*) low temperature

(*c*) both (*a*) & (*b*) (*d*) None of these

(*iv*) Van der-Waal's equation explains the behaviour of.....

(*a*) Ideal gases (*b*) Real gases

(*c*) Non-real gases (*d*) None of these

P.T.O.

(v) RMS velocity is given by the term :

(a) $\sqrt{\frac{3RT}{M}}$ (b) $\sqrt{\frac{3PV}{M}}$

(c) $\sqrt{\frac{3P}{D}}$ (d) All of these

(vi) Which of the following is an amorphous solid ?

(a) Graphite (b) Diamond

(c) Rubber (d) Table salt

(vii) For simple cubic lattice, the relative spacings for the unit cell are :

(a) $\frac{a}{2} : \frac{a}{\sqrt{2}} : \frac{a}{2\sqrt{3}}$ (b) $\frac{a}{2} : \frac{a}{2\sqrt{2}} : \frac{a}{\sqrt{3}}$

(c) $a : \frac{a}{2\sqrt{2}} : \frac{a}{2}$ (d) $a : \frac{a}{\sqrt{2}} : \frac{a}{\sqrt{3}}$

(viii) The alkaline earth metal which does not form its hydride directly with $H_2$.

(a) Be (b) Mg

(c) Ca (d) Sr

(ix) The metal presents in chlorophyll is.....

(a) Ca (b) Mg

(c) Mn (d) Zn

(x) $Sn^{+2} \longrightarrow Sn^{+3} + e^-$ is .....

(a) Redox reaction (b) Oxidation

(c) Reduction (d) Neutralization

## Theory

### (Physical Chemistry)

2. Answer any *two* of the following :

   (a) Derive kinetic gas equation. $PV = \frac{1}{3}mnu^2$.

   (b) What is 'adsorption isotherm' ? Explain freundlich adsorption isotherm.

   (c) Explain the determination of crystal structure of sodium chloride (NaCl) by using Bragg's x-ray diffraction method.

   (d) Prove, $p^H + p^{OH} = 14$. Calculate pH of $2.5 \times 10^{-3}$M HCl solution.

3. Answer any *two* of the following :

   (a) What are Ideal and Non-ideal gases ? Explain the deviation of gases from ideal behaviour.

   (b) Discuss the various types of elements of symmetry.

   (c) (i) Give the difference between adsorption and absorption.

   (ii) Calculate the RMS velocity of carbon monoxide (CO) molecule at 373 K ($R = 8.314\ JK^{-1}\ mol^{-1}$)

   (d) State and explain 'permutation'. Evaluate the value of $^5P_3$.

### (Inorganic Chemistry)

4. Solve any *two* of the following :

   (a) Discuss the flame colours and metallic properties of s-block elements.

   (b) Discuss the formation of complexes of alkali metals with Salicylaldehyde and Acetylacetone.

   (c) (i) Write a note on oxides of s-block elements.

   (ii) Define oxidation and reduction according to oxidation number concept.

   (d) Give the rules for assigning oxidation number.

Faculty of Science
B.Sc. F. Y. ( Semester I ) Examination Winter – 2020
Subject : CHEMISTR
Paper Title & No. : Physical & Inorganic emistry - Paper II
Cluster code : SD

Date : 08/04/2021 Time : 01 Hour Maximum Marks : 40

N. B. *(i) Attempt all questions*
*(ii) All questions carry equal marks*
*(iii) Use OMR answer sheet*

**MCQ**

1. The value of log 1 is
   a) 0 b) 1 c) 2 d) 3
2. The process of adsorption is
   a) endothermic b) exothermic c) neu al d) none of these
3. The critical temperature of carbon dioxide gas is
   a) 21° C b) 25° C c) 31° C d) 50° C
4. In Bragg's equation , 'n' represents
   a) the number of moles b) the vogadro's number
   c) the order of reflection d) the incipal quantum number
5. Deviation from ideal behavior of a gas is more prominent at
   a) high temperature low pressure b) hig emperature high pressure
   c) low temperature low pressure d) low mperature high pressure
6. NaCl is an example of :
   a) covalent solid b) met lic solid
   c) ionic solid d) mo ular solid
7. In ....., the gas molecules or atoms are held to the sol surface by chemical bonds
   a) chemisorption b) phy cal adsorption
   c) desorption d) abs otion
8. The prefix used for expressing 'Height of Mount Everes in SI unit is
   a) m b) cm c) Km d) Gm
9. ..... among the following is an amorphous solid
   a) Diamond b) Graphite c) Table salt d) Plastic
10. Andrews isotherms of $CO_2$ involve
    a) P - V relationship b) P - relationship
    c) V - T relationship d) T - relationship
11. Langmuir adsorption isotherms hold good at
    a) high pressure b) inte ediate pressure
    c) low temperature d) low essure
12. Slope of any line parallel to $x$ - axis is
    a) 1 b) 1 c) 0 d) not fined
13. Average velocity of gas molecules = ..... R.M.S. velo ty
    a) 0.9513 b) 0.8314 c) 0.92 d) 0.8165
14. —— are the Miller indices for a plane when the interce along the axes are 2a,3b and 2c
    a) (2,3,3) b) (3,2,3) c) (2,3 ) d) all of these
15. The phenomenon of concentrations of molecules of a as or liquid at a solid surface is called
    a) absorption b) adsorption c) catal sis d) occlusion

16. . ..... is the correct relation between pH and pOH.
a) pH + pOH = 14 b) pH + pOH = 7
c) pH + pOH = - 14 d) pH + pOH = -
17. For one mole of a gas, the ideal gas equation is
a) PV = RT b) PV = RT c) PV = RT d) PV = nRT
18. Rubber is an example of
a) metallic solid b) crystalline soli
c) amorphous solid d) ionic solid
19. Chemisorption generally ..... with increase of temperature
a) remains same b) decreases
c) sometimes decreases d) increases
20. The different ways a committee containing 5 members selected ou of 9 candidates are
a) 127 b) 621 c) 126 d) 721
21. ..... gas has the maximum value of root mean square velocity.
a) $CH_4$ b) $CO_2$ c) $H_2$ d) $N_2$
22. . The easiest way to liquefy a gas represent the conditions of
a) high pressure and high temperature b) high pressure a d low temperature
c) low pressure and low temperature d) low pressure ar high temperature
23. A cubic crystal has never more than one
a) axis of symmetry b) centre of symm try
c) plane of symmetry d) all of these
24. Which of the following is incorrect?
a) Chemisorption is specific in nature
b) Chemisorption increases with increase in temperature initial
c) Chemisorption is caused by bond formation
d) Chemisorption is reversible
25. . $\log_a x^y$ is equal to
a) $x \log_a y$ b) $y \log_a x$ c) $\log_a x . \log_a y$ d) None of these
26. . Freundlich isotherms is not applicable at
a) 273 K b) room temperatu e
c) high pressure d) low pressure
27. The correct value of critical volume ( $V_C$) is given by term
a) 27Rb b) 8a/27 Rb
c) 3b d) none of the abo e
28. The most reactive element is .....
a) Be b) Mg c) Sr d) Ba
29. In comparison to alkali metals alkaline earth metals are :
a) less reactive b) less reducing c) less basic d) l the three
30. From the following alkali metals has the smallest size.....
a) Rb b) K c) Ma d) Li
31. As compared to K, Na has.....
a) higher ionization potential b) lower melting p int
c) lower electro negativity d) larger atomic ra ius
2 .Which one of the following metals has the highest density?
a) Li b) Na c) Rb d) Cs
3. Alkali metals contain.....
a) 3 Valance electron b) 1 Valence elect on
c) 4 Valance electron d) 2 Valence electr n

34. The most electropositive amongst the alkaline earth metals is.....

a) Be b) Mg c) Ca d) Ba

35. Which of the following represents a redox reaction?

a) $NaOH + HCl \rightarrow NaCl + H_2O$ b) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

c) $CuSO_4 + 2H_2O \rightarrow Cu(OH)_2 + H_2SO_3$ d) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

36. Which reaction involves neither oxidation nor reduction?

a) $CrO_4^{2-} \rightarrow Cr_2O_7^{2-}$ b) $Cr \rightarrow CrCl_3$

c) $Na \rightarrow Na^+$ d) $2S_2O_3^{2-} \rightarrow S_4O_6^{2-}$

37. Reduction Involves

a) Loss of electron b) Increase in oxidation number

c) Gain in electron d) None of the above

38. In redox reaction

a) Oxidant gets reduced b) Oxidant loses electrons

c) reductant gets reduced d) reductant gains electrons

39. Potassium metal is kept under

a) Water b) Alcohol c) Ammonia d) Kerosene

40. Which of the following alkali metal is used in photoelectric cells

a) Li b) Na c) Cs d) Fr

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This question paper contains 5 printed pages]

# V—36—2017

## FACULTY OF SCIENCE

**B.Sc. (First Year) (Second Semester) EXAMINATION**

**OCTOBER/NOVEMBER, 2017**

**(CBCS/CGPA Pattern)**

CHEMISTRY

Paper III

(Organic and Inorganic Chemistry)

(MCQ + Theory)

**(Sunday, 12-11-2017)** **Time : 10.00 a.m. to 12.00 noon**

*Time—2 Hours* *Maximum Marks—40*

*N.B.* :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Use OMR sheet for question No. 1.

(*iv*) Calculator is allowed.

(*v*) Only one answer sheet should be used for Sections A and B.

**MCQ**

1. Select the *correct* answer for each of the following multiple choice questions.

(1) The carbon-carbon bond length in benzene is .....

(A) 1.33 Å (B) 1.40 Å

(C) 1.54 Å (D) 1.30 Å

(2) Which of the following compounds is not Aromatic ?

(A) Pyridine (B) Anthracene

(C) Thiophene (D) Cyclopentene

P.T.O.

(3)  $-CH_3Cl \xrightarrow{AlCl_3}$ ?

(A) Toluene (B) Chlorobenzene

(C) Both (A) and (B) (D) None of these

(4) Pyrogallol is _____ phenol.

(A) Monohydric (B) Dihydric

(C) Trihydric (D) None of these

(5) The carbon atom in vinyl chloride is _____

(A) $sp^2$ (B) sp

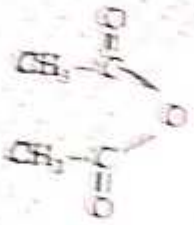
(C) $sp^3$ (D) $dsp^2$

(6) Ullman reaction is also called as _____ reaction.

(A) Substitution (B) Addition

(C) Elimination (D) Coupling

(7) The IUPAC name of



is _____

(A) Acetic Anhydride

(B) Methanoic Anhydride

(C) Ethanoic Anhydride

(D) Propanoic Anhydride

(8) Which of the following element shows highest melting point ..... .

(A) S (B) Se

(C) Te (D) Po

(9) The term hard and soft acid and base was given by ..... .

(A) Bronsted (B) Lewis

(C) Franklin (D) Pearson

(10) The Strongest Bronsted base in the following anion is ..... .

(A) $ClO^-$ (B) $ClO_2^-$

(C) $ClO_3^-$ (D) $ClO_4^-$

## Theory

## Section A

## (Organic Chemistry)

2. Answer any *two* of the following :

(a) State Huckel Rule. Explain aromaticity of the following compounds :

(i) Anthracene

(ii) Furan

(b) Explain Reimer-Tiemann reaction of phenol with mechanism.

(c) (i) How will you synthesize vinyl chloride from :

(1) 1, 2-dichloroethane

(2) Ethyne

P.T.O.

(*ii*) How will you prepare ..... .

(1) Chlorobenzene from benzene diazonium chloride

(2) Bromobenzene from silver benzoate.

(*d*) Explain nitration of benzene with mechanism.

3. Answer any *two* of the following :

(*a*) Explain the o/p-directing nature of –OH group in phenol and *m*-directing nature of $-NO_2$ group in nitrobenzene.

(*b*) (*i*) Explain the Gatterman reaction of halobenzene.

(*ii*) How will you synthesize allyl iodide from :

(1) Allyl Chloride

(2) Glycerol and HI

(*c*) (*i*) How will you prepare ethyl acetate from ..... .

(1) Ethyl alcohol and acetic acid

(2) Ethyl alcohol and acetyl chloride.

(*ii*) What is the action of the following on ethyl acetate ?

(1) NaOH

(2) $CH_3NH_2$

(3) $LiAlH_4$

(*d*) (*i*) Explain Fries rearrangement.

(*ii*) How will you convert acetic anhydride into :

(1) Acetic acid

(2) Ethyl acetate.

## Section B

## (Inorganic Chemistry)

4. Answer any two of the following :

(a) Discuss the diagonal relationship between B and Si.

(b) (i) Explain the oxidising and reducing properties of 'VII A' group elements.

(ii) Discuss the solvent system concept of acids and bases with suitable example.

(c) State and explain HSAB principle. Discuss its following applications :

(i) Relative stability of compounds

(ii) Feasibility of chemical reaction.

(d) Define and explain the following concepts of acids and bases with example :

(i) Arrhenius concept

(ii) Lewis concept.

This question paper contains 8 printed pages.

AO—36—2018

FACULTY OF SCIENCE

B.Sc. (First Year) (Second Semester) EXAMINATION

MARCH/APRIL, 2018

(CBCS/OCPS)

CHEMISTRY

Paper-III

(Organic and Inorganic Chemistry)

(MCQ-Theory)

(Tuesday, 20-3-2018) Time : 10.30 a.m. to 12.00 noon

*Time—Two Hours* *Maximum Marks—40*

*N.B.* :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Use OMR-Sheet for question No. 1.

(*iv*) Calculator is allowed.

(*v*) Only one answer sheet should be used for Section A and B.

## MCQs

1. Select the *correct* answer for each of the following multiple choice questions.

(*i*) Nitration of benzene is an example of .....

(*a*) Nucleophilic Substitution (*b*) Electrophilic Substitution

(*c*) Nucleophilic Addition (*d*) Electrophilic Addition

(*ii*) Which of the following shows aromaticity ?

(*a*) Benzene (*b*) Furan

(*c*) Pyridine (*d*) All of these

P.T.O.

(iii) Which of the following is *m-directing group* ?

(a) $-NO_2$ (b) $-NH_2$

(c) $-OH$ (d) $-CH_3$

(iv) Resorcinol is an example of ..... .

(a) Monohydric phenol (b) Dihydric phenol

(c) Trihydric phenol (d) None of these

(v) Acid chlorides reacts ammonia to give ..... .

(a) Amides (b) Acid anhydride

(c) Ethers (d) Esters

(vi) Which of the following derivatives is more reactive ?

(a) Acid chloride (b) Acid anhydride

(c) Ester (d) Amide

(vii) Chlorobenzene is prepared from diazonium salt using ..... reaction.

(a) Balz-Schiemann (b) Gattermann

(c) Sandmeyer (d) Hunsdicker

(viii) Which of the following acids possesses oxidising, reducing and complex forming properties ?

(a) $HNO_3$ (b) $H_2SO_4$

(c) $HCl$ (d) $HNO_2$

(ix) Which of the following is Lewis acid ?

(a) $CaO$ (b) $CH_3NH_2$

(c) $SO_3$ (d) None of these

(*x*) Which of the following is hard base ?

(*a*) $CO_3^{--}$ (*b*) $CN^-$

(*c*) RNC (*d*) CO

## Theory

## Section A

## (Organic Chemistry)

2. Answer any *two* of the following :

(*a*) Explain Friedel-Craft acylation reaction with mechanism.

(*b*) Explain Kolbe's carboxylation reaction of phenol with mechanism.

(*c*) (*i*) Give the synthesis of vinyl chloride from :

(1) 1, 2-dichloroethane

(2) Ethene.

(*ii*) What is the action of the following on allyl iodide ?

(1) NaOH

(2) KCN

(3) $NH_3$

(*d*) State Huckel rule. Explain the aromaticity of the following :

(*i*) Naphthalene

(*ii*) Pyridine.

P.T.O.

WT

3. Answer any two of the following :

(a) Explain bromination of benzene with mechanism.

(b) What are haloarenes ? Explain :

(i) Hunsdicker reaction

(ii) Balz-Schiemann reaction.

(c) (i) How will you synthesize acetic anhydride from :

(1) Acetic acid and acetyl chloride

(2) Sodium acetate and acetyl chloride.

(ii) What is the action of the following on acetic anhydride :

(1) $H_2O$

(2) $C_2H_5OH$

(3) $CH_3NH_2$

(d) (i) Explain Houben-Hoesch reaction of resorcinol.

(ii) How will you convert acetamide into :

(1) Acetic acid

(2) Ethanamine.

## Section B

## (Inorganic Chemistry)

4. Answer any two of the following :

(a) Explain the following properties of IV A group elements :

(i) Ionization energy

(ii) Melting and boiling points.

(b) (i) Discuss the electronegativity and metallic character properties of VI A group elements.

(ii) Classify the following as hard and soft acids :

$Cu^{1}$, $Na^{1}$, $Ti^{4+}$, $Ag^{1}$, $Pb^{2+}$

(c) Give the characteristics of hard and soft bases.

(d) Discuss the following acid-base theories :

(i) Lux-Flood concept

(ii) Usanovich concept.

This question paper contains 4 printed pages]

W—38—2018

FACULTY OF SCIENCE

B.Sc. (First Year) (Second Semester) EXAMINATION

OCTOBER/NOVEMBER, 2018

(CBCS/CGPA)

CHEMISTRY

Paper III

(Organic and Inorganic Chemistry)

(MCQ & Theory)

(Thursday, 11-10-2018) Time : 10.00 a.m. to 12.00 noon

*Time—2 Hours* *Maximum Marks—40*

*N.B.* :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

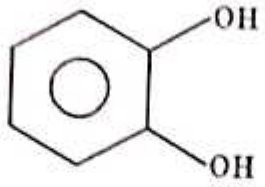
(*iii*) Use OMR sheet for Question No. 1.

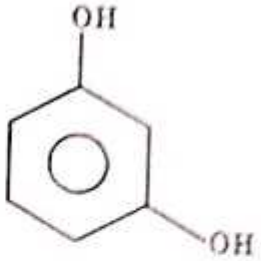
(*iv*) Only one answer-sheet should be used for Sections A and B.

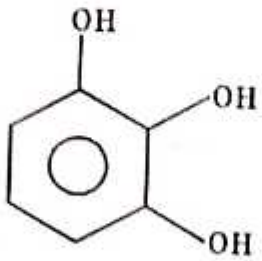
## MCQ

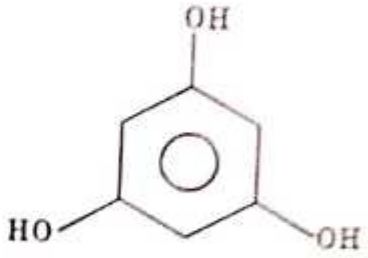
1. Select the *correct* answer for each of the following Multiple Choice Questions :

(*i*) Which of the following is pyrogallol ?

(*a*) 


(*b*) 


(*c*) 


(*d*) 

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(ii) ..... is an antiaromatic compound.

(a) Furan (b) Pyrrole

(c) Naphthalene (d) Cyclobutadiene

(iii) ..... is a characteristic reaction of aromatic compounds.

(a) Electrophilic substitution reaction

(b) Electrophilic addition reaction

(c) Nucleophilic substitution reaction

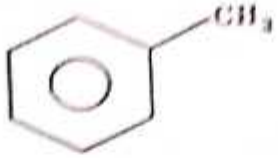
(d) Nucleophilic addition reaction

(iv) $n\,CH_2=\underset{Cl}{\overset{|}{CH}} \xrightarrow{\text{Peroxide}} ?$

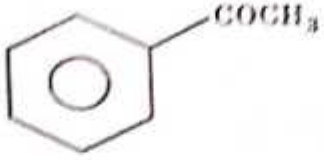
(a) Allyl chloride (b) Polyvinyl chloride

(c) Acetic acid (d) Acetyl chloride

(v) Acetic anhydride reacts with benzene in presence of $AlCl_3$ to form :

(a) 

(b) 

(c) 

(d) 

(vi) $CH_3-\overset{\overset{O}{\|}}{C}-NH_2 \xrightarrow{H_2O} ?$

(a) $CH_3-NH_2$ (b) $CH_3-CH_2-NH_2$

(c) $CH_3-COOH$ (d) $CH_3-OH$

(*vii*) Which of the following is coupling reaction ?

(*a*) Perkin (*b*) Gattermann

(*c*) Hunsdiecker (*d*) Ullmann

(*viii*) Increase in ionisation energy across a period generally increases :

(*a*) Reducing character (*b*) Oxidising character

(*c*) Atomic size (*d*) Both (*a*) and (*b*)

(*ix*) According to Lux-Flood concept an acid is :

(*a*) Oxide ion donor (*b*) Oxide ion acceptor

(*c*) Hydride ion donor (*d*) Hydride ion acceptor

(*x*) $H_2O$ is :

(*a*) Lewis base (*b*) Lowry-Bronsted base

(*c*) Both (*a*) and (*b*) (*d*) None of these

## Theory

## Section A

## (Organic Chemistry)

2. Answer any *two* of the following :

(*a*) What are aromatic compounds ? Give their sources.

(*b*) Explain acidic nature of phenol and compare the acidity of phenol with ethanol.

(*c*) Write a note on the following :

(*i*) Hunsdiecker reaction

(*ii*) Balz-Schiemann reaction.

(*d*) How will you prepare acetic anhydride from :

(*i*) Sodium acetate

(*ii*) Acetic acid ?

What is the action of ammonia on acetic anhydride ?

3. Answer any *two* of the following :

(*a*) Explain Birch reduction with mechanism.

(*b*) How will you prepare ortho and para hydroxy acetophenone from phenyl acetate ? Explain with mechanism.

(*c*) What are haloalkenes ? Explain resonance in vinyl chloride and give their preparation from ethyne.

(*d*) How will you convert the following :

(*i*) Vinyl chloride to polyvinyl chloride

(*ii*) Benzene diazonium chloride to chlorobenzene

(*iii*) Benzene to nitrobenzene

(*iv*) Benzene to acetophenone

(*v*) Ethanamide to ethanoic acid.

## Section B

## (Inorganic Chemistry)

4. Solve any *two* of the following :

(*a*) Discuss the diagonal relationship between B and Si.

(*b*) (*i*) Give the variation in oxidizing and reducing properties of P-block elements.

(*ii*) Define acids and bases according to Cady-Elsey concept.

(*c*) Give the characteristics of hard and soft acids.

(*d*) Explain Lewis and Bronsted-Lowry concept of acids and bases.

**Swami Ramanand Teertha Marathwada University, Nanded**

**Faculty of Science**

**B.Sc. First year (First Semester)**

**Winter -2020**

**Subject- Chemistry**

**Paper No. - III**

**Paper-Organic and Inorganic Chemistry (MCQ)**

**Cluster Code-SD**

**Date 08/04/2021** **Time:1 Hour** **Marks- 40 Marks**

**Note -**

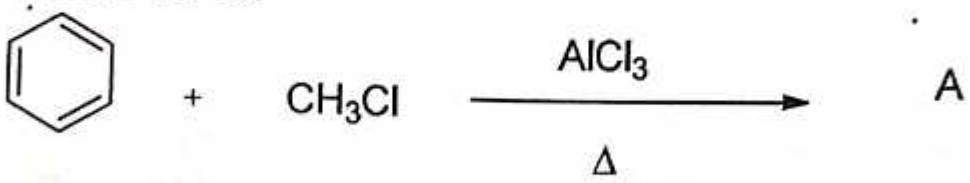
1. **Attempt all the Questions**
2. **Each question carries one mark**
3. **No negative marking system**
4. **Use black ball pen to darken the circle of correctly choice in OMR answer sheet.**
5. **Circle once darken is final. No change is permitted.**

1. Which one of the following is an aromatic compound?
   a) Naphthalene b) Acetone
   c) Cyclohexane d) Cyclohexene
2. Vinyl Chloride reacts with HBr to ..... Form.
   a) 1- bromo 2- chloroethane b) 1- bromo 2- chloroethene
   c) 1- bromo 1- chloroethene d) 1- bromo1- chloroethane
3. All the carbon atoms in benzene is/ are ---- hybridized.
   a) $SP^3$ b) $SP^2$ c) SP d) None of these
4. Benzene contains ---- number of$\pi$ electrons.
   a) 3 b) 6 c) 9 d) 12
5. Benzene is aromatic compound which satisfies Huckel rule $(4n+2)\ \pi$ electrons, wherevalue of 'n' is -----
   a) 0 b) 1 c) 2 d) 3
6. In nitration of benzene, an electrophile is ------
   a) $NO^+$ b) $NO_2^+$ c) $NO_3^+$ d) Both a and b
7. Chlorobenzene is prepared by ------- Reaction.

a) Balz-Schemann b) Gattermann
c) Hunsicker d) None of the above

8. Benzene can be converted into acetophenone by ----
a) Friedel Craft acylation b) Friedel Craft alkylation
c) Diel's Alder reaction d) Kolbe's reaction

9. Where 'A'is?




a) Toluene b) Acetophenone
c) Chlorobenzene d) Phenylbenzene

10. ----- is an O/P directing and activating group on monosubstituted benzene for electrophilic substitution reaction.
a) – COOH b) - CN c) – $NO_2$ d) – OH

11. Glycerol reacts with excess of ------ to produce Allyl Iodide as product.
a) HCl b) HF c) HI d) HBr

12. Carbolic acid is -----.
a) HCOOH b) $CH_3COOH$
c) $C_6H_5OH$ d) $C_6H_5COOH$

13. Phenol is more acidic than ----.
a) Benzoic acid b) Acetic acid c) Ethanol d) HCl

14. Phenol containing two – OH group is called as ----- phenol.
a) Monohydric phenol b) Dihydric phenol
c) Trihydric phenol d) All of above

15. Sodium phenoxide reacts with $CO_2$ at 125 $^0$C under 5 atm pressure to give salicylic acid. This reaction is called as --.

a) Claisen rearrangement reaction
b) Kolbe's reaction
c) Hauben – Hoesch reaction
d) Reimann – Tiemann reaction

16. Phenol on refluxing with chloroform and sodium hydroxi followed by hydrolysis ------is formed.
a) O-Hydroxy benzaldehyde b) Salicylaldehyde
c) Both 'a'and 'b' d) None of these.

17. When phenyl acetate is heated with anhydrous $AlCl_3$, a mixture of ortho and para hydroxy acetophenone is formed This reaction is known as -----Reaction
a) Fries rearrangement b) Kolbe's
c) Friedel craft alkylation d) Reimann – Tiemann

18. Iodobenzene heated with Copper in a sealed tube to form. Biphenyl is a ------. Reaction.
a) Dow's process b) Ullmann synthesis
c) Filkelstein d) Balz-Schemann

19. Epoxide isalso known as----.
a) Oxirane b) Carbocation
c) Carbanion d) Free radical

20. IUPAC name of Ethyl acetate is ---
a) Ethyl ethanoate b) Ethyl methanoate
c) Methyl methanoate d) Methyl ethanoate

21. Where A and B are respectively
$C_2H_5OH + CH_3COOH \rightarrow A + B;$

a) $CH_3COOC_2H_5$ and $H_2O$ b) $C_2H_5COOCH_3$ and $H_2O$
c) $CH_3CH_2COOC_2H_5$ and $H_2O$ d) $CH_3COOCH_3$ and $H_2O$

22. Which of the following derivatives is most reactive?
a) Acid chloride b) Amide c) Ester d) Acid anhydride

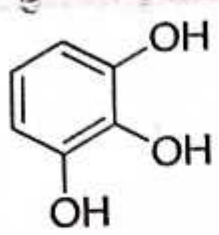
23. Conversion of Acetamide to Ethanamine using $LiAlH_4$ is type ....Ofreaction.
a) Oxidation b) Reduction c) Dehydration d) Hydrolysis

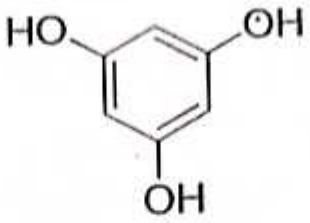
24. Sorbitol is an example of ..... alcohol.
a) Monohydric b) Dihydric alcohol c) Trihydric d) polyhydric

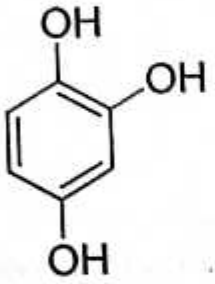
25. Acetic anhydride is obtained by the action of ------ on ethanoyl chloride.
a) Sodium acetate b) Hydrazine c) Ammonia d) Ethanol

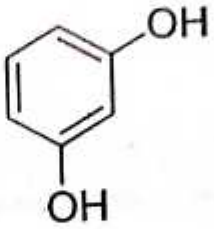
26. Glycerine has..... group.
a) one primary two secondary -OH
b) one secondary and two primary-OH
c) three primary -OH
d) three secondary -OH

27. The structure of Phloroglucinol is.....

a) 

b) 

c) 

d) 

28. According to lux flood concept acid is
    a] Oxide ion acceptor  b] electron acceptor
    c] Proton donor  d] none of the above

29. Which one among the following is Bronsted- Lowry acid?
    a] $Cl^-$  b] $H_3O^+$  c] $OH^-$  d] $HSO_4^-$

30. CaO is base according to -------- concept.
    a] Arrhenius  b] Lewis
    c] Lux – Flood  d] Solvent system

31. Which one of the following has the lowest melting point?
    a) B  b) Al  c) Ga  d) TI

32. According to Lewis concept base is a species, which .....
    a] Accept proton  b] Accept a lone pair of electrons
    c]Donates proton  d] Donate a lone pair of electrons

33. Electrophiles are...
    a] Lewis acid  b] Lewis base
    c] Bronsted acid  d] Bronsted base

34. According to Bronsted- Lowry concept a base is

a] Proton donor b] An electron donor
c] A proton acceptor d] an electron acceptor

35. N, P, As, Sb, Bi elements belong to group?
a) 16 b) 15 c) 17 d) 18

36. The outermost electronic configuration of the mos electronegative element is:
a) $ns^2np^5$ b) $ns^2np^3$ c) $ns^2$ d) $ns^2 np^4$

37. Thallium shows different oxidation states because .....
a] of its high reactivity b] Of inert pair effect
c] Of its amphoteric nature d] it is a transition metal

38. Which of the following is a not hard acid.....?
a) $H^+$ b) $Li^+$ c) $K^+$ d) $OH^-$

39. Which statement is Correct about halogen?
a) They are diatomic and univalent ions
b) They are all capable of exhibiting several oxidations States
c) they are all atomic and form divalent ion
d) None of the above

40. Which block does refer to all the non-metal elements?
a) P-Block b) d-block c) f-block d) s-block

---------- Best luck ----------

This question paper contains 2 printed pages]

# SB—15—2022

## FACULTY OF SCIENCE

## B.Sc. (First Year) (Second Semester) EXAMINATION

## MAY/JUNE, 2022

(New Course)

CHEMISTRY

Paper–III

(Organic and Inorganic Chemistry)

**(Wednesday, 8-6-2022)** **Time : 10.00 a.m. to 12.30 p.m.**

*Time*— 2½ *Hours* *Maximum Marks*—40

### (Inorganic Chemistry)

1. Solve any *three* of the following : 3×5=15

   (1) Explain the diagonal relationship between Boron and Silicon.

   (2) Explain variation in Ionization energy in '*p*'-block elements.

   (3) Define acids and bases with Lewis concept and discuss briefly with suitable examples.

   (4) Define Hard and Soft and borderline acids and bases with suitable examples.

   (5) What is SHAB principle ? Give the limitation of SHAB.

### (Organic Chemistry)

2. Attempt any *three* of the the following : 3×5=15

   (1) Predict the product of the following :

   (*i*) $CH_3-\overset{\overset{O}{\|}}{C}-OH + SOCl_2 \longrightarrow ?$

   (*ii*) $\begin{array}{l} CH_2-OH \\ | \\ CH-OH \\ | \\ CH_2-OH \end{array} + HI \longrightarrow ?$

P.T.O.

(iii) $CH_3-\overset{O}{\overset{\|}{C}}-Cl + CH_3-\overset{O}{\overset{\|}{C}}-OH \xrightarrow{\Delta} ?$

(iv) $CH_3-\overset{O}{\overset{\|}{C}}-Cl + CH_3-NH_2 \xrightarrow{\Delta} ?$

(v) $CH_3-\overset{O}{\overset{\|}{C}}-OH + CH_3-CH_2-OH \xrightarrow{\Delta} ?$

(2) Explain the Friedel-Craft reaction with suitable mechanism.

(3) What is the action of the following reagents on allyl iodide ?

(*i*) NaOH;

(*ii*) KCN;

(*iii*) $Br_2$.

(4) How will you prepare Glycerol from ?

(*i*) Oil and Fats;

(*ii*) Propene.

(5) How will you prepare nitrobenzene from benzene ? Explain with mechanism.

3. Attempt any *two* of the following : 2×5=10

(1) Discuss the effect of —OH group on aromatic electrophilic substitution of Benzene.

(2) How will you prepare Benaldehyde by Gattermann reaction ? Explain with mechanism.

(3) Write Reimer-Tiemann reaction with suitable mechanism.

(4) Discuss the mechanism of ring opening of epoxide in acidic and basic condition.

This question paper contains 4 printed pages]

AO—43—2018

FACULTY OF SCIENCE

B.Sc. (First Year) (Second Semester) EXAMINATION

MARCH/APRIL, 2018

(CBCS/COPA Pattern)

CHEMISTRY

Paper-IV

(Physical and Inorganic Chemistry)

(MCQ+Theory)

(Thursday, 22-3-2018) Time : 10.00 a.m. to 12.00 noon

*Time—Two Hours* *Maximum Marks*—40

*N.B.* :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Use OMR-sheet for question No. 1.

(*iv*) Calculator is allowed.

(*v*) Only one answer sheet should be used for Section A and B.

**MCQ** 10

1. Select the *correct* answer for each of the following multiple choice questions.

(*i*) In Bohr's atomic theory, the angular momentum of electron in fourth orbit is given as :

(*a*) $\frac{h}{4\pi}$ (*b*) $\frac{4h}{\pi}$

(*c*) $\frac{2h}{\pi}$ (*d*) $\frac{h}{2\pi}$

P.T.O.

(*ii*) "The electrons in various orbitals are arranged according to their increasing order of energy" is a statement of :

(*a*) Hund's rule (*b*) Aufbau principle

(*c*) Pauli's exclusion principle (*d*) None of these

(*iii*) With rise in temperature the surface tension of liquid :

(*a*) decreases (*b*) increases

(*c*) remains the same (*d*) none of these

(*iv*) 'The precipitation power of an ion increases with increase in valency of an ion', this rule is known as :

(*a*) Brownian rule (*b*) Hardy-Schulze rule

(*c*) Gold number rule (*d*) None of these

(*v*) Which of the following is *not* a colloidal system ?

(*a*) Butter (*b*) Smoke

(*c*) Paint (*d*) Sodium chloride solution

(*vi*) Oxidation of sulphur dioxide to sulphur trioxide with nitric oxide as a catalyst, is an example of :

(*a*) Homogeneous catalysis (*b*) Heterogenous catalysis

(*c*) Enzyme catalysis (*d*) All of these

(*vii*) In the synthesis of ammonia by 'Haber's process; the substance which acts as a catalytic 'poison' is :

(*a*) Iron (*b*) Platinum

(*c*) $H_2S$ (*d*) $Al_2O_3$

(viii) Which of the following statements is *not* correct ?

(a) Double bond is shorter than single bond

(b) Double bond is stronger than single bond

(c) Sigma bond is weaker than pi bond

(d) Covalent bond is stronger than hydrogen bond

(ix) Fajan's rule depends on :

(a) Charges of cation (b) Charges of anion

(c) Electronic configuration (d) All of these

(x) The correct structure of $IF_7$ is ..... .

(a) Octahedral (b) Pentagonal bipyramidal

(c) Square pyramidal (d) Trigonal bipyramidal

## Theory

## Section A

## (Physical Chemistry)

2. Solve any *two* of the following :

(a) Explain Pauli's exclusion principle. Give any *two* limitations of Bohr's theory.

(b) Define parachor. Give the relationship between parachor and *surface* tension.

(c) Discuss the general applications of colloids.

(d) State and explain Autocatalysis with examples.

WT

( 4 )

AO—43—2018

3. Solve any *two* of the following :

(*a*) Derive an expression for the radius of nth Bohr's orbit of H-atom.

(*b*) What are gels ? How are they classified ? Give their properties.

(*c*) Explain enzyme catalysis with examples.

(*d*) (*i*) Calculate the energy of an electron in first Bohr's orbit of H-atom.

(*ii*) At 20°C, pure water required 104 sec. to flow the capillary of an Ostwald's viscometer, while toluene required 70 sec. Calculate the viscosity of toluene. If the viscosity of water is 1.008 centipoise and densities of water and toluene are 0.99 and 0.86 g/cm$^3$ respectively.

## Section B

## (Inorganic Chemistry)

4. Solve any *two* of the following :

(*a*) Explain valence bond theory for the formation of covalent bond.

(*b*) Define hydrogen bonding. Explain different types of hydrogen bonding with example.

(*c*) (*i*) Write a note on Born-Haber cycle.

(*ii*) Draw molecular orbital diagram of oxygen molecule and calculate its bond order.

(*d*) Give the postulates of VSEPR theory.

This question paper contains 4 printed pages

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Paper IV

(Physical and Inorganic Chemistry)

(Major Theory)

(Saturday, 19-10-2019)

Time : 10:30 a.m. to 12:30 p.m.

Maximum Marks : 40

Time : 2 Hours

N.B. :— (i) Attempt *all* questions.

(ii) *All* questions carry equal marks.

(iii) Use OMR sheet for question No. 1.

(iv) Calculator is allowed.

(v) Only one answer sheet should be used for Question 1 and 2.

(MCQ)

1. Select the correct answer for each of the following multiple choice questions.

(i) Rutherford Scattering experiment is related to the size of :

(A) Atoms (B) Electron

(C) Neutron (D) Nucleus

(ii) Energy of electron in third Bohr's orbit of hydrogen atom is :

(A) −1.5 eV (B) −3.4 eV

(C) −13.6 eV (D) −1.36 eV

(iii) Which of the following is *not* a colloid ?

(A) Smoke (B) Milk

(C) Chlorophyll (D) Ruby Glass

270

(iv) The blue colour of water in the Sea is due to :

(A) absorption of blue colour

(B) reflection of blue sky by sea water

(C) refraction of blue light by impurities in sea water

(D) scattering of blue light by water molecules

(v) Efficiency of a catalyst depends on its :

(A) Solubility (B) Particle size

(C) Molecular weight (D) None of these

(vi) The iron catalyst used in the synthesis of ammonia is poisoned by :

(A) $H_2S$ (B) $Al_2O_3$

(C) $H_2O$ (D) $CO_2$

(vii) Insects can walk on the surface of water due to .....

(A) Optical activity (B) Viscosity

(C) Surface tension (D) Refractivity

(viii) The force of attraction between $M^+$ ions and valence electrons is ..... in all directions.

(A) Uniform (B) Non-uniform

(C) Less (D) High

(ix) Dissolution of NaCl in water is due to .....

(A) dipole - dipole interaction

(B) dipole - induced dipole interaction

(C) ion - dipole interaction

(D) Instantaneous dipole - induced dipole interaction

(x) The hybridisation of $Ni^{2+}$ ion in $[Ni(CN)_4]^{2-}$ ion is .....

(A) $Sp^3$ (B) $dSp^2$

(C) $Sp^3d$ (D) $Sp^3d^2$

(Theory)

Section A

(Physical Chemistry)

2. Solve any *two* of the following :

(a) Derive an expression for radius of $n$th Bohr's Orbit of Hydrogen atom.

(b) What is Parachor ? Give the relation between Parachor and Surface tension.

(c) Discuss the electrical properties of sols.

(d) Explain Homogeneous and Heterogeneous catalysis with examples.

3. Solve any *two* of the following :

(a) Explain : (i) Pauli's exclusion principle

(ii) Aufbau principle.

(b) Discuss the general applications of colloids.

(c) Explain promotors and catalytic poisoning with suitable example.

(d) (i) Calculate the radius of third Bohr's orbit of hydrogen atom.

(ii) In the determination of surface tension by drop number method, a liquid gives 60 drops and water gives 35 drops for the same volume. The densities of liquid and water are 0.86 and 0.99 $g.cm^{-3}$ respectively. If the surface tension of water is 72 $dyne.cm^{-1}$, calculate surface tension of liquid.

Section B

(Inorganic Chemistry)

4. Solve any *two* of the following :

(a) What is van der Waals bonding ? Discuss its types in detail.

(b) Explain Fajan's rule of polarization.

(c) (i) Give the unique properties of water based on hydrogen bonding.

(ii) Explain the geometry of $H_2O$ molecule on the basis of VSEPR theory.

(d) Discuss $sp^3d^2$ hybridization with example.

This question paper contains 4 printed pages]

# Y—53—2019

## FACULTY OF SCIENCE

## B.Sc. (First Year) (Second Semester) (Backlog) EXAMINATION

## OCTOBER/NOVEMBER, 2019

## (CBCS/CGPA Pattern)

## CHEMISTRY

Paper IV

(Physical and Inorganic Chemistry)

(MCQ & Theory)

**(Thursday, 17-10-2019)** **Time : 10.00 a.m. to 12.00 noon**

*Time*—2 *Hours* *Maximum Marks*—40

*N.B.* :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Use OMR sheet for Question No. 1.

(*iv*) Calculator is allowed.

(*v*) Only one answer sheet should be used for Section A and B.

### MCQ

1. Select the *correct* answer each of the following Multiple Choice Questions :

(*i*) The idea of stationary orbit was first given by :

(*a*) Rutherford (*b*) J.J. Thomson

(*c*) Niels Bohr (*d*) Max Planck

(*ii*) The maximum number of electrons in orbit is given by :

(*a*) $2n^2$ (*b*) $n^2$

(*c*) $2(2l + 1)$ (*d*) $2l - 1$

P.T.O.

(iii) Brodig's Arc method is used for preparing hydrosols of metal :

(a) Ag (b) Au

(c) Pt (d) All of these

(iv) The precipitation power of $Al^{+3}$, $Na^{+}$, $Ba^{+2}$ is in the order :

(a) $Na^{+} > Ba^{+2} > Al^{+3}$ (b) $Ba^{+2} > Na^{+} > Al^{+3}$

(c) $Al^{+3} > Na^{+} > Ba^{+2}$ (d) $Al^{+3} > Ba^{+2} > Na^{+}$

(v) The enzyme which can catalyse the conversion of Glucose to Ethanol is :

(a) Maltase (b) Invertase

(c) Zymase (d) Catalyse

(vi) A catalyst will affect the rate of the forward reaction by changing the :

(a) Activation energy

(b) Heat of reaction

(c) Heat of formation

(d) Potential energy of the products

(vii) Surface tension is measured in :

(a) dyne cm (b) dyne $cm^{-1}$

(c) $dyne^{-1}$ cm (d) $dyne^{-1}$ $cm^{-1}$

(viii) The hydrogen bond is strongest in :

(a) O—H.....S— (b) S—H.....O—

(c) F—H.....F— (d) F—H.....O—

(ix) $PCl_5$ molecule has ..... type of hybridization.

(a) $sp^3$ (b) $sp^3d^1$

(c) $sp^3d^2$ (d) $sp^3d$

(x) $O_2$ molecule is diamagnetic according to ..... theory.

(a) VBT (b) VSEPR

(c) MOT (d) None of these

## Theory

### Section-A : (Physical Chemistry)

2. Solve any *two* of the following :

(a) State the postulates of Bohr's atomic theory. Give its demerits.

(b) What is Viscosity ? How will you determine the viscosity of liquid by Ostwald's viscometer method ?

(c) Define colloidal system. Give its classification with suitable example.

(d) Write short notes on :

(i) Catalytic poisoning

(ii) Promoters.

3. Solve any *two* of the following :

(a) Explain :

(i) Hund's rule

(ii) Pauli's exclusion principle.

(b) What is emulsion ? Explain the types of emulsion.

(c) Describe the dispersion method for the preparation of solutions.

(d) (i) Calculate the energy of electron in second Bohr's orbit of H-atom.

(ii) In the determination of surface tension of liquid by drop number method, a liquid gives 59 drops while water gives 28 drops for the same volume. The densities of liquid and water are 0.996 gm/cm$^3$ and 0.800 gm/cm$^3$ respectively. Find the surface tension of the liquid if that of water is 72.0 dynes/cm.

## Section-B : (Inorganic Chemistry)

4. Solve any *two* of the following :

(*a*) What is 'Free Electron Theory' of Metallic Bonding ? Explain the effects of metallic bonding on metallic properties.

(*b*) How the percentage ionic character in a covalent bond can be explained from the dipole moment ? Explain in detail.

(*c*) (*i*) How are 'Sigma and Pi-bond' formed ? Explain with the help of V.B.T.

(*ii*) The shape of $H_2O$ molecule is angular. Justify with the help of V.S.E.P.R. theory.

(*d*) (*i*) Explain molecular orbital diagram for $Ne_2$. Calculate its bond order.

(*ii*) $O_2$ molecule is not diamagnetic. Explain with the help of M.O.T.

# FACULTY OF SCIENCE

B. c. (First Year) ( Second Semester)

Winter - 2020 Examination

CHEMISTRY-IV

Pa er Name :- Physical and Inorganic Chemistry ( MCQ Pattern )

Cluster Code :- SD

Date : 08/04/2021 Time :- 1 hours Total Marks

N.B. :- i) Attempt All uestions.
ii) Each questi n carry one mark
iii) No Negati marking system
iv) Use OMR A swer sheet

1) Nuclear model of t atom was proposed by.....
a) Neils Bohr b) Thomson c) Moseley d) Rutherford

2) The Balmer series the spectrum of hydrogen atom Falls in.
a) Ultraviolet gion b) Visible region
c) Infrared reg n d) None of the above

3) If 'r' is the radius o first orbit, in the hydrogen atom is .
a) 0.529A0 b) 2 x 0529A0
c) 4 x 0.529A0 d) None of the above

4) The maximum num r of electrons in the outermost orbit is .....
a) 8 b) 2
c) 18 d) 32

5) The energy of an el tron in the first Bohr orbit for dydrogen is ...
a) 1.36ev b) -13.6 ev c) 13.6 evd) -1.36 ev

6) The ground state of n atom corresponds to a state
a) maximum en rgy b) minimum energy
c) both a & b d) None of the above

7) "In the ground state f an atom, the electrons tend to occupy the available orbitals in e increasing order of energies." This is the statement of .....
a) Hund's rule b) Aufbau principle

c) Pauli's exclusion principle d) Planck's radiation law

8) The viscosity of a liquid is measured by using

a) Viscometer b) Stalagmometer

c) Eudiometer d) None of the above

9) The SI unit of coefficient of viscosity is

a) $kgm^{-1} sec^{-1}$ b) $kgm^{-1} sec$ c) $kgm\ sec^{-1}$ d) $kgm^{-1} sec$

10) Which of the following liquid has the maximum viscosity

a) Water b) Acetone c) Ethyl alcohol d) Glycerine

11) Surface tension of liquid is a measure

a) Intermolecular forces between the liquid molecules

b) Frictional resistance

c) Repulsive forces between the liquid molecules

d) All of the above

12) With the rise in temperature the surface tension of liquid is

a) Increases b) decreases

c) Both a & b d) None of the above

13) An emulsion is a colloidal solution of a ..... dispersed in another liquid

a) Liquid b) Solid c) gas d) None of the above

14) The unit of surface tension is measured

a) dyne $cm^{-1}$ b) $dyne^{-1} cm^{-1}$ c) dyne cm d) $dyne^{-1}cm$

15) The parachor is .....

a) a constitutive property b) an additive property

c) both ( a ) & ( b) d) None of the above

16) The following which one is a natural colloid ?

a) Blood b) urea c) Cane sugar d) Sodium chloride (Nacl)

17) 'Milk' is an example of .....

a) Gel b) Sol c) Emulsion d) Solid Foam

18) The blue colour of the sky is due to .....

a) Tyndall effect b) Brownian movement

c) electrophoresis d) None of the above

19)does not show the Tyndall effect.

a) True solution b) colloidal solution

c) suspension d) None of the above

20) Which one of the following is not a colloidal system.

a) paint b) milk c) Butter d) Sodium chloride( Nacl)

21) In true solution the diameter of the d persed particles in the range from
a) $10\ A^0$ to $100\ A^0$ ) $1\ A^0$ to $10\ A^0$
c) $100\ A^0$ to $200\ A^0$ d) $200\ A^0$ to $500\ A^0$

22) The name of catalyst was given by .....
a) Berzelius b) Chadwick
c) J J Thomson d) Ruther ord

23) The enzyme which can catalyse the nversion of glucose to ethanol is ...
a) Invertase b) zymas ) Both (a) & (b) d) None of the above

24) All enzymes are..... mol cules.
a) Protein b) Fat c) Both (a) & (b) d) None of the above

25) The following which one is enzyme talyst?
a) Zymase b) Invert e c) urease d) All the above

26)is the example of acid - base catalysis.
a) Inversion of cane sugar ) Decomposition of nitramide
c) Keto-enol tautomerism ) All of the above

27)decreases the activity of catalyst.
a) Poison b) Promo r
c) Both (a) & (b) d) All of e above

28) The type of hybridization involved i $SF_6$ is.
a) $Sp^3d$ ) $dsp^2$
c) $Sp^3d^3$ ) $Sp^3d^2$

29) Intramolecular hydrogen bonding is esent in
a) O-nitrophenol b) -chlorophenol
c) P-nitrophenol d) None of these

30) The lattice energy of ionic crystal is gh if.
a) Cation and anion are small in ize
b) Cation and anion have high c rge
c) Bothe A and B d) None of these .

31) Fajan's rule is depends on -
a) Charges of cation b) harges on anion
c) Electronic configuration ) All of these

32) Bond order in N2 molecule is.
a) 2 b) 3 c) 4 d) 5

33) The type of bond is present in NaCl is -
a) Covalent ) Ionic

c) Hydrogen d) Co-ordinate covalent

34) Head to head overlapping of atomic orbitals produce.

a) Pi- bond b) Sigma bond

c) Hydrogen bond d) Metallic bond

35) The ability of a cation to polarize nearby anion is known as.

a) Polarisability b) Polarisation power

c) Both A and B d) None of these

36) The bond angle present in $CH_4$ molecule is.

a) $109^0$ b) $108^0$

c) $110^0$ d) $111^0$

37) The geometry of $PCI_5$ molecule is

a) Linear b) Tetrahedral

c) Trigonal bipyramidal d) None of these

38) Free electron theory is proposed in case of .

a) Ionic bond b) Metallic bond

c) Covalent bond d) None of these

39) Which of the following is least ionic ?

a) AgCI b) KCI c) BaCI d) CaCI2

40) Type of hybridization present in $[NI(CN)_4]$ is.

a) $dsp^2$ b) $sp^3d$

c) $sp^3d^3$ d) None of these

# FACULTY OF SCIENCE

B.Sc. (First Year) ( Second Semester)

Winter - 2020 Examination

CHEMISTRY-IV

Paper Name :- Physical and Inorganic Chemistry ( MCQ Pattern )

Cluster Code :- SD

Date : 08/04/2021 Time :- 1 hours Total Marks.- 40

N.B. :- i) Attempt All questions.
ii) Each question carry one mark
iii) No Negative marking system
iv) Use OMR Answer sheet

1) Nuclear model of the atom was proposed by.....
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a) Polarisability b) Polarisation power

c) Both A and B d) None of these

36) The bond angle present in $CH_4$ molecule is.

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c) $110^0$ d) $111^0$

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a) Linear b) Tetrahedral

c) Trigonal bipyramidal d) None of these

38) Free electron theory is proposed in case of.

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39) Which of the following is least ionic ?

a) AgCl b) KCl c) BaCl d) CaCl2

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a) $dsp^2$ b) $sp^3d$

c) $sp^3d^3$ d) None of these

# FACULTY OF SCIENCE

B.Sc. (First Year) ( Second Semester)

Winter - 2020 Examination

CHEMISTRY-IV

Paper Name :- Physical and Inorganic Chemistry ( MCQ Pattern )

Cluster Code :- SD

Date : 08/04/2021 Time :- 1 hours Total Marks.- 40

N.B. i) Attempt All questions.

ii) Each question carry one mark

iii) No Negative marking system

iv) Use OMR Answer sheet

1 Nuclear model of the atom was proposed by.....

a) Neils Bohr b) Thomson c) Moseley d) Rutherford

2 The Balmer series in the spectrum of hydrogen atom Falls in

a) Ultraviolet region b) Visible region

c) Infrared region d) None of the above

3 If 'r' is the radius of first orbit, in the hydrogen atom is

a) 0.529A0 b) 2 x 0529A0

c) 4 x 0.529A0 d) None of the above

4 The maximum number of electrons in the outermost orbit is .....

a) 8 b) 2

c) 18 d) 32

5 The energy of an electron in the first Boher orbit for dydrogen is ...

a) 1.36ev b) -13.6 ev c) 13.6 evd) -1.36 ev

6 The ground state of an atom corresponds to a state

a) maximum energy b) minimum energy

c) both a & b d) None of the above

7 "In the ground state of an atom, the electrons tend to occupy the available orbitals in the increasing order of energies." This is the statement of .....

a) Hund's rule b) Aufbau principle

c) Pauli's exclusion principle d) Planck's radiation law

8) The viscosity of a liquid is measured by using

a) Viscometer b) Stalagmometer

c) Eudiometer d) None of the above

9) The SI unit of coefficient of viscosity is

a) $kgm^{-1} sec^{-1}$ b) $kg\ m^{2} sec$ c) $kgm\ sec^{-1}$ d) $kgm^{-1}sec$

10) Which of the following liquid have the maximum viscosity

a) Water b) Acetone c) Ethyl alcohol d) Glycerine

11) Surface tension of liquid is a measure

a) Intermolecular forces between the liquid molecules

b) Frictional resistance

c) Repulsive forces between the liquid molecules

d) All of the above

12) With the rise in temperature the surface tension of liquid is

a) Increases b) decreases

c) Both a & b d) None of the above

13) An emulsion is a colloidal solution of a ..... dispersed in another liquid

a) Liquid b) Solid c) gas d) None of the above

14) The unit of surface tension is measured

a) dyne $cm^{-1}$ b) $dyne^{-1} cm^{-1}$ c) dyne cm d) $dyne^{-1}cm$

15) The parachor is .....

a) a constitutive property b) an additive property

c) both ( a ) & ( b) d) None of the above

16) The following which one is a natural colloid ?

a) Blood b) urea c) cane sugar d) Sodium chloride (Nacl)

17) 'Milk' is an example of .....

a) Gel b) Sol c) Emulsion d) Solid Foam

18) The blue colour of the sky is due to .....

a) Tyndall effect b) Brownian movement

c) electrophoresis d) None of the above

19)does not show the Tyndall effect.

a) True solution b) colloidal solution

c) suspension d) None of the above

20) Which one of the following is not a colloidal system.

a) paint b) milk c) Butter d) Sodium chloride( Nacl)

21) In true solution the diameter of the dispersed particles in the range from

a) $10\ A^0$ to $100\ A^0$ b) $1\ A^0$ to $10\ A^0$

c) $100\ A^0$ to $200\ A^0$ d) $200\ A^0$ to $500\ A^0$

22) The name of catalyst was given by .....

a) Berzelius b) Chadwick

c) J J Thomson d) Rutherford

23) The enzyme which can catalyse the conversion of glucose to ethanol is ...

a) Invertase b) zymasec) Both (a) & (b) d) None of the above

24) All enzymes are..... molecules.

a) Protein b) Fat c) Both (a) & (b) d) None of the abo

25) The following which one is enzyme catalyst?

a) Zymase b) Invertase c) urease d) All the above

26)is the example of acid - base catalysis.

a) Inversion of cane sugar b) Decomposition of nitramide

c) Keto-enol tautomerism d) All of the above

27)decreases the activity of catalyst.

a) Poison b) Promoter

c) Both (a) & (b) d) All of the above

28) The type of hybridization involved in $SF_6$ is.

a) $Sp^3d$ b) $dsp^2$

c) $Sp^3d^3$ d) $Sp^3d^2$

29) Intramolecular hydrogen bonding is present in

a) O-nitrophenol b) P-chlorophenol

c) P-nitrophenol d) None of these

30) The lattice energy of ionic crystal is high if

a) Cation and anion are small in size

b) Cation and anion have high charge

c) Bothe A and B d) None of these

31) Fajan's rule is depends on -

a) Charges of cation b) Charges on anion

c) Electronic configuration d) All of these

32) Bond order in N2 molecule is.

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

33) The type of bond is present in NaCl is -

a) Covalent b) Ionic

c) Hydrog n d) Co-ordinate covalent

34) Head to head o erlapping of atomic orbitals produce.

a) Pi- bon b) Sigma bond

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This question paper contains 2 printed pages]

# SB—35—2022

## FACULTY OF SCIENCE

## B.Sc. (First Year) (Second Semester) EXAMINATION

## MAY/JUNE, 2022

## (New Course)

## CHEMISTRY

## Paper-IV

## (Physical and Inorganic Chemistry)

**(Friday, 10-06-2022)** **Time : 10.00 a.m. to 12.30 p.m.**

*Time*— 2½ *Hours* *Maximum Marks*—40

*N.B.* :— (*i*) Attempt *All* questions.

(*ii*) Use of logarithmic table is allowed.

1. Solve any *three* of the following : 15

(*i*) Discuss different types of van der Waal's forces with examples.

(*ii*) What is lattice energy ? How will you determine lattice energy using Born Haber Cycle ?

(*iii*) Explain the formation of $H_2$ molecules on the basis of molecular orbital theory and calculate its bond order.

(*iv*) Explain hybridization of $IF_7$ and its structure.

(*v*) Differentiate between :

(*a*) Ionic and Covalent bond

(*b*) Polar and Non-polar Covalent bond.

2. Solve (any *three*) of the following : 15

(*i*) What is catalysis ? Discuss different types of catalysis with suitable examples.

P.T.O.

(*ii*) What are colloids ? Explain lyophilic and lyophobic colloids with examples.

(*iii*) Derive the expression for radius of an orbit of an atom and give an account of hydrogen spectrum.

(*iv*) Give an account of various intermolecular forces in liquids.

(*v*) (*a*) Define term catalytic promotor.

(*b*) Explain Hund's rule of maximum multiplicity.

3. Solve any *two* of the following : 10

(*i*) What is enzyme catalysis ? Give different examples of it.

(*ii*) How will you prepare sols by Bredig's arc method & peptization method ?

(*iii*) What is Parachor ? Give the relation between Parachor and surface tension.

(*iv*) (*a*) Calculate the energy of transition involving $n_1 = 6$ to $n_2 = 3$ in a hydrogen atom. (R = 109737.32, $h = 6.62 \times 10^{-34}$ Jsec).

(*b*) Explain Rutherford's $\alpha$-particles scattering experiments.