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**Previous Year Paper
(Chemistry) 03 Nov 2022**





भारत सरकार :: अंतरिक्ष विभाग
Government of India :: Department of Space

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Indian Space Research Organisation



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Participant ID	
Participant Name	
Test Center Name	
Test Date	03/11/2022
Test Time	3:30 PM - 6:30 PM
Subject	SCIENTIFIC ASSISTANT (CHEMISTRY) Post Code 022

Section : SCIENTIFIC ASSISTANT (CHEMISTRY) Post Code 022

Q.1

Which among the following set of quantum numbers is NOT possible

- a. $n = 2, l = 1, m = -1, m_s = -1/2$
- b. $n = 2, l = 1, m = 0, m_s = 1/2$
- c. $n = 2, l = 1, m = 0, m_s = -1/2$
- d. $n = 1, l = 1, m = 0, m_s = 1/2$

Ans A. a

B. b

C. c

D. d



Question ID : 1703224596

Status : Answered

Chosen Option : D

Q.2

In which among the following, release of energy is due to **nuclear fusion**?

- (i) Nuclear reactor (ii) Atom bomb (iii) Sun and stars (iv) hydrogen bomb
- a. (i) only
- b. (iii) only
- c. Both (iii) and (iv)
- d. Both (i) and (ii)

Ans

- A. a
- B. b
- C. c
- D. d

Question ID : 1703224605

Status : Answered

Chosen Option : C

Q.3

Various isotopes of a given element have same.....

- a. Number of protons
- b. Number of neutrons
- c. Molar mass
- d. Thermodynamic stability

Ans

- A. a
- B. b
- C. c
- D. d

Question ID : 1703224648

Status : Answered

Chosen Option : A

Q.4

Hydrogen fluoride is a liquid unlike other hydrogen halides because

- a. F-atom is small in size
- b. Hydrogen bonding is present
- c. H-F bond is strong
- d. HF is a weak acid

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224617
Status : Answered
Chosen Option : B

Q.5

Blue vitriol is

- a. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
- b. $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$
- c. $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$
- d. $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224620
Status : Answered
Chosen Option : A

Q.6

An example of a tridentate ligand

- a. Diethylene triamine
- b. Ethylene diamine tetra acetate
- c. Ethylene diamine
- d. Oxalate ion

Ans A. a

B. b

C. c

D. d

Question ID : 1703224645

Status : Answered

Chosen Option : A

Q.7

Material that produce electricity when a pressure or mechanical stress is applied on them are referred to as

- a. Pyro electric
- b. Piezo electric
- c. Ferro electric
- d. Antiferro electric

Ans A. a

B. b

C. c

D. d

Question ID : 1703224616

Status : Answered

Chosen Option : B

Q.8

When one *s* and one *p* orbitals are hybridized the result is

- a. three orbitals in a plane
- b. two orbitals at 180 degrees
- c. two mutually perpendicular orbitals
- d. four orbitals directed tetrahedrally

Ans  A. a B. b C. c D. d

Question ID : 1703224650

Status : Answered

Chosen Option : B

Q.9

Ziegler-Natta catalyst is used in

- a. Addition polymerisation
- b. Condensation polymerisation
- c. Vulcanisation
- d. None of the above

Ans  A. a B. b C. c D. d

Question ID : 1703224633

Status : Answered

Chosen Option : A

Q.10

The type of isomerism shown by cis-[PtCl₂(NH₃)₂] and trans-[PtCl₂(NH₃)₂]

- a. Linkage isomerism
- b. Position isomerism
- c. Geometrical isomerism
- d. Optical isomerism

Ans

- A. a
- B. b
- C. c
- D. d

Question ID : 1703224646

Status : Answered

Chosen Option : C

Q.11

Calculate the crystal field stabilization energy for a d⁵ ion in a strong octahedral field

- a. 0.0 Δ₀
- b. 2.0 Δ₀
- c. 0.8 Δ₀
- d. 0.4 Δ₀

Ans

- A. a
- B. b
- C. c
- D. d

Question ID : 1703224613

Status : Answered

Chosen Option : B

Q.12 According to VSEPR (Valence Shell Electron Pair Repulsion) theory which is the correct order of repulsive interactions?

- a. Lone pair-Lone pair < Bond pair- Bond pair < Lone pair-Bond pair
- b. Lone pair-Lone pair > Bond pair- Bond pair > Lone pair-Bond pair
- c. Lone pair-Lone pair <Lone pair-Bond pair < Bond pair-Bond pair
- d. Lone pair-Lone pair >Lone pair-Bond pair > Bond pair- Bond pair

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224611

Status : Answered

Chosen Option : D

Q.13

In the phase diagram of water system, the triple point is

- a. Monovariant
- b. Bivariant
- c. Invariant
- d. Cannot say

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224602

Status : Not Answered

Chosen Option : --

Q.14

Orlon is a polymer of

- a. Styrene
- b. Vinyl chloride
- c. Tetrafluoroethylene
- d. Acrylonitrile

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224631
Status : Not Answered
Chosen Option : --

Q.15

In Clemmensen reduction reagent used is

- a. Zn-Hg/HCl
- b. LiAlH₄
- c. N₂H₄/KOH
- d. Red P/HI

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224629
Status : Answered
Chosen Option : A

Q.16

The Chemical formula of Urea is

- a. $(\text{NH}_4)_2\text{CO}_2$
- b. $(\text{NH}_2)\text{CO}$
- c. $(\text{NH}_4)_2\text{CO}$
- d. $(\text{NH}_2)_2\text{CO}$

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224640

Status : Answered

Chosen Option : D

Q.17

Which of the following statements is true in $\text{S}_{\text{N}}2$ reaction?

- a. $\text{S}_{\text{N}}2$ reaction proceeds with complete chemical inversion and follows second order kinetics
- b. $\text{S}_{\text{N}}2$ reaction proceeds with complete chemical inversion and follows first order kinetics
- c. $\text{S}_{\text{N}}2$ reaction proceeds with racemisation and follows first order kinetics
- d. $\text{S}_{\text{N}}2$ reaction proceeds with racemisation and follows second order kinetics

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224637

Status : Not Answered

Chosen Option : --

Q.18

Which of the following is a biodegradable polymer?

- a. PGA
- b. PVC
- c. PTFE
- d. Bakelite

Ans  A. a B. b C. c D. d

Question ID : 1703224625

Status : Answered

Chosen Option : A

Q.19

In a first order reaction, it takes the reactant 230.3 minutes to be 90% decomposed.

Calculate the rate constant of the reaction

- a. 0.1 min^{-1}
- b. 0.01 min^{-1}
- c. 0.001 min^{-1}
- d. 0.0001 min^{-1}

Ans  A. a B. b C. c D. d

Question ID : 1703224598

Status : Answered

Chosen Option : B

Q.20

If a graph is plotted between temperature on x-axis and volume on y-axis for 1 mole of gas at constant pressure then we get a straight line which cuts the temperature axis at

- a. 0 °C
- b. 273.16 K
- c. -273.16 K
- d. -273.16 °C

Ans A. a

B. b

C. c

D. d

Question ID : 1703224609

Status : Not Answered

Chosen Option : --

Q.21

Which compound in CH₃Br, CH₃Cl, CH₃I, CH₃F will respond faster towards SN₂ reaction?

- a. CH₃Br
- b. CH₃Cl
- c. CH₃I
- d. CH₃F

Ans A. a

B. b

C. c

D. d

Question ID : 1703224638

Status : Answered

Chosen Option : C

Q.22

A substance whose electrical conductivity decreases with increase in temperature

- a. A metallic conductor
- b. An electrolytic conductor
- c. A semiconductor
- d. An insulator

Ans  A. a

 B. b

 C. c

 D. d

Question ID : 1703224644

Status : Not Answered

Chosen Option : --

Q.23

Modern periodic law states that physical and chemical properties of the elements are periodic functions of their _____

- a. Atomic number
- b. Mass number
- c. Atomic weight
- d. Atomic radius

Ans  A. a

 B. b

 C. c

 D. d

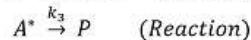
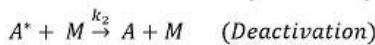
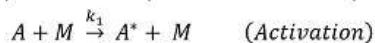
Question ID : 1703224618

Status : Answered

Chosen Option : A

Q.24

Consider the following Lindemann mechanism for the unimolecular decomposition of a molecule A in the presence of a species M to form the product P.



Using steady state approximation, derive the rate law for the formation of the product

a. $r = k_1 \frac{[A][M]}{k_2[M] + k_3}$

b. $r = k_1 k_3 \frac{[A][M]}{k_2[M] + k_3}$

c. $r = k_1 k_3 \frac{[A][M]}{k_2[A] + k_3}$

d. $r = k_1 k_2 \frac{[A][M]}{k_2[M] + k_3}$

Ans A. a

B. b

C. c

D. d

Question ID : 1703224599

Status : Not Answered

Chosen Option : --

Q.25

Aromatic molecules satisfy which among the following characteristics

- a. Cyclic and planar
- b. Conjugated all around ring
- c. $(4n+2)\pi$ electrons
- d. All of the above

Ans A. a

B. b

C. c

D. d

Question ID : 1703224641

Status : Answered

Chosen Option : D

Q.26

In a close packed structure, anions B form the lattice and cations A occupy alternate tetrahedral voids. Formula of the compound is

- a. AB_2
- b. A_2B
- c. A_3B
- d. AB

Ans A. a

B. b

C. c

D. d

Question ID : 1703224647

Status : Not Answered

Chosen Option : --

Q.27

In a Lambert-Beer law cell, the absorbance of an aqueous solution of a substance of known concentration is "A". What will be the absorbance of the solution of the same substance with half the concentration in a cell five times as long?

- a. $5 A$
- b. $10 A$
- c. $2/5 A$
- d. $5/2 A$

Ans A. a

B. b

C. c

D. d

Question ID : 1703224593

Status : Answered

Chosen Option : D

Q.28

Sodium tetraborate decahydrate is also known as _____

- a. Epsom salt
- b. Gypsum
- c. Borax
- d. Galena

Ans  A. a B. b C. c D. d

Question ID : 1703224642

Status : Answered

Chosen Option : C

Q.29

What is measured in Hertz?

- a. Frequency
- b. Energy
- c. Heat
- d. Power

Ans  A. a B. b C. c D. d

Question ID : 1703224649

Status : Answered

Chosen Option : A

Q.30

Identify Wilkinson's catalyst used in hydrogenation of alkenes

- a. $K[PtCl_3(\eta^2-C_2H_4)]$
- b. $[(C_6H_5)_3P]_3RhCl$
- c. $[Fe(\eta^5-C_5H_5)]$
- d. $Cr(C_6H_6)_2$

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224615

Status : Answered

Chosen Option : B

Q.31

Isoelectric point in amino acid is used for

- a. Crystallisation
- b. Precipitation
- c. Solubility
- d. None of the above

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224639

Status : Not Answered

Chosen Option : --

Q.32

In spectroscopy, a shift of λ_{\max} to longer wavelength is referred to as

- a. Bathochromic Shift
- b. Hypsochromic Shift
- c. Hyperchromic Shift
- d. Hypochromic Shift

Ans ✓ A. a✗ B. b✗ C. c✗ D. d

Question ID : 1703224608

Status : Answered

Chosen Option : A

Q.33

Laughing gas is

- a. N_2O
- b. NO
- c. NO_2
- d. N_2O_4

Ans ✓ A. a✗ B. b✗ C. c✗ D. d

Question ID : 1703224626

Status : Answered

Chosen Option : A

Q.34

Which among the following has the highest electron affinity?

- a. Fluorine
- b. Chlorine
- c. Bromine
- d. Iodine

Ans  A. a B. b C. c D. d

Question ID : 1703224610

Status : Answered

Chosen Option : B

Q.35

Consider a primitive cubic unit cell with $a=150$ picometer. Determine the spacing between the (122) planes

- a. 50 picometer
- b. 100 picometer
- c. 150 picometer
- d. 200 picometer

Ans  A. a B. b C. c D. d

Question ID : 1703224603

Status : Answered

Chosen Option : A

Q.36

Correct order of decreasing acidic strength is

- a. Phenol > Ethanol > Chloroacetic acid > Acetic acid
- b. Chloroacetic acid > Acetic acid > Phenol > Ethanol
- c. Chloroacetic acid > Phenol > Acetic acid > Ethanol
- d. Acetic acid > Chloroacetic acid > Phenol > Ethanol

Ans A. a B. b C. c D. d

Question ID : 1703224627

Status : Answered

Chosen Option : B

Q.37

Calculate the maximum efficiency of a heat engine operating between 111°C and 15°C

- a. 15 %
- b. 25%
- c. 30 %
- d. 35 %

Ans A. a B. b C. c D. d

Question ID : 1703224600

Status : Answered

Chosen Option : B

Q.38

Which among the following is the correct expression for Van't Hoff reaction isotherm which shows the relation between equilibrium constant K_p and standard free energy change ΔG° ?

- a. $\Delta G^\circ = - RT \ln K_p$
- b. $\Delta G^\circ = RT \ln K_p$
- c. $\Delta G^\circ = K_p e^{RT}$
- d. $\Delta G^\circ = RT \log K_p$

Ans ✓ A. a✗ B. b
✗ C. c
✗ D. d

Question ID : 1703224601
Status : Not Answered
Chosen Option : --

Q.39

The ESR (Electron Spin Resonance) spectrum of methyl radical, $\cdot\text{CH}_3$ is a

- a. Doublet
- b. Quartet
- c. Triplet
- d. Singlet

Ans ✗ A. a
✓ B. b
✗ C. c
✗ D. d

Question ID : 1703224643
Status : Not Answered
Chosen Option : --

Q.40

The oxidation number of nickel in $\text{Ni}(\text{CO})_4$ is

- a. 0
- b. +2
- c. +4
- d. +6

Ans ✓ A. a✗ B. b
✗ C. c
✗ D. d

Question ID : 1703224621

Status : Answered

Chosen Option : A

Q.41

Enzyme that converts starch to maltose

- a. Zymase
- b. Maltase
- c. Amylase
- d. Invertase

Ans ✗ A. a
✗ B. b
✓ C. c
✗ D. d

Question ID : 1703224634

Status : Not Answered

Chosen Option : --

Q.42

The number of ions produced by the complex $[\text{CoCl}_2(\text{NH}_3)_4]\text{Cl}_2$

- a. 0
- b. 1
- c. 2
- d. 3

Ans  A. a B. b C. c D. d

Question ID : 1703224614

Status : Answered

Chosen Option : D

Q.43

A mixture of benzoic acid and phenol is separated by treatment with

- a. NaHCO_3
- b. NaOH
- c. NH_3 solution
- d. KOH

Ans  A. a B. b C. c D. d

Question ID : 1703224635

Status : Answered

Chosen Option : A

Q.44

Which among the following indicators is best suitable for the titration of a weak acid with a strong base?

- a. Phenolphthalein
- b. Methyl Orange
- c. Methyl red
- d. Thymol Blue

Ans ✓ A. a
✗ B. b
✗ C. c
✗ D. d

Question ID : 1703224606
Status : Not Answered
Chosen Option : --

Q.45

Peptide linkage is an

- a. Amide linkage
- b. Ester linkage
- c. Ether linkage
- d. Imide linkage

Ans ✓ A. a
✗ B. b
✗ C. c
✗ D. d

Question ID : 1703224632
Status : Answered
Chosen Option : A

Q.46

Which of the following factors facilitate the formation of an ionic bond between a metal and a non-metal

- a. Low ionization energy of metal
- b. High electron affinity of non- metal
- c. High lattice energy
- d. All of the above

Ans A. a B. b C. c D. d

Question ID : 1703224597

Status : Answered

Chosen Option : D

Q.47

Which of the following statements about Fullerene is NOT correct?

- a. It is one of the purest forms of carbon
- b. All carbon atoms undergo sp^2 hybridization
- c. A six membered ring is fused with six membered rings only
- d. A five membered ring is fused with six membered rings only

Ans A. a B. b C. c D. d

Question ID : 1703224623

Status : Not Answered

Chosen Option : --

Q.48

Which among the following radioactive series does not end with an isotope of lead?

- a. Uranium Series
- b. Thorium Series
- c. Neptunium Series
- d. Actinium Series

Ans  A. a B. b C. c D. d

Question ID : 1703224604

Status : Not Answered

Chosen Option : --

Q.49

The number of gram equivalents of the component present in one litre of the solution is known as

- a. Molarity
- b. Molality
- c. Normality
- d. Mole Fraction

Ans  A. a B. b C. c D. d

Question ID : 1703224594

Status : Answered

Chosen Option : C

Q.50

The brown ring test for nitrates involves

- a. Reduction of ferrous sulphate to iron
- b. Reduction of nitrates to nitric oxide
- c. Conversion of nitrates to nitrogen dioxide
- d. Oxidizing action of Con. Sulphuric acid

Ans A. a B. b C. c D. d

Question ID : 1703224624

Status : Answered

Chosen Option : D

Q.51

Calculate the boiling point of a 1 molal aqueous solution of a non-volatile solute if the ebullioscopic constant of water is 0.52K kg mol^{-1}

- a. 373.52 K
- b. 100.52 K
- c. 273.52 K
- d. 173.52 K

Ans A. a B. b C. c D. d

Question ID : 1703224595

Status : Answered

Chosen Option : A

Q.52

Mathematical expression for root mean square velocity of molecules in a gas is:

a. $\sqrt{\frac{2RT}{M}}$

b. $\sqrt{\frac{8RT}{\pi M}}$

c. $\sqrt{\frac{3RT}{M}}$

d. $\sqrt{\frac{2RT}{\pi M}}$

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224592

Status : Answered

Chosen Option : C

Q.53

The magnetic susceptibility is **negative** for which type of solid?

- a. Diamagnetic
- b. Paramagnetic
- c. Ferromagnetic
- d. Antiferromagnetic

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224607

Status : Not Answered

Chosen Option : --

Q.54

Reaction mechanism in Markownikov's rule follows

- a. Carbo-cation intermediate
- b. Carb-anion intermediate
- c. Free radical intermediate
- d. None of the above

Ans ✓ A. a✗ B. b
✗ C. c
✗ D. d

Question ID : 1703224628

Status : Answered

Chosen Option : A

Q.55

_____ gets converted to phosgene, when exposed to sunlight.

- a. Chloroform
- b. Acetone
- c. Benzene
- d. Propylene

Ans ✓ A. a✗ B. b
✗ C. c
✗ D. d

Question ID : 1703224622

Status : Answered

Chosen Option : A

Q.56

Which one of the following compounds is a non-reducing sugar?

- a. Glucose
- b. Fructose
- c. Sucrose
- d. Galactose

Ans A. a
 B. b
 C. c
 D. d

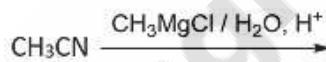
Question ID : 1703224630

Status : Answered

Chosen Option : C

Q.57

Product formed in the reaction



- a. Acetaldehyde
- b. Acetone
- c. Acetic Acid
- d. Acetyl acetone

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224636

Status : Answered

Chosen Option : B

Q.58

Zeolites are basically

- a. Metal Silicides
- b. Organo silicon compounds
- c. Alumino Phosphates
- d. Alumino Silicates

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224612
Status : Answered
Chosen Option : D

Q.59

The compound in which nitrogen has an oxidation state of +5 is

(i) NO_2 (ii) N_2O_5 (iii) HNO_3 (iv) Mg_3N_2

- a. (ii) only
- b. (iv) only
- c. (ii) and (iii)
- d. (iii) and (iv)

Ans A. a
 B. b
 C. c
 D. d

Question ID : 1703224651
Status : Answered
Chosen Option : C

Q.60

Isotope of hydrogen having 2 neutrons in the nucleus

- a. Protium
- b. Deuterium
- c. Tritium
- d. Hydronium

Ans  A. a

 B. b

 C. c

 D. d

Question ID : 1703224619

Status : Answered

Chosen Option : C

