

1.ATOMIC STRUCTURE-II

- The hybridization in NH_4^+ ion is
a) **SP^3** b) SP^3d c) SP^3d^2 d) SP^3d^3
- Which one of the following experiments confirmed the wave nature of electron?
a) **G.P. Thomson's gold experiment** b) Black body radiation
c) Photo electric d) Millikan's oil drop experiment
- Dual character of an electron was explained by
a) Bohr b) Heisenberg c) **de-Broglie** d) Pauli
- Water exists in liquid state, this is due to
a) high boiling point b) low boiling point
c) freezing point is zero d) **hydrogen bond**
- The most stable molecule among the following is
a) Li_2 b) H_2 c) O_2 d) **N_2**
- Which of the following does not exist.
a) He_2 b) N_2 c) Ne_2 d) **both (a) and (c)**
- Hybridization of PCl_5 is
a) Sp^3 b) **Sp^3d** c) Sp^3d^2 d) Sp^3d^3
- The intermolecular hydrogen bonding is present in
a) HF b) O-nitro phenol c) H_2O d) **both (a) and (c)**
- The value of Bohr radius for hydrogen atom is
a) $0.529 \times 10^{-8} \text{ cm}$ b) **$0.529 \times 10^{-10} \text{ m}$** c) $0.529 \times 10^{-6} \text{ cm}$ d) $0.529 \times 10^{-12} \text{ cm}$
- For $2p_x$ orbital, plane is the nodal plane x .
a) XZ b) **YZ** c) XY d) All of these

MATCH THE FOLLOWING:

| Molecule | Bond order | Magnetic nature |
|----------|------------|-----------------|
|----------|------------|-----------------|

- | | |
|------------------|--------------------|
| A. N_2 | 1. 2, Paramagnetic |
| B. O_2 | 2. 0, - |
| C. He_2 | 3. 1, Diamagnetic |
| D. H_2 | 4. 3, Diamagnetic |

- | | A | B | C | D |
|-----------|----------|----------|----------|----------|
| a) | 1 | 2 | 3 | 4 |
| b) | 4 | 1 | 2 | 3 |
| c) | 3 | 2 | 1 | 4 |
| d) | 1 | 3 | 2 | 4 |

2. PERIODIC CLASSIFICATION – II

- Which is not a homonuclear diatomic molecule .
a. F_2 . b. H_2 . c. O_2 . d. **CO**
- In a homonuclear diatomic molecule, the covalent radius $r(A)$ is equal to
a. $2d(A-A)$ b. $d(A-A)/4$. c. **$d(A-A)/2$** . d) $2d(A-A) /3$
- Bond length of CCl_4 is
a. 1.98 \AA . **b. 1.76 \AA** . c. 1.93 \AA . d) 1.54 \AA .
- Which of the following are isoelectronic.
a. NaF. b. Cl^{2+} and F^{2-} c. Na^{2+} and Cl^{3-}
- KCl crystal has _____ type of configuration.
a. Ne. **b. Ar.** c. Both a and b.
- The value of screening constant (s) and effective nuclear Charge (Z^*) can be found by
a. Pauling's rule b. Schrodinger's rule. **c. Slater's rule.**
- The effective nuclear charge of last electron in chlorine is
a. 6.1 b. 5.1 c. 4.1
- Ionisation energy is measured in
a. eV/atom. b. kcal/mole. **c. Both.**
- Which of the following has higher ionization energy.
a. Sodium. **b. Magnesium.** c. Oxygen.
- The repulsive force between electrons results in _____ electron affinity.
a. High. **b. less.** c. None.
- Electron affinity for Gold is higher than
a. $222.7 \text{ kJ/mol}^{-1}$ b. $222.7 \text{ kJ/mol}^{-2}$ c. 222.7 kJ/mol .
- Which has low electron affinity value.
a. Chlorine. b. Fluorine. **c. Calcium.**
- Mulliken's scale value of electronegativity is _____ Higher than Pauling value.
a. 2.8 times. b. 2 times. c. 3.8 times.
- $1 \text{ eV} =$
a. $90.48 \text{ kJ/mol}^{-1}$. b. 97.48 kJ/mol . **c. None.**
- $(A^{\delta-})-B^{\delta+}$ bond is
a. Predominantly ionic. b. Dominantly ionic. c. Predominantly covalent.

MATCH THE FOLLOWING:

1. MOLECULE - BOND ENERGY

- | | | |
|----------------|---|---------|
| a. Br_2 | - | 1. 0.74 |
| b. Cl_2 | - | 2. 1.44 |
| c. H_3C-CH_3 | - | 3. 1.98 |
| d. H_2 | - | 4. 2.28 |
| e. F_2 | - | 5. 1.54 |

- | | | | | | |
|----|---|---|---|---|---|
| | a | b | c | d | e |
| a) | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|-----------|----------|----------|----------|----------|----------|
| b) | 4 | 5 | 2 | 1 | 3 |
| c) | 3 | 2 | 1 | 4 | 5 |
| d) | 1 | 3 | 2 | 4 | 5 |

2. a. $X_A - X_B = 1.7$ - Ionic < covalent.
 b. $X_A - X_B > 1.7$ - Ionic > covalent.
 c. $X_A - X_B < 1.7$ - Ionic = covalent.
 d. H_2 - Covalent bond.
 e. F_2 - polar covalent bond.

| | | | | | |
|-----------|----------|----------|----------|----------|----------|
| | a | b | c | d | e |
| a) | 1 | 2 | 3 | 4 | 5 |
| b) | 4 | 5 | 2 | 1 | 3 |
| c) | 3 | 2 | 1 | 4 | 5 |
| d) | 1 | 3 | 2 | 4 | 5 |

ASSERTION AND REASON:

- a. Both assertion and reason are true and reason explains assertion.
 b. Both are false.
 c. A is correct, but R is false.
 d. A is false, but R is true.

1. A: Greater the number of inner lying state, greater will be the Electron affinity.

R: Screening effect hinder the nuclear attraction for incoming electron. **[Ans: a]**

2. A: Comparing to all metals gold has high electron affinity.

[Ans: a]

R: They have higher effective nuclear charge and poor Shielding of nuclear by d electrons.

3. A: Electron affinity for noble gas is zero.

R: They have partially filled electronic configuration.

[Ans: c]

4. A: Fluorine has more electron affinity than Cl.

R: Fluorine is smaller in size.

[Ans: d]

5. A: Element of group 18 possess high electron affinity.

R: They have stable noble gas configuration.

[Ans: a]

6. A: Ionization energy decreases down the group.

R: The atomic size of atom decreases from left to right.

[Ans: c]

**Prepared by
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3. p – BLOCK ELEMENTS.

- The first four elements of the Oxygen family are referred to as Chalcogens, because they form,
 - a.Ores.**
 - Salts.
 - Acids.
 - bases.
- Brim stone refers to
 - Selenium.
 - Boron.
 - c. Sulphur.**
 - Polonium.
- Polonium Occurs in trace amounts in
 - Francium ores.
 - Radium ores.
 - c. Uranium ores.**
 - Thorium ores.
- Oxygen constitutes _____ of earth's crust.
 - 46.7%
 - 46.8%
 - 46.9%
 - d. 46.6%**
- Which is not a chalcogen?
 - Selenium.
 - Tellurium.
 - c. Polonium.**
 - Sulphur.
- Who discovered Polonium?
 - Dewar.
 - Pierre curie.
 - Rochow.
 - d. None of the above.**
- Which element has the Noble gas electronic configuration of $[Ar] 3d^{10} 4s^2 4p^4$?
 - Sulphur.
 - b. Selenium.**
 - Tellurium.
 - Oxygen.
- The electronic configuration for sulphur is
 - a. $[Ne] 3s^2 3p^6$.**
 - $[Ne] 3s^2 3p^5$.
 - $[Ar] 3s^2 3p^4$.
 - $[Ar] 3s^2 3p^6$.
- General electronic configuration for Oxygen family
 - a. $ns^2 np^4$**
 - $ns^2 np^5$
 - $ns^2 np^6$
 - $ns^2 np^3$.
- Choose the correct match
 - Chlorine - a. Brown
 - Iodine - b. Violet
 - Bromine - c. Yellow
 - 1-a, 2-c, 3-b.
 - b. 1-c, 2-b, 3-a.**
 - 1-b, 2-c, 3-a.
 - 1-c, 2-a, 3-b.
- Formula for hydricids
 - HOX.
 - b. HX.**
 - H_2X .
 - H_2OX .
- The activity of halogens towards hydrogens from fluorine to Iodine.
 - Increases
 - b. Decreases**
 - Remains constant
 - Alternate.
- Hydracids are _____.
 - Oxidizing agent
 - b. reducing agent**
 - Both a and b
 - None.
- At which condition, Hydrogen combines with Iodine?
 - Dark
 - b. Catalyst and heating.**
 - Sunlight.
 - Heating only.
- Among these hydrogen halide, which is liquid?
 - a. HF.**
 - HCl.
 - HBr.
 - HI.
- Due to Inter molecular hydrogen bonding, HI is a
 - a. Liquid**
 - gases
 - solid.
 - vitreous.
- Pick out the correct order on the basis of acidic character.
 - $HF > HCl > HBr > HI$.
 - $HCl < HBr < HF > HI$.
 - c. $HF < HCl < HBr < HI$.**
 - $HI < HBr < HCl < HI$.
- Fluorine decomposes cold dilute alkalis liberating OF_2 , Whereas other Halogens give rise to
 - Hydracids
 - b. Hypohalites.**
 - Halates.
 - Polyhalides.
- Fluorine decomposes cold con. Alkalies liberating O_2 , Whereas other halogens give rise to
 - Hydracids.
 - Hypohalites.
 - c. Halates.**
 - Polyhalides.

20. Among which is a Weak acid?
 a. **HF.** b. HCl. c. HBr. d. HI.
21. Among which is soluble in water?
 a. AgCl. b. AgBr. **c. AgF.** d. AgI.
22. The most common, Freon is known as
 a. CF_3Cl_2 . b. $\text{C}_2\text{F}_2\text{Cl}_2$. **c. CF_2Cl_2 .** d. CF_2Cl_3 .
23. Among which is not known?
 a. ClF_3 . b. BrF_3 . **c. BrCl_3 .** d. ICl_3 .
24. Interhalogen compounds are generally _____ compounds in which the _____ halogen forms the central atom.
 a. Co-ordinate, large. b. Covalent, smaller. C. Co-ordinate, smaller. **d. Covalent, larger.**
25. Among which is not present in air in traces?
 a. Xe. b. Kr. **c. Rn.** d. Ar.
26. Due to their chemical inactivity, Group 18 elements are Called as
 a. Rare gases. b. Noble gases. c. Idle gases. **d. Inert gases.**
27. Which noble gas get adsorbed at 93k by coconut charcoal in DEWAR'S method?
 a. Helium. b. Krypton. **c. Neon.** d. Argon.
28. Xenon fluoride compounds are colourless crystalline solids subliming readily at _____.
 a. 273k. b. 288k. **c. 298k.** d. 573k.
29. XeF_6 has _____ structure.
 a. Triagonal. b. Squareplanar. c. Linear. **d. Octahedral.**
30. Boiling point of liquid helium _____.
 a. 4.3k **b. 4.2k** c. 4.5k d. 4.6k
31. The voltage limit in the chemical method of isolation of Noble gases.
 a. 5000-8000k. **b. 6000-8000k.** c. 2000-3000k. d. 5000-6000k.

MATCH THE FOLLOWING:

1. COMPOUNDS

1. NaF
2. CaF_2
3. SF_6
4. Teflon
5. CF_2Cl_2

USES

- a. flux in metallurgy store.
- b. hydrofluoric acid
- c. dental cavities and Fermentation.
- d. Freon
- e. Insulating material.

Ans: 1-c,2-a,3-e,4-b,5-d.

2.COMPOUNDS

1. BrF
2. BrF_5
3. IF_7
4. ClF_3
5. XeF_4

STRUCTURE

- a. Octahedral.
- b. Linear.
- c. Square planar.
- d. Pentagonal bipyramidal.
- e. Triagonal bipyramidal.

Ans: 1-b,2-a,3-d,4-e,5-c.

3. COMPOUNDS

1. Helium
2. Radon

USES

- a. Radio valves and tubes.
- b. Protection of electrical Instruments.

- | | | |
|------------------|---|-------------------------|
| 3. Neon | - | c. MRI, NMR. |
| 4. Argon | - | d. Botanical gardens. |
| 5. Helium + Neon | - | e. Treatment of cancer. |

Ans: 1-c, 2-e, 3-d, 4-a, 5-b.

4. ADSORBED GAS - TEMPERATURE

- | | | |
|-------|---|--------------------|
| 1. Kr | - | a. 183k |
| 2. Ne | - | b. Liquid air temp |
| 3. Ar | - | c. 173k |
| 4. Xe | - | d. 93k |

Ans: 1-c, 2-d, 3-b, 4-a.

ASSERTION AND REASON:

- A is true, R is a correct explanation for A.**
- Both are true, but R is not a correct explanation for A.**
- A is true, but R is false.**
- Both are false.**

- A: Neon is used to fill balloons for meteorological Observations.
R: It is light and inflammable. **[Ans: d.]**
- A: Fluorine is the most reactive element among halogens.
R: Because, it has minimum value of F-F bond dissociation Energy. **[Ans: a.]**
- A: Except HF, all hydrogen Halides are gases.
R: HF is a liquid because of intermolecular hydrogen Bonding. **[Ans: a.]**
- A: Group 17 is called as Halogens.
R: They are ore formers. **[Ans: c.]**
- A: Halogen of low atomic number oxidizes the halide of halides of higher atomic number.
R: The oxidizing power decreases from fluorine to Iodine. **[Ans: a.]**

**PREPARED BY
S.I. SINDHU PARKAVI.**

- The general electronic configuration of p-block elements is
a. ns^2np^{1-10} **b. ns^2np^{1-6}** c. ns^2np^{1-14} d. ns^2np^{1-2} .
- Potash Alum is manufactured from
a. Aluminium b. Alunite c. Alumstone **d. both b and c.**
- Potash Alum is _____.
a. Yellowish crystalline solid. **b. White crystalline solid.** c. Red crystalline solid.
- The hydrolysis of trialkylmonochlorosilane R_3SiCl yields _____.
a. Penta alkylsiloxane. b. Tetra alkylsiloxane. **c. Hexa alkylsiloxane.** d. Trialkylsiloxane.
- _____ acts as excellent insulators for electric motors and other appliances.
a. Silicon. **b. Silicone.** c. Galena. d. Lead ochre.
- When lead is heated in air or oxygen, lead is oxidized to _____.
a. Litharge. b. Galena. c. Cerrusite. d. Anglesite.

7. Red lead is _____.
 a. **Pb₃O₄**. b. PbO. c. PbO₂. d. Pb₂O₂.
8. Lead is used to prepare _____.
 a. **Tetra lead (Pb(C₂H₅)₄)** b. Tri ethyl lead (Pb(C₂H₅)₃)
 c. Hexa ethyl lead (Pb(C₂H₅)₆) d. Penta ethyl lead (Pb(C₂H₅)₅)
9. P₂O₅ or P₄O₁₀ is a _____.
 a. Powerful reducing agent b. Powerful oxidizing agent. **c. Powerful dehydrating agent.**
10. In Holme's signal, water enters the container through the bottom and reacts with calcium carbide and calcium Phosphide to give _____.
a. Acetylene and Phosphine. b. Formylene and Phosphorus. c. Acetylene and Phosphine.
11. Sulphur is also known as _____.
 a. Lime stone. **b. Brime stone.** c. Alumstone. d. Both b and c
12. Silver is removed by eith
 a. Pattinson's process. b. Park's process. c. Plumbo process. **d. Both a and b.**
13. The swollen mass in potash alum is called _____.
 a. Heated alum. b. Cooled alum. **c. Burnt alum.** d. None.
14. PCl₅ heats at _____ and melts at _____.
 a. 273K and 518k. b. 310k and 21d8k. c. 453k and 318k. **d. 473k and 318k.**
15. Phosphine burns in chlorine forming _____.
 a. PCl₂ and PCl₅. b. PCl₃ and PCl₂. **c. PCl₃ and PCl₅.** d. PCl₃ and PCl₄.

MATCH THE FOLLOWING:

- | | |
|----------------------------|-------------------------------|
| 1. Silicones | - water proofing textiles. |
| 2. Straight chain polymers | - Paints and varnish. |
| 3. Silicone rubber | - Oil bath, high vaccum pump. |
| 4. Silicone resins | - damp- resistant. |
| 5. Silicone oils | - electrimotors. |

Ans: 2,4,5,3,1.

- | | |
|-----------------------------|--|
| 1. Phosphorus Trichloride | - H ₃ PO ₄ . |
| 2. Phosphorus Pentachloride | - H ₄ P ₂ O ₇ . |
| 3. Phosphorus acid | - PCl ₃ . |
| 4. Ortho Phosphonic acid | - PCl ₅ . |
| 5. Pyrophosphoric acid | - H ₃ PO ₃ . |

Ans: 4,5,1,2,3.

- | | |
|-----------------------------------|------------------|
| 1. PCl ₃ | - Garlic taste. |
| 2. P ₂ O ₃ | - Souring agent. |
| 3. H ₃ PO ₃ | - Garlic odour. |
| 4. H ₃ PO ₄ | - Fishodour. |
| 5. PH ₃ | - Pungent odour. |

Ans: 3,4,2,5,1.

ASSERTION AND REASON:

- a. A and R are true, and R is the correct explanation for A.
- b. Both are correct but R is not a correct explanation for A.
- c. A is correct, but R is wrong.
- d. Both are wrong.

1. A: p-block elements is to show inert pair effect.
R: Less availability for ns electron in bonding.

[Ans: a.]

2. A: Gallium is remarkable for low melting point.
R: Exist as a liquid at room temperature.

[Ans: a.]

3. A: The complete hydrolysis of SiCl_4 yields Silica SiO_2 .
R: It has very stable two- dimensional structure.

[Ans: c.]

4. A: The concentrated ore is roasted in a reverberatory Furnace at a moderate temperature.
R: During roasting , galena is partly oxidized to lead Monoxide and to lead sulphate. [Ans: b.]

5. A: Phosphine is obtained by boiling white Phosphorus.

R: 30 – 40% solution of caustic soda in inert atmosphere at CO_2 .

[Ans: a.]

**PREPARED BY
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4. d-Block Elements

CHOOSE THE CORRECT ANSWER:

1. Zinc when heated in air at 773K it burns to form oxide which settles to form a
a) Philosopher's wool b) Molten silver c) Sodium zincate d) Zincite
2. Which has no action with alkalies ?
a) Zinc b) Silver c) Gold d) Both (b) and (c)
3. Which is a bluish white metal, malleable and ductile?
a) Silver salt b) Zinc c) Gold d) Copper
4. Which is used as laboratory reagent ?
a) Silver nitrate b) Silver leaf c) Silver salt d) Zinc carbonate
5. A mixture of copper sulphate and lime is known as
a) Barium peroxide mixture b) Blister copper mixture
c) Copper sulphate mixture d) Bordeaux mixture
6. Zinc carbonate in nature is known as
a) Lunar caustic b) Anhydrous salt c) Calamine d) Potassium
7. Which is used as a pigment for rubber
a) Zinc carbonate b) Zinc c) Silver d) Gold
8. The chief ore of zinc is zinc blende and it is mostly occurred in
a) Karnataka b) Gujarat c) Rajasthan d) Assam
9. The chief ore of silver is Argentite and it is occurred mostly in
a) Tamil Nadu b) Karnataka c) Assam d) Goa
10. Among the following which is incorrect
a) Purple of cassius is only a form of colloidal gold
b) Zinc carbonate is used in the preparation of cosmetics
c) Lunar caustic is used for silver plating
d) Gold is used in volumetric analysis

MATCH THE FOLLOWING:

- | | |
|---------------------------|---------------------------|
| 1. Batteries and dry cell | - a. Silver Bromide |
| 2. Photography | - b. Potassium dichromate |
| 3. In medicine as tonic | - c. Purple of cassius |
| 4. Hardening gelatin film | - d. Zinc plates |
| 5. High class pottery | - e. Gold leaf |
| | - f. Copper |

Ans: 1.d , 2. a, 3.e, 4.b, 5. C

5. F- BLOCK ELEMENTS.

- Who discovered the metallic element Lanthanum in 1839.
a. Edwin Mcmillan. b. Glenn Seaborg. **c. Carl Mosander.** d. both a and b.
- The element in which orbitals are being filled in their atoms are called
a. s-block elements. b. p-block elements. c. d-block elements. **d. f-block elements.**
- The f-block elements are also known as
a. Rare earth elements. b. Earth elements. c. Alkaline earth elements. d. none of the above.
- The Lanthanide and Actinide series include
a. Twelve elements. **b. Fifteen elements.** c. Sixteen elements. d. None of the above.
- In 1923, who postulated the existence of an actinide series analogous to the Lanthanide series.
a. Glean Seaborg. b. Edwin Mcmillan. **c. Neils Bohr.** d. Glenn Seaborg.
- In 1951, Noble prize was shared by whom for the discovery and work in chemistry of transuranic elements.
a. Edwin Mcmillan and Glean Seaborg. **b. Edwin Mcmillan and Glenn Seaborg.**
c. Carl Mosander and Glenn Seaborg. d. Glenn Seaborg and Glean Seaborg.
- The size of M^{3+} ions decrease in ionic radii in the series is called
a. Lanthanides contraction. b. Actinides contraction. c. Both a and b. d. None of the above.
- The ionic radii decrease gradually as we move along 5f series is called _____ and is analogous to _____.
a. Lanthanides contraction and Actinide contraction.
b. Actinide contraction and Lanthanide contraction.
c. Only Actinide contraction. d. Only Lanthanide contraction.
- A pyrophoric alloy is used in _____.
a. Cigarette lighter. b. Flame throwing tanks. **c. Both a and b.** d. None of the above.
- Extraction of Lanthanides, the pure metal is obtained by heating the _____ of Lanthanide in the presence of calcium and Lithium.
a. Difluorides. **b. Trifluorides.** c. Both a and b. d. None
- Thoria (ThO_2) are used in
a. Tracer bullets. b. Toys. **c. Gas Lamp materials.** d. Cigarette lighters.
- Cerium salts are used in _____.
a. Dyeing cotton. b. Lead storage. **c. Both a and b.** d. None of the above.
- Lanthanides are used in metallothermic reactions due to their extraordinary _____ property.
a. Reducing property. b. Oxidizing property. c. Both a and b. d. None of the above.
- Lanthinido- thermic processes can yield sufficiently pure _____.
a. Zr and Fe. b. Y and W. c. Ce and Pa. **d. Both a and b.**
- _____ is used as power source in long mission space probes.
a. Pu- 238. b. U-235. c. Es-251. d. None of the above.
- _____ is used as fuel in nuclear power plants and as a component in nuclear weapons.
a. Th-232. **b. U-235.** c. Es-251. d. None of the above.
- Extraction of Lanthanides, the pure metal is obtained by heating the trifluorides of Lanthanides in the presence of _____ and _____.
a. Li and Be. **b. Li and Ca.** c. K and Ca. d. Ca and Be.

MATCH THE FOLLOWING:

- A. Ce (45-50%) - 1. Stainless
B. La (25%) - 2. Parts of jet engines.
C. Nd (5%) - 3. Heat resistant.
D. Mg (30%) - 4. Instrumental steels.
a. 1,3,2,4. b. 4,3,1,2. c. 2,4,1,3. **d. 3,1,4,2.**

ASSERTION AND REASON:

- a. Assertion is true, Reason explains assertion.
b. Both assertion and reason are true and reason does not explain assertion.
c. Both are wrong.
d. Assertion is not true, but reason is true.

18. A: Due to Lanthanide contraction, the size of Ln^{3+} ions decreases regularly with increase in atomic number.

R: According to Fajan's rule, decrease in size of Ln^{3+} ions increases the covalent and decreases the basic character.
[Ans: A]

19. A: Due to Lanthanide contraction, second and third rows of d-block transition elements are quite close in properties.

R: Regular decrease in their tendency to act as reducing agent, with increase in atomic number.

[Ans: B.]

20. A: Lanthanides and Actinides have coloured ions, low Electronegativity, high reactivity and show magnetic Properties.

R: Both show close resemblance because they involve filling of f- subshells. **[Ans: A.]**

21. A: Actinides show lower oxidation states.

R: Actinides have lower binding energies.

[Ans: D.]

22. A: As we move along the Lanthanide series, the nuclear charge and the number of 4f electrons increase by one unit at each step.

R: Due to imperfect shielding, the effective charge increases causing a contraction in electron cloud of 4f-subshell.

[Ans: A]

**Prepared by
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6.COORDINATION COMPOUNDS AND BIOCOORDINATION COMPOUNDS.

- A salt is formed by neutralization of an acid by a
a. neutral ions. **b. base.** c. acid. d. None of the above.
- All electron donors are called as
a. lewis acid . **b. lewis base.** c. both a and b. d. only a.
- The central metal ion in a complex serves as a
a. Lewis acid. b. Neutral. c. Solution. d. None of the above.
- When a single ligand has two coordinating position it is Known as
a. Mono Denate ligand. b. Ligand. c. Bilegand. **d. Bidentate ligand.**
- Those ligand, which can bind through the uncharged nitrogen
a. Positive ligand. b. Ligand. c. Negative ligand. d. None of the above.
- The most stable complex compound is formed by
a. Cu^{2+} b. Ni^{2+} **c. Mn^{2+}** d. Fe^{2+} .
- The coordination number of Co in $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ is
a. 2 b. 5 **c. 6** d. 1.
- Which of the following species does not act as chelating Ligand?
a. Oxalato. b. Glycinato. c. Ethane 1,2- diamine. **d. Thiosulphate.**
- Optical isomerism is formed by
a. $[\text{Cr}(\text{NH}_3)_6]^{3+}$ b. $[\text{Cr}(\text{en})(\text{H}_2\text{O})_4]^{3+}$ c. $[\text{Cr}(\text{en})_2\text{Cl}_2]^+$ **d. $[\text{Cr}(\text{en})_3]^{3+}$**
- Hybridisation of the complex, $\text{K}_3[\text{Co}(\text{en})_3]$ is
a. Sp^3 **b. Sp^3d^2** c. dsp^2 d. d^2sp^3
- The pair of compounds that can exist together is
a. $\text{FeCl}_3, \text{SnCl}_2$. b. $\text{HgCl}_2, \text{SnCl}_2$. c. $\text{FeCl}_2, \text{SnCl}_2$. **d. FeCl_3, KI .**
- The IUPAC name of $[\text{Ni}(\text{CO})_4]$ is
a. Tetracarbonylnickelate. b. Tetracarbonylnickel(II)
c. Tetracarbonylnickel. d. Tetracarbonylnickel(II)
- What is the oxidation number of Fe in $[\text{Fe}(\text{CO})_5]$?
a. +3 **b. Zero.** c. +2 d. +5
- Which of the following ligand is not an chelating agent?
a. EDTA b. en. c. Oxalate. **d. Pyridine.**
- Which of the following complex ion is diamagnetic in nature?
a. $[\text{CoF}_6]^{3-}$ b. $[\text{NiCl}_4]^{2-}$ **c. $[\text{Ni}(\text{CN})_6]^{2-}$** d. $[\text{CuCl}_2]^{2-}$

MATCH THE FOLLOWING:

- | | |
|--------------------------------------|--------------------------------|
| 1. $[\text{Ni}(\text{CN})_4]^{2-}$ | - a. Paramagnetic. |
| 2. $[\text{Cu}(\text{NH}_3)_4]^{2+}$ | - b. Shows no isomerism. |
| 3. $[\text{ZnCl}_2(\text{NH}_2)_2]$ | - c. Didentate ligand. |
| 4. Glycinate | - d. Diamagnetic. |
| 5. $[\text{Fe}(\text{CN})_6]^{3-}$ | - e. Follows EAN. |
| 6. $[\text{Co}(\text{en})_3]^{2+}$ | - f. Sp^3d^2 . |

Ans: 2,3,4,1,6,5.

ASSERTION AND REASON:

- A is true, R is false.**
- A is true but R is false.**
- Both are true but R is not a correct explanation for A.**
- Both are wrong.**

- A: Complexes of MX_6 and MX_5L type do not show geometrical isomerism.
R: Geometrical isomerism is not shown by complexes of Coordination number 6. **[Ans: b.]**
- A: Toxic metal ions are removed by chelating ligands.
R: Chelate compounds tend to be more stable. **[Ans: c.]**
- A: $[\text{Co}(\text{H}_2\text{O})_6]\text{Cl}_2$ and $[\text{Fe}(\text{H}_2\text{O})_6]\text{Cl}_2$ are reducing in nature.
R: Unpaired electrons are present in their d- orbitals. **[Ans: c.]**
- A: The magnetic moment of $[\text{Fe}(\text{CN})_6]^{3-}$ corresponds to the presence of two unpaired electrons.
R: Because this complex ion possess Sp^3d^2 hybridisation. **[Ans: d]**
- A: Double salts retain their properties only in solid state.
R: They ionize in liquid. **[Ans: a.]**

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9. THERMODYNAMICS.

- The mathematical expression for first law of thermodynamics.
a. $\Delta E = -q + w$ **b. $\Delta E = q - w$** c. $-\Delta E = -q - w$ d. $-\Delta E = -q + w$.
- The law for the conservation of heat into work by the machine was stated by
a. Kelvin-planck b. claussius c. Gibbs d. Trouton.
- " It is impossible to transfer heat from cold body to a hot body by a machine without doing some work". This statement was given by
a. Kelvin-planck **b. claussius** c. Gibbs d. Trouton.
- A process accompanied by increase in entropy tends to be spontaneous. This statement is
a. Entropy statement b. Efficiency statement c. both a and b d. none.
- Efficiency of a machine can never be cent percent.
a. Efficiency statement. b. Entropy statement. c. both a and b d. none.
- The efficiency of the machine, when $T_1 > T_2$ is given by
a. $T_1 - T_2 / T_1 \times 100$ b. $T_2 - T_1 / T_2 \times 100$ c. $T_1 / T_2 \times 100$ d. $T_2 / T_1 \times 100$.
- The efficiency of the machine, when $T_1 < T_2$ is given by
a. $T_2 - T_1 / T_2 \times 100$ b. $T_1 - T_2 / T_1 \times 100$ c. $T_2 / T_1 \times 100$ d. $T_1 / T_2 \times 100$.
- The entropy relation, $S = q/t$ is only valid for
a. Reversible process. b. spontaneous process.
c. Irreversible process. d. non- spontaneous process.
- Entropy change of the process is given by
a. $\Delta S = S_2 - S_1$ b. $\int q_{\text{rev}} / T$ **c. both a and b** d. $\Delta S = S_1 - S_2$.
- In a reversible process, entropy of the universe is
a. double the entropy of surrounding. b. double the entropy of system. c. none **d. constant.**

11. Entropy change derived from isothermal process.
a. $\Delta S = 1/T \int q_{rev} = q_2 - q_1/T$ b. $\Delta S = 1/T \int q_p, rev$ c. $\Delta S = 1/T \int q_v, rev$ d. none.
12. Entropy change derived from isothermal and isobaric process.
 a. $\Delta S = 1/T \int q_{rev}$ **b. $\Delta S = 1/T \int q_p, rev$** c. $\Delta S = 1/T \int q_v, rev$ d. none.
13. Entropy change derived from isothermal and isochoric process
 a. $\Delta S = 1/T \int q_{rev}$ b. $\Delta S = 1/T \int q_p, rev$ **c. $\Delta S = 1/T \int q_v, rev$** d. none.
14. If entropy change is positive and the entropy of the universe increases, the process will be
 a. spontaneous. b. irreversible. **C. both a and b.** d. reversible.
15. If entropy change is negative and the entropy of the universe is zero and the system is
 a. at equilibrium. b. spontaneous. **c. non-spontaneous.** d. none
16. According to Trouton, the heat of vapourisation in calories per mole divided by the boiling point of the liquid in Kelvin is
 a. 22 cal/deg mole. b. 25 cal/deg mole. **c. 21 cal/deg mole.** d. none.
17. Among the following which are low boiling liquid?
 a. Hg b. H c. He **d. both b and c.**
18. For an isothermal process the entropy change of the universe during a reversible process is
 a. constant. **b. zero.** c. double the entropy of the system. d. none.
19. When, the entropy of the universe tends to maximum, the energy of the universe is
 a. zero. **b. constant** c. none d. double the entropy of the system
20. The network of the system is given by
a. $-\Delta G = w - P\Delta V$ b. $-w - P\Delta V$ c. both a and b. d. none.
21. Standard free energies of formation of elements are taken as
 a. constant. **b. zero.** c. both a and b. d. none.
22. The Gibbs free energy is given by
a. $\Delta G = H - TS$ b. $-G = H + TS$ c. $G = -H - TS$ d. none.

Reason and assertion.

- a. Assertion and reason are right and the reason is the correct explanation for the assertion.
 - b. Both are right but assertion is not a correct reason for the assertion.
 - c. Assertion is right but reason is wrong.
 - d. Assertion is wrong but reason is right.
1. A: A spontaneous process is accompanied by increase in the of the molecules.
 R: Entropy increase in all spontaneous reaction.
 2. A: In a chemical reaction, when number of molecules of products are more than the number of molecules of reactant entropy increases.
 R: When the system undergoes any chemical change, there is a change in the entropy.
 3. A: In physical process, when a solid changes to liquid, when a liquid changes to vapour and when a solid changes to vapour, entropy increases.
 R: These are spontaneous processes.

4. A: For a spontaneous process, the enthalpy change at Constant pressure will be negative.

R: In an exothermic process, the enthalpy of the final state is lower than the enthalpy of the initial state.

5. A: The standard free energy change of a reaction which is stoichiometrically balanced, is equal to the difference between the total sum of the standard free energies of products and the total sum of the standard free energies of reactants, at standard conditions.

R: Standard free energies of formation of elements are taken as zero.

MATCH THE FOLLOWING:

Match values with processes.

1. a. ΔS -positive - non- spontaneous.
- b. ΔS -negative - equilibrium.
- c. ΔS -zero - spontaneous.

Ans: 2,3,1

2. a. ΔG -positive - equilibrium.
- b. ΔG -negative - spontaneous.
- c. ΔG -zero - non- spontaneous.

Ans: 3,2,1.

3. a. ΔH -negative - non- spontaneous.
- b. ΔH -positive - equilibrium.
- c. ΔH -zero - spontaneous.

Ans: 2,3,1.

**PREPARED BY
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13. Electrochemistry -I

Choose the correct answers:

1. carbon tetra chloride is an example of
a)conductor b)semiconductor **c)insulator** d)electrolytic conductor
2. Semiconductors which exhibit conductivity due to positive holes
a)n-type semiconductor **b)p-type semiconductor**
c)intrinsic semiconductor d)extrinsic semiconductor
3. The constant value of enthalpy of neutralization of strong acid by strong base is
a)-57.32 KJ.gm.equiv⁻¹ b)-53.37 KJ.gm.equiv⁻¹
c)-53.32 KJ.gm.equiv⁻¹ d)-53.37 KJ.gm.equiv⁻¹
4. Which is a strong electrolyte
a)HF **b)AgNO₃** c)NH₃ d)CH₃COOH
5. The colour of nickel salts due to Ni²⁺ ions
a)blue **b)green** c)yellow d)red

6. The quantity of electricity required to liberate one gram equivalent of a substance is
 a) 95495 coulombs **b) 96495 coulombs** c) 96465 coulombs d) 96485 coulombs
7. Charge of an electron
 a) 1.603×10^{-19} coulomb b) 0.602×10^{-9} coulomb
c) 1.602×10^{-19} coulomb d) 1.603×10^{-18} coulomb
8. The degree of dissociation of HF in 1M of solution is
a) 2.7×10^{-2} b) 2.8×10^{-2} c) 2.7×10^{-8} d) 2.8×10^{-8}
9. λ is called as
 a) dissociation **b) cell constant** c) electrochemical equivalent d) none of these
10. What is the P^H value of 0.001M HCL solution
 a) 3.1 **b) 3.0** c) 3.2 d) 3.4
11. The P^H of sodium acetate is
a) 4.74 b) 4.75 c) 5.74 d) 5.75
12. κ is also expressed as
 a) s/m **b) sm^{-1}** c) 1simen = 1ohm d) all of these
13. P^H was introduced in year
a) 1909 b) 1905 c) 1907 d) 1906
14. Ostwald's theory is based on
 a) Ostwald's dilution law **b) Arrhenius theory** c) Kohlraush's law d) Quinonoid theory
15. P^H range of methyl orange
 a) 4.4-6.2 b) 4.5-6. c) 4.9-5.2 **d) 3.1-4.4**
16. Indicator used in strong acid and weak base
 a) phenolphthalein b) methyl orange **c) both (a) and (b)** d) none of these
17. Colour of methyl orange in acidic solution
 a) yellow b) red c) colourless **d) pink**
18. One mole of cu^{2+} requires
 a) 1F **b) 2F** c) 3F d) 4F
19. An example of insulator is
a) C_6H_6 b) C_6H_5 c) CH_3CH_2 d) CH_5OH
20. The P^H of Buffer solution can be calculated from _____ of weak acid and salt
 a) Equilibrium concentration b) initial concentration
c) molar concentration d) none of these

MATCH THE FOLLOWING:

- | | |
|---------------------------|----------------------------------|
| 1. Equivalent conductance | - $ohm^{-1} m^{-1}$ |
| 2. Molar conductance | - ohm^{-1} |
| 3. Specific conductance | - $ohm^{-1} m^2 (gm equiv)^{-1}$ |
| 4. Specific resistance | - $ohm^{-1} m^2 mole^{-1}$ |
| 5. conductance | - ohm m |

PREPARED BY
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18. CARBONYL COMPOUNDS.

- The coenzyme derived from vitamin B6 is
a. Retinol. b. Aldimine. **c. Pyridoxal.** d. Aldol.
- Aldehydes and ketones comes under the class of compound called
a. Nitro compounds. **b. Carbonyl compounds.** c. Unsaturated compounds. d. Nitro compounds.
- Which one does not contain carbonyl group.
a. Aldehyde. b. ketone. c. Carboxylic acid. **d. nitrile.**
- In Rosenmund reduction, BaSO₄ act as a
a. Reducing agent. b. Oxidising agent. c. Catalyst. **d. Catalytic poison.**
- Gem dihalides consist of _____ halides.
a. Three. **b. Two.** c. Four. d. One.
- Ozone form addition product with olefins called
a. Benzenoid. **b. Ozonide.** c. Ozondysis. d. None.
- Stephen's reactions of methyl cyanide give
a. Acetic acid. **b. Acetone.** c. Acetaldehyde. d. Formaldehyde.
- Iminium hydro Chloride is the intermediate of
a. Rosenmund reaction. b. Wolf kishner reduction. **c. Stephen's reaction.** d. Clemmenson reduction.
- The α - hydrogen of aldehyde is
a. Acidic. b. Basic. c. Neutral. d. Ionic.
- Aldehydes are more reactive than ketone, the reason for this
a. Resonance effect. **b. Steric effect.** c. Polar effect. d. None.
- The Original pink colour of Schiff's reagent is made colourless using
a. NO₂. **b. SO₂.** c. CCl₄. d. N₂.
- Formalin is
a. Solution of HCHO in water. b. Liquid HCHO. **c. 40% solution of HCHO in water.** d. 40% solution of HCHO in alcohol.
- The intermediate of Wolf kishner reduction is
a. Hydrazine. **b. Hydrazone.** c. Acetone. d. Semicarbazide.
- NH₂-NH₂ is..... a. Hydroxyl amine. **b. Hydrazine.** c. Semicarbazide. d. Ammonia.
- Hydride ion is a. Electrophile. **b. Nucleophile.** c. Neutral. d. None.

MATCH THE FOLLOWING:

- | | | |
|-----------------------------------|---|----------------------|
| a. Vitamin B6 | - | Periodic acid. |
| b. Pyridoxal | - | Ethyl methyl ketone. |
| c. Oxidative cleavage of 1,2-diol | - | Pyridoxine. |
| d. 2- butanone | - | Crotonaldehyde. |
| e. 3- phenyl -2-Propenal | - | Coenzyme. |
| f. Organo metallic compound | - | Ester. |
| g. Chloral | - | Metal hydride. |
| h. NaBH ₄ | - | Dialkyl cadmium |
| i. LiAlH ₄ | - | Paraldehyde. |
| j. Hypnotic | - | Reducing agent. |

ANS: 3,4,1,5,2,7,9,6,10,8.

ASSERTION AND REASON:

- a. Both A and R are true. R explains A.
 b. Both A and R are true, R does not explain A.
 c. A is true, but R is false.
 d. A is false, but R is true.

1. A: Ethers are functional isomers of alcohols.

R: They have the general formula $C_nH_{2n+2}O$.

[Ans:]

2. A: Ketones are prepared by hydrolysis of gemhalides.

R: Two halogenes are attached to terminal carbon atom.

[Ans:]

3. A: Ketones are Oxidised only by strong carboxylic acid to mono oxidising agents.

R: They have less number of carbon atom.

[Ans:]

4. A: Acetaldehyde polymerises to a cyclic structure called paraldehyde.

R: A drop of acetic acid added to it.

[Ans:]

5. A: In Rosenmund, Acid chlorides are reduced to ketones by hydrogen.

R: The presence of Palladium suspended in Barium Sulphate as catalyst. [Ans:]

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HARD WORK NEVER FAILS

This content was prepared and typed by XII students (Boys & Girls) of Akshaya Academy, Oddanchatram, Dindigul for their Assignment work.(2018-19)

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