

1. If Thomson model is considered to be true then in Rutherford model.
- (1) All α particles deflects at 180°
 - (2) They deflect at wide range of angle
 - (3) All will pass through foil without deflection
 - (4) They will pass but with reduced speed.

Ans. (1)

Sol. Theory Based.

2. Identify the correct increasing order of 1st ionisation enthalpy order of Mg, Al, P, S
- (1) Al, Mg, S, P
 - (2) Mg, Al, P, S
 - (3) Al, Mg, P, S
 - (4) Mg, Al, S, P

Ans. (1)

Sol. Correct increasing order of 1st ionisation enthalpy is : Al < Mg < S < P.

3. **List-I**
- (a) Li
 - (b) Na
 - (c) K
 - (d) Cs
- Identify the correct match
- (1) a – ii, b – iii, c – iv, d – I
 - (2) a – i, b – iii, c – iv, d – ii
 - (3) a – i, b – ii, c – iii, d – iv
 - (4) a – ii, b – iv, c – iii, d – i

List-II

- (i) used in devising photoelectric cell
- (ii) used to make electrochemical cell
- (iii) used as coolant in nuclear reactor
- (iv) used in absorption of CO₂

Ans. (1)

Sol.

- (a) Li \Rightarrow used in electrochemical cell
- (b) Na \Rightarrow used as coolant in fast breeder nuclear reactors
- (c) K \Rightarrow used as an absorbent of CO₂
- (d) Cs \Rightarrow used in devising photoelectric cell.

4. How many number of electron are there in bonding molecular orbital of O₂²⁻.

Ans. 10

(d) Cs (iv) used in absorption of CO₂

Identify the correct match

(1) a – ii, b – iii, c – iv, d – i (2) a – i, b – iii, c – iv, d – ii

(3) a – i, b – ii, c – iii, d – iv (4) a – ii, b – iv, c – iii, d – i

Ans. (1)

Sol. (a) Li ⇒ used in electrochemical cell
(b) Na ⇒ used as coolant in fast breeder nuclear reactors
(c) K ⇒ used as an absorbent of CO₂
(d) Cs ⇒ used in devising photoelectric cell.

4. How many number of electron are there in bonding molecular orbital of O₂²⁻.

Ans. 10

Sol. O₂²⁻ (Total electron = 18)

EC = (σ1s)²(σ*1s)²(σ2s)²(σ*2s)²(σ2p_z)²(π2p_x)²(π2p_y)²(π*2p_x)²(π*2p_y)²

Total electron in BMO = 10.

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5. How many total Cl=O bonds are there in HClO₄, HClO₃ and HClO₂.

Ans. 6

Sol.

Compounds	Structure	Total C=O bond
HClO ₄	$ \begin{array}{c} \text{O} \\ \\ \text{H}-\text{O}-\text{Cl}=\text{O} \\ \\ \text{O} \end{array} $	3
HClO ₃		2
HClO ₂	<p style="text-align: center;">$\mu \neq 0$</p>	1

6. Identify the incorrect statement from following.

- (1) crystalline solids are isotropic
- (2) amorphous solids are also called pseudo solid
- (3) amorphous solids do not have definite enthalpy of fusion
- (4) crystalline solids are long range order

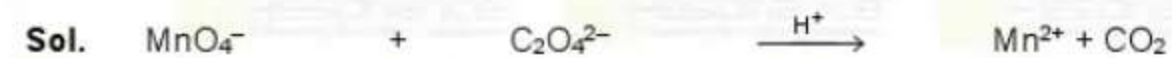
Ans. (1)

Sol. Crystalline solids are anisotropic in nature.

7. 10 ml 0.05 M KMnO₄ is titrated with 10 ml of oxalic acid, find strength of oxalic acid (in g/l).

[Report your answer to nearest integer]

Ans. 11



Valency factor = 5 Valency factor = 2

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8. 1 mole of A takes 100 minutes to give 0.2 mole of B in the reaction $A \longrightarrow 2B$ (According to 1st order reaction). The half life of the reaction is :
 [Report your answer to nearest integer]
 [Given $\ln 2 = 0.693$ & $\ln 10 = 2.303$]

Ans. 752

Sol.

	A	→	2B
Initially	1 mole		0
After 100 min	(1 - 0.1)mole		0.2 mole

$$k = \frac{1}{t} \ln \left(\frac{a}{a-x} \right)$$

$$k = \frac{2.303}{100} \log \left(\frac{1}{0.9} \right)$$

$$\frac{\ln 2}{t_{1/2}} = \frac{2.303}{100} [\log 10 - \log 9]$$

$$\frac{0.693}{t_{1/2}} = \frac{2.303}{100} [1 - 2 \times 0.48]$$

$$t_{1/2} = \frac{69.3}{2.303 \times 0.04} \text{ min}$$

$$t_{1/2} = 752.3 \text{ min}$$

9. The total number of neutrons and electrons present in radioactive isotope of Hydrogen is :

Ans. (3)

Sol. Radioactive isotope of Hydrogen is tritium (${}^3_1\text{H}$)
 Number of {P = 1, n = 2, e⁻ = 1}, so (n + e⁻) = 3

10. For reaction $\text{MO(s)} \rightleftharpoons \text{M(s)} + \frac{1}{2} \text{O}_2(\text{g})$

K_p is 4, then partial pressure of $\text{O}_2(\text{g})$ in atm is :

Sol. Radioactive isotope of Hydrogen is tritium (${}^3_1\text{H}$)

Number of $\{P = 1, n = 2, e^- = 1\}$, so $(n + e^-) = 3$

10. For reaction $\text{MO}(s) \rightleftharpoons \text{M}(s) + \frac{1}{2}\text{O}_2(g)$

K_p is 4, then partial pressure of $\text{O}_2(g)$ in atm is :

Ans. (16)

Sol. $K_p = (P_{\text{O}_2})^{\frac{1}{2}} = 4$

$P_{\text{O}_2} = 16$

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11. Assertion : SO_2 is highly adsorbed on charcoal than H_2 .

Reason : SO_2 has high critical temperature than H_2 .

(1) Assertion is True, Reason is True; Reason is a correct explanation for Assertion.

(2) Assertion is True. Reason is True: Reason is NOT a correct explanation for Assertion.

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- 11.** Assertion : SO₂ is highly adsorbed on charcoal than H₂.
Reason : SO₂ has high critical temperature than H₂.
- (1) Assertion is True, Reason is True; Reason is a correct explanation for Assertion.
(2) Assertion is True, Reason is True; Reason is NOT a correct explanation for Assertion.
(3) Assertion is True, Reason is False.
(4) Assertion is False, Reason is True.

Ans. (1)
Sol. SO₂ is adsorb more than H₂ on charcoal as critical temperature of SO₂ is higher than H₂ as higher the critical temperature, easier is liquification of gas and more is adsorption of gas on charcoal.

- 12.** An electrolyte AB is 50% dimerise and rest is ionise in a solvent, then Van't hoff factor (i) for this acid is.
(1) 1 (2) 1.25 (3) 2 (4) 1.5

Ans. (2)

Sol. $i = \frac{\text{Total no. of particle after dissociation/association}}{\text{Total number of particle before dissociation/association}}$

dissociation [Let total mole of acid HA = a]

$$\begin{array}{l} \text{HA} \longrightarrow \text{H}^+ + \text{A}^- \\ 0.5a \qquad \qquad 0.5a \quad 0.5a \end{array}$$

association

$$\begin{array}{l} 2\text{HA} \longrightarrow (\text{HA})_2 \\ 0.5a \qquad \qquad \left(\frac{0.5a}{2}\right) \end{array}$$

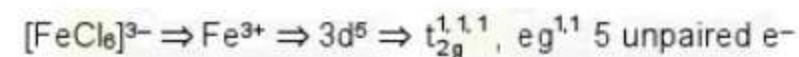
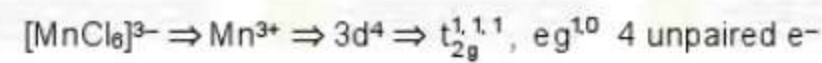
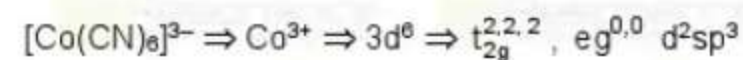
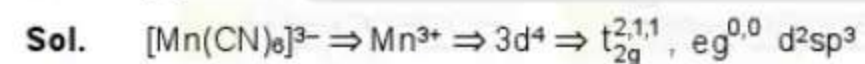
$$i = \left(\frac{a + 0.5a}{a}\right) = 1.25$$

- 13.** S₁ : [Mn(CN)₆]³⁻, [Fe(CN)₆]³⁻ and [Co(CN)₆]³⁻ have d²sp³ hybridisation.
S₂ : [MnCl₆]³⁻ and [FeCl₆]³⁻ are paramagnetic with 4 and 5 unpaired electrons respectively.
- (1) Both S₁ & S₂ are true. (2) S₁ is true and S₂ is false
(3) S₁ is false and S₂ is true (4) Both S₁ & S₂ are false.

Ans. (1)

13. S_1 : $[\text{Mn}(\text{CN})_6]^{3-}$, $[\text{Fe}(\text{CN})_6]^{3-}$ and $[\text{Co}(\text{CN})_6]^{3-}$ have d^2sp^3 hybridisation.
 S_2 : $[\text{MnCl}_6]^{3-}$ and $[\text{FeCl}_6]^{3-}$ are paramagnetic with 4 and 5 unpaired electrons respectively.
- (1) Both S_1 & S_2 are true. (2) S_1 is true and S_2 is false
(3) S_1 is false and S_2 is true (4) Both S_1 & S_2 are false.

Ans. (1)



so both S_1 & S_2 are true.

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14. What is the reason to add silica during metallurgy of copper ore.

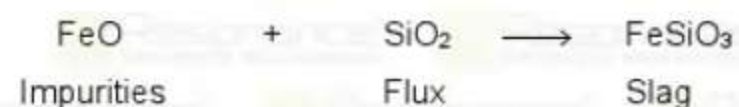
- (1) To reduce temperature (2) To convert Cu to copper silicate

14. What is the reason to add silica during metallurgy of copper ore.

- (1) To reduce temperature
- (2) To convert Cu to copper silicate
- (3) To convert CuO to copper silicate
- (4) To remove impurities of iron as FeSiO₃

Ans. (4)

Sol. During metallurgy of copper from copper ore



15. How many cations will get precipitated from



When H₂S is passed along with dil. HCl.

Ans. 1

Sol. H₂S + dil. HCl is 2nd group reagent so Cu²⁺ get precipitate

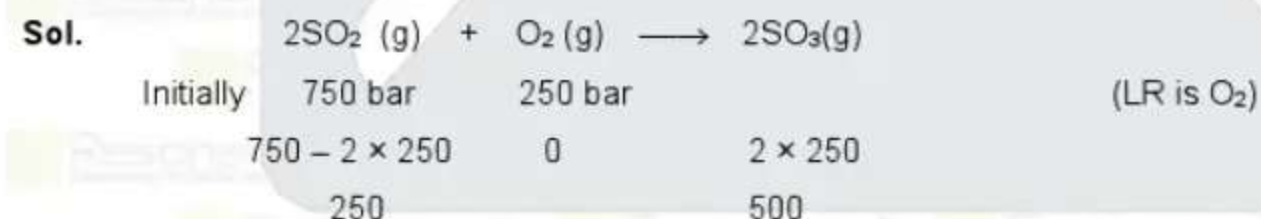
- 2nd group cation Cu²⁺
- 3rd group cation Al³⁺, Fe³⁺
- 4th group cation Co²⁺, Ni²⁺, Zn²⁺
- 5th group cation Ba²⁺

16. In a closed container initially SO₂ and O₂ are taken at 750 bar and 250 bar and following reaction takes place.



then what will be the total pressure of gases after completion of reaction (in bar.)

Ans. 750



$$P_{\text{Total}} = 250 + 500 = 750 \text{ bar}$$

250 500

$$P_{\text{Total}} = 250 + 500 = 750 \text{ bar}$$

17. 1 Mole of complex $\text{CoCl}_3 \cdot 6\text{NH}_3$ on reaction with AgNO_3 gives 3 moles of AgCl precipitate. The secondary valency of complex is-

Ans. 6

Sol. As complex give 3 moles AgCl precipitate so all 3 chloride ions are in ionisation sphere so complex is $[\text{Co}(\text{NH}_3)_6] \text{Cl}_3$
secondary valency of complex = 6.

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18.

List - I (Metal)	List - II (Colour during flame test)
a) Li	(i) Golden yellow
b) Na	(ii) Crimson red
c) Ca	(iii) Apple green
d) Ba	(iv) Brick Red

18.

List - I (Metal)	List - II (Colour during flame test)
a) Li	(i) Golden yellow
b) Na	(ii) Crimson red
c) Ca	(iii) Apple green
d) Ba	(iv) Brick Red

Identify the correct matching from List – I with List - II :

- (1) a-(ii) b-(i) c-(iv) d-(iii) (2) a-(i) b-(ii) c-(iii) d-(iv)
 (3) a-(ii) b-(i) c-(iii) d-(iv) (4) a-(i) b-(ii) c-(iv) d-(iii)

Ans. (1)

Sol.	Metal	Flame colour test
(i)	Li	Crimson Red
(ii)	Na	Golden Yellow
(iii)	Ca	Brick Red
(iv)	Ba	Apple green

19. Statement-I : Hyper conjugation is a permanent effect.

Statement-II : In $\text{CH}_3 - \overset{\oplus}{\text{C}}\text{H}_2$ $\text{sp}^2_{\text{C-H}}$ overlap with the adjacent vacant p-orbital.

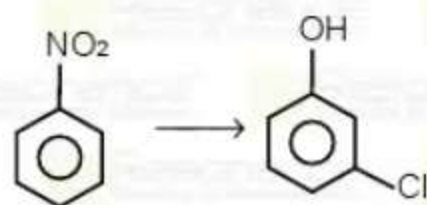
- (1) Both Statement-I & Statement-II are correct.
 (2) Statement-I is correct and Statement-II is incorrect.
 (3) Statement-I is incorrect and Statement-II is correct.
 (4) Both Statement-I and Statement-II are incorrect.

Ans. (2)

20. For the following conversion



20. For the following conversion



the appropriate sequence of reagent will be.

- (1) NaNO_2/HCl , AlCl_3/Fe , Fe/HCl , $\text{H}_2\text{O}/\Delta$ (2) Fe/HCl , AlCl_3/Fe , NaNO_2/HCl , $\text{H}_2\text{O}/\Delta$
(3) AlCl_3/Fe , Fe/HCl , NaNO_2/HCl , $\text{H}_2\text{O}/\Delta$ (4) Fe/HCl , AlCl_3/Fe , $\text{H}_2\text{O}/\Delta$, NaNO_2/HCl

Ans. (3)

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21. D-Galactose & D-Glucose are formed by the hydrolysis of following disaccharide.

- (1) Sucrose (2) Lactose (3) Maltose (4) Amylose

Ans. (2)

22. Statement-I : Penicillin is Bacteriostatic.

Statement-II : The correct structure of penicillin is.

- (1) Both Statement-I & Statement-II are correct

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21. D-Galactose & D-Glucose are formed by the hydrolysis of following disaccharide.
 (1) Sucrose (2) Lactose (3) Maltose (4) Amylose

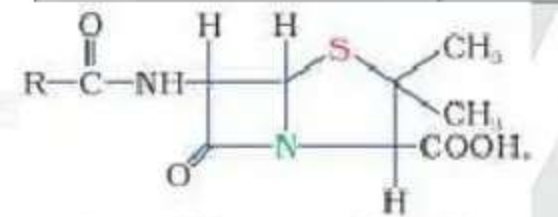
Ans. (2)

22. Statement-I : Penicillin is Bacteriostatic.
 Statement-II : The correct structure of penicillin is.
 (1) Both Statement-I & Statement-II are correct
 (2) Statement-I is correct and Statement-II is incorrect
 (3) Statement-I is incorrect and Statement-II is correct
 (4) Both Statement-I and Statement-II are incorrect

Ans. (3)

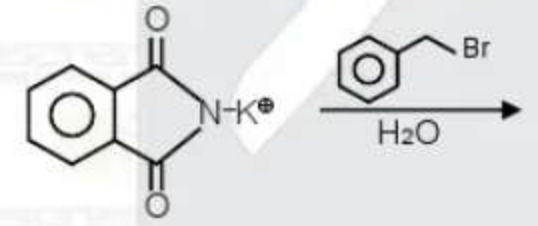
Sol.

Bactericidal	Bacteriostatic
Penicillin	Erythromycin
Aminoglycosides	Tetracycline
Ofloxacin	Chloramphenicol

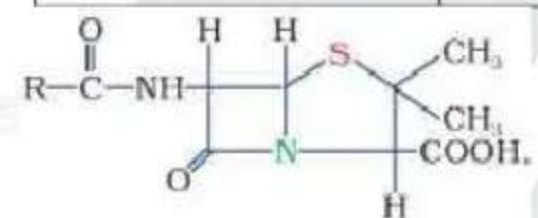


General Structure of Penicillin

23. In following sequence of reaction final product will be

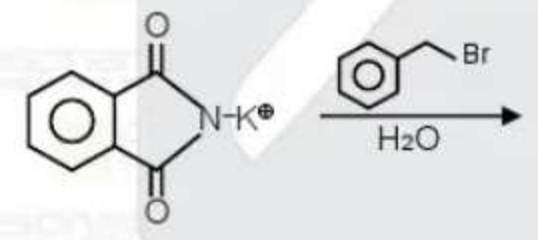


Ofloxacin	Chloramphenicol
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General Structure of Penicillin

23. In following sequence of reaction final product will be



- (1)
- (2)
- (3)
- (4)

Ans. (2)

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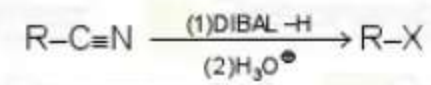
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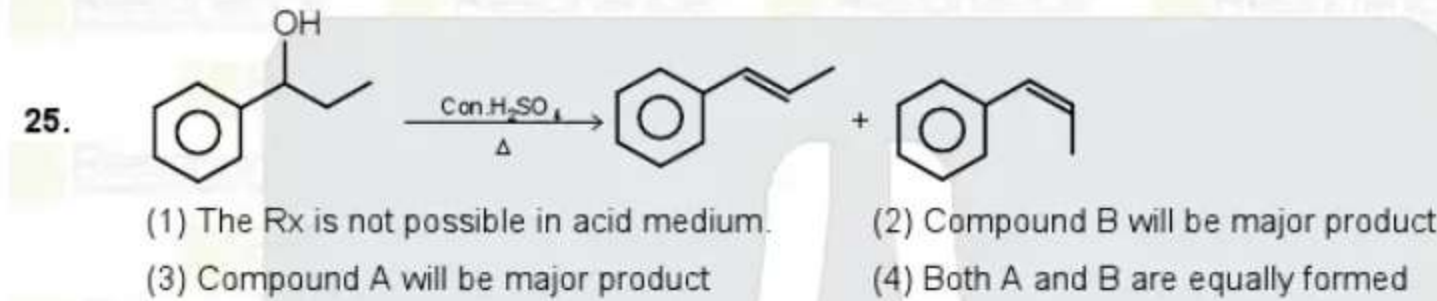
24. In the following reaction



-X will be

- (1) -CHO (2) -COOH (3) -CH₂NH₂ (4) -CH₂OH

Ans. (1)

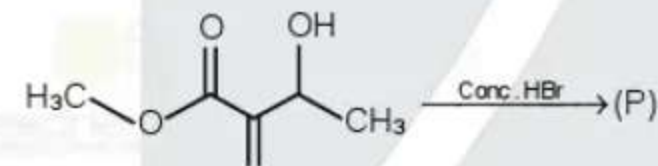


Ans. (3)

26. Dihedral angle in 1,1,1-trichloro ethane in staggered conformation (in degree) is

Ans. 60

27. Which of the following product is not possible



Product (P)

- (1)  (2) 
 (3)  (4)  + CH₃Br