



JEE (MAIN) 2024 (Session-2)

MEMORY BASED QUESTIONS & SOLUTIONS

SHIFT-1

DATE & DAY: 04th April 2024 & Thursday

PAPER-1

Duration: 3 Hrs.
Time: 09:00 - 12:00 IST

SUBJECT: CHEMISTRY

ADMISSIONS OPEN FOR CLASS 12+

ACADEMIC SESSION 2024-25



TARGET: JEE (ADV.) 2024

For Class XII Passed Student

VISHESH COURSE

MODE: OFFLINE/ONLINE



CLASS STARTS
08TH APRIL, 2024



TARGET: JEE (MAIN) 2024

For Class XII Passed Student

ABHYAAS COURSE

MODE: OFFLINE/ONLINE



CLASS STARTS
08TH APRIL, 2024

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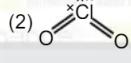
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Ans. (1)

Sol.

(1)	(2)	(3)	(4)
 $\text{SN} = 4$ sp^3	 $\text{SN} = 3$ sp^2 Odd electron gets delocalised in 3d	 $\text{SN} = 3$ sp^2 no 2d subshell so odd electron does not get delocalised	 $\text{SN} = 3$ sp^2

2. Which of the following is the correct order of first ionization enthalpy ?

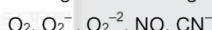
- (1) $\text{Be} < \text{B} < \text{O} < \text{F} < \text{N}$ (2) $\text{B} < \text{Be} < \text{O} < \text{N} < \text{F}$
 (3) $\text{B} < \text{Be} < \text{N} < \text{F} < \text{O}$ (4) $\text{Be} < \text{B} < \text{N} < \text{F} < \text{O}$

Ans. (2)

Sol. Exception of IE

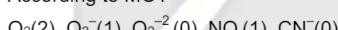


3. Amongst the following how many of the following have one unpaired electron ?



Ans. (2)

Sol. According to MOT



4. Determine molarity of a NaCl solution in which 5.85 gram of it is present in 500 ml solution.

- (1) 0.2 M (2) 2 M (3) 0.3 M (4) 3 M

Ans. (1)

Sol.

$$[\text{NaCl}] = \frac{5.85 / 58.5 \text{ mol}}{500 / 1000 \text{ L}} \\ = 0.2 \text{ M}$$

5. Amongst the following which shows only one type of oxidation state ?

- (1) Ti (2) Sc (3) Co (4) Ni

Ans. (2)

Sol. Sc show only +3 oxidation state having Ar noble gas configuration.

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6. De-Broglie wave length of e^- in fourth Bohr's orbit of H-atom is _____ πa_0 .

Fill in the blank. (Here a_0 is radius of first Bohr's orbit in H-atom)

Ans. (8)

Sol. $mvr = \frac{nh}{2\pi}$

or $2\pi r = \frac{nh}{mv}$ or $n\lambda_e = 2\pi r$

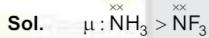
or $4\lambda_e = 2\pi r_4$ or $4\lambda_e = 2\pi r^2 a_0$

or $\lambda_e = 8\pi a_0$

7. Amongst the following which has maximum dipole moment ?

- (1) NH_3 (2) PCl_5 (3) NF_3 (4) XeF_2

Ans. (1)



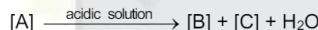
As lone pair exerts dipole moment outwards from molecule

For PCl_5 & $\text{XeF}_2 \mu = 0$

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8. In the precipitation of the iron group III of qualitative analysis ammonium chloride is added before adding ammonium hydroxide to -
 (1) Prevent interference by phosphate ions
 (2) Increase conc. of Cl^- ions
 (3) Decrease conc. of OH^- ions
 (4) Increase conc. of NH_4^+ ions

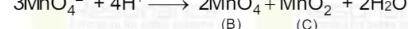
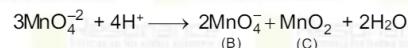
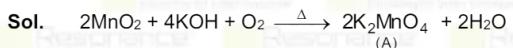
Ans. (3)

Sol. By common ion effect, concentration of OH^- ions decreases so that higher group metal hydroxide does not ppt.



Determine sum of spin only magnetic moment of [B] & [C] ? Give your answer to nearest integer.

Ans. (4)



In KMnO_4 & MnO_2 number of unpaired electrons is 0 & 3($\sqrt{15}$ BM)

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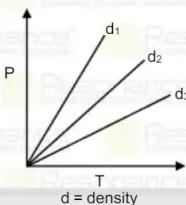
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10. Following graph between P and T are given -

Choose the correct option :



(1) $d_1 > d_2 > d_3$

(2) $d_1 < d_2 < d_3$

(3) $d_1 = d_2 = d_3$

(4) $d_2 > d_1 > d_3$

Ans. (1)

Sol. $PV = nRT$

$$PV = \frac{W}{M} RT$$

$$P = \frac{W RT}{V M}$$

$$P = \frac{dR}{M} T$$

$$y = mx$$

$$\text{slope} = \frac{dR}{M}$$

$$d_1 > d_2 > d_3$$

11. E° for hydrogen electrode at 25°C is 2010 mV at pressure of 1 bar .

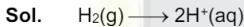
(1) 10^{-14}

(2) 10^{-7}

(3) 1

(4) 0.5

Ans. (1)



$$E = E^\circ - \frac{0.059}{n} \log Q$$

$$E = \frac{0.0591}{2} \log \frac{P_{\text{H}_2}}{[\text{H}^+]^2}$$

$$0 = \frac{0.0591}{2} \log \frac{P_{\text{H}_2}}{[\text{H}^+]^2}$$

$$\log \frac{P_{\text{H}_2}}{[\text{H}^+]^2} = 0 \Rightarrow \log \frac{P_{\text{H}_2}}{[\text{H}^+]^2} = \log 1$$

$$\frac{P_{\text{H}_2}}{[\text{H}^+]^2} = 1$$

$$\Rightarrow P_{\text{H}_2} = [\text{H}^+]^2$$

for pure water $[\text{H}] = 10^{-7} \text{ M}$

$$P_{\text{H}_2} = 10^{-14} \text{ bar}$$

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12. How many of the following have even number of unpaired electrons ?

- (1) $[\text{V}(\text{H}_2\text{O})_6]^{+3}$ (2) $[\text{Cr}(\text{H}_2\text{O})_6]^{+3}$ (3) $[\text{N}(\text{H}_2\text{O})_6]^{+2}$ (4) $[\text{Fe}(\text{H}_2\text{O})_6]^{+3}$

Ans. (1)

Sol. As H_2O is week filed ligand, so number of unpaired electrons will be same as central metal ion in the complex

$^{23}\text{V}^{+3}(3), ^{23}\text{Cr}^{+3}(3), ^{28}\text{Ni}^{+2}(2), ^{24}\text{Fe}^{+3}(5)$

13. Amongst the following which is correct order of field strength of ligands as per spectrochemical series ?

- (1) $\text{CO} > \text{NH}_3 > \text{H}_2\text{O} > \text{I}^-$ (2) $\text{C}_2\text{O}_4^{2-} > \text{CN}^- > \text{I}^- > \text{NH}_3$

- (3) $\text{Cl}^- > \text{en} > \text{CO} > \text{CN}^-$ (4) $\text{OH}^- > \text{C}_2\text{O}_4^{2-} > \text{NH}_3 > \text{en}$

Ans. (1)

Sol. Theory based

14. For the reaction $\text{C}_2\text{H}_6 \rightarrow \text{C}_2\text{H}_4 + \text{H}_2$ the reaction enthalpy $\Delta_r\text{H} \dots \text{kJ mol}^{-1}$

[Round off to the nearest integer]

Given bond enthalpies in kJ mol^{-1}

C-C : 347, C=C : 611, C-H : 414, H-H : 436

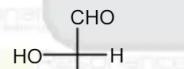
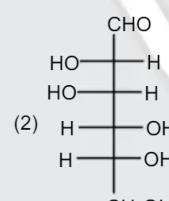
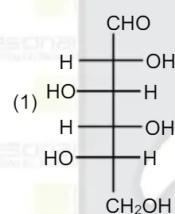
Ans. (128)

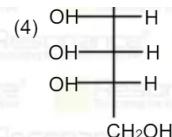
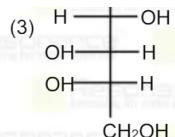
Sol. $\Delta_r\text{H} = \text{sum of bond diss E} - \text{sum of bond formation E}$

$$\Delta_r\text{H} = 347 + 6 \times 414 - (611 + 4 \times 414 + 436)$$

$$= 128 \text{ kJ mol}^{-1}$$

15. Which of the following correct structure of L-Glucose.





Ans. (1)

Sol.

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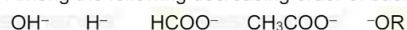
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16. Among the following decreasing order of basic strength will be-



(I) (II) (III) (IV) (V)

(1) II > V > III > I > IV (2) II > V > I > IV > III

(3) III > IV > I > V > II (4) V > I > IV > II > III

Ans. (2)

Sol. Maximum strongest base = H^-

RO^- is stronger base than OH^-

V > I

ROH ever weaker acid



Conjugate base strong.

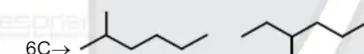
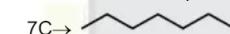
17. The number of different structural isomers of molecular formula C_7H_{16}

Ans. (9)

Sol. $\text{DU} = n + 1 \left[\frac{\text{H} + \text{X} - \text{N}}{2} \right]$

$\text{DU} = 8 - 8 = 0$

i.e. Saturated compound.



18. Statement-1 : Aldol condensation is proceed due to acidity of alpha hydrogen.

Statement-2 : PhCHO and ethanal will not give cross Aldol product.

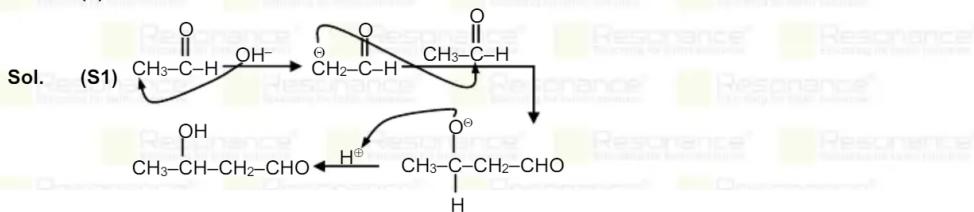
(1) Both Statement-1 & Statement-2 are correct.

(2) Both Statement-1 & Statement-2 are incorrect.

(3) Statement-1 is correct whereas Statement-2 is incorrect.

(4) Both Statement-1 and Statement-2 are incorrect.

Ans. (2)



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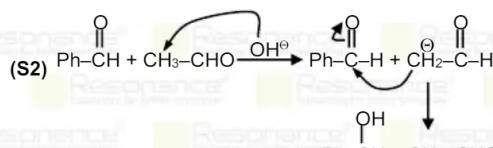
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19. Which of the following nitrogen ion containing compound to not give Lassaigne's test?

- (1) Hydrazine (2) Phenyl hydrazine
(3) Glycene (4) Urea

Ans. (1)

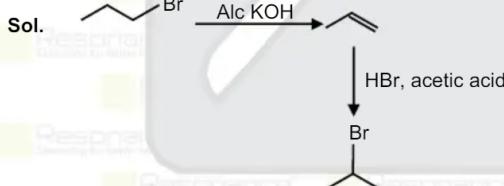
Sol. Hydrazine $\text{NH}_2\text{--NH}_2$ is an inorganic compound (carbon absent then how to make NaCN) then this test is not possible.

20. (P) $\text{CH}_3\text{CH}_2\text{Br} \xrightarrow{\text{Alc.KOH}} \text{A} \xrightarrow[\text{CH}_3\text{COOH}]{\text{HBr}}$ (B)

Find the relation between (P) and (B)

- (1) Diastereomer (2) Enantiomer
(3) Positional isomer (4) Mesomer

Ans. (3)



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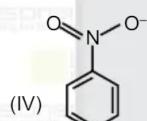
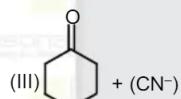
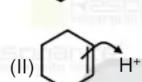
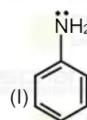
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21. Match the following:

List-I



List-II



(1) (I) - (P), (II) - (R), (III) - (Q), (IV) - (S)

(2) (I) - (R), (II) - (P), (III) - (Q), (IV) - (S)

(3) (I) - (R), (II) - (P), (III) - (S), (IV) - (Q)

(4) (I) - (P), (II) - (R), (III) - (S), (IV) - (Q)

Ans. (1)

Sol. NH₂ group, show +R

+ H⁺ attacking species is H⁺, so it is +E

+ (CN)⁻ attacking species is CN⁻, so it is -E

-NO₂ group show -R.

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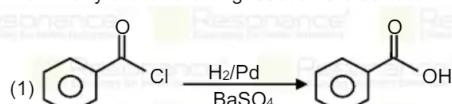
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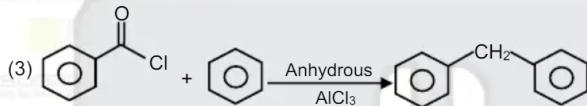
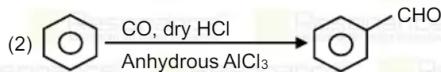
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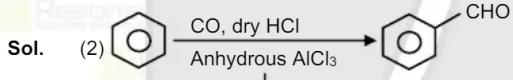
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22. How many of the following reaction are correct?

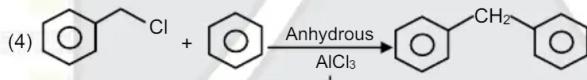




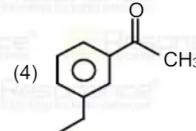
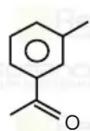
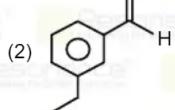
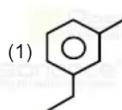
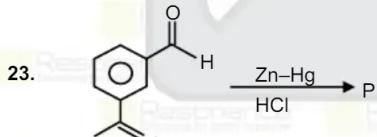
Ans. (2)



Gatterman Koch reaction



Friedel-Crafts reaction



Ans. (1)

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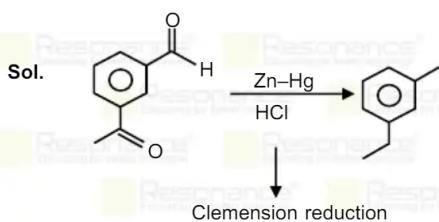
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Now, (1)  is correct option.

24. The correct formula sodium Nitroprusside.

(1) $\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}]$

(2) $\text{Na}_2[\text{Fe}(\text{CN})_3\text{NO}]$

(3) $\text{Na}_2[\text{Fe}(\text{CN})_4\text{NO}]$

Ans. (1)

Sol. The correct formula sodium Nitroprusside is $\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}]$.

(4) $\text{Na}_2[\text{Fe}(\text{CN})_2\text{NO}]$

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