



JEE (Main)

PAPER-1 (B.E./B. TECH.)

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2021

COMPUTER BASED TEST (CBT) Memory Based Questions & Solutions

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Duration: 3 Hours | Max. Marks: 300

SUBJECT: CHEMISTRY

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**RESULT: JEE (Advanced),
JEE (Main), NEET**

HIGHEST No. of Classroom Selections
in JEE (Advanced) 2020 from any Institute of Kota

5 AIRs in TOP-50 in JEE (Adv.) 2020 from Classroom

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AIR-2 (GEN-EWS) AIR-15 DHANANJAY KEJRIWAL With us Since Class 9th

Zonal Topper IIT-Kharagpur AIR-25 SAMARTH AGARWAL With us Since Class 11th

2nd Rank in IIT-Kharagpur Zone AIR-29 SANKALP PARASHAR With us Since Class 11th

AIR-30 AARYAN K. GUPTA With us Since Class 9th

AIR-41 UTKARSH P. SINGH With us Since Class 10th

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Eligible for JEE (Advanced) Through JEE (Main) 2020

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NEET 2020

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PART : CHEMISTRY

1. 4 gram mixture of NaOH and Na₂CO₃ is equimolar, if it contain X gram of NaOH and Y gram of Na₂CO₃, then value of 'X' is

Ans. (1)

Sol. Given (i) X + Y = 4

$$(ii) \frac{X}{40} = \frac{Y}{106} \text{ [Equimolar]}$$

$$\text{So } X + \frac{106}{40}X = 4$$

$$X + 2.65X = 4$$

$$3.65X = 4$$

$$X = 1.096 \text{ gram.}$$

2. What is the correct relation between degree of freedom and γ

(1) $\left(1 + \frac{2}{F}\right)$

(2) $1 + \frac{F}{2}$

(3) $\frac{F}{2}$

(4) $\frac{2}{F}$

Ans. (1)

Sol. $\frac{C_p}{C_v} = \gamma$

$\left(\frac{F+2}{F}\right) = \gamma$

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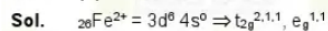
$$\left(\frac{1}{2} + 1\right)^K = 7$$

$$\left(\frac{F}{2} + 1\right) = 7 \left[\frac{F}{2}\right]$$

$$R = 1 + \frac{2}{F}$$

3. In an octahedral complex of Fe^{2+} in high spin state what is the Magnetic moment (Spin only)
 (1) 4.89 BM (2) 1.73BM (3) 0 BM (4) 3.87BM

Ans. (1)



Unpaired e⁻ [n = 4]

$$\mu = \sqrt{n(n+2)} = \sqrt{24}$$

$$= 4.89 \text{ BM}$$

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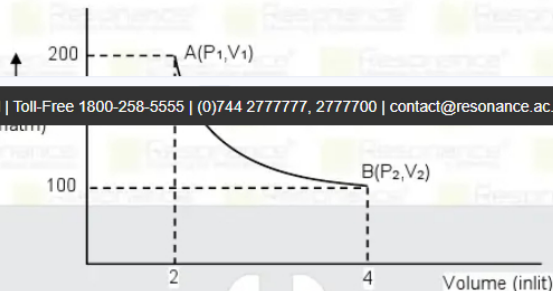
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4. An ideal gas change state from A to state B. Find work done by gas (in KJ) using following P-V diagram



Ans. (2.8)

Sol. As $P_1V_1 = P_2V_2$ So reversible isothermal process

$$W = -nRT \ln \left(\frac{V_2}{V_1}\right) = -P_1V_1 \ln \left(\frac{V_2}{V_1}\right) = -200 \times 2 \ln \left(\frac{4}{2}\right)$$

$$= -2.303 \times 400 \log 2 = -2.303 \times 400 \times 0.3$$

$$= -276.36 \text{ atm} \times \text{lit} = -28002 \text{ J} = -2.8 \text{ KJ}$$

Work done by gas = 2.8 KJ

5. An ideal solution is prepared by mixing of A ($P_A^0 = 90$ torr) and B ($P_B^0 = 15$ torr) in which mole fraction of

Ans. (1)

Sol. $X_A + X_B = 1$ $\begin{cases} X_A = 0.6 \\ X_B = 0.4 \end{cases}$

$$P_{\text{Total}} = P_A^0 X_A + P_B^0 X_B$$

$$= [90] 0.6 + [15] 0.4 = 54 + 6 = 60 \text{ torr}$$

$$P_B = P_B^0 X_B = [P_{\text{TOTAL}}] Y_B$$

$$Y_B = \frac{15 \times 0.4}{60} = 0.1$$

Ans. 1×10^{-1}

6. What is the difference in number of unpaired electron when NiCl_2 change into $[\text{Ni}(\text{CN})_6]^{2-}$

Ans. (2)

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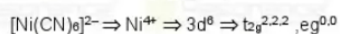
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Unpaired electron $n = 2$



unpaired electron = 0

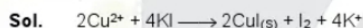
difference in unpaired electron = 2

7. What is the major use of dihydrogen (H_2)
- (1) In formation of HNO_3
 - (2) In synthesis of ammonia (NH_3)
 - (3) In fuel cell for generating electrical energy
 - (4) To reduce heavy metal oxides to metal

Ans. (2)

8. Cu^{2+} salt on reaction with KI forms
- (1) CuI
 - (2) Cu_2I_3
 - (3) $\text{Cu}(\text{I}_3)_2$
 - (4) Does not react

Ans. (1)



9. Which of the following species does not have magnetic moment (spin only) 1.73 BM

- (1) O_2^-
- (2) O_2^+
- (3) CuI
- (4) $[\text{Cu}(\text{NH}_3)_4]\text{Cl}_2$

Ans. (3)

Sol. $\mu = 1.73 \text{ BM}$ It means number of unpaired electron = 1

Species	Unpaired electron
O_2^-	1
O_2^+	1

Cu^{2+}	1
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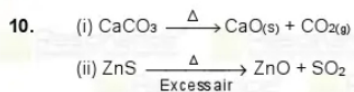
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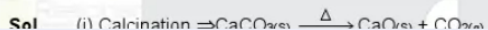
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Identify the calcination and roasting reaction from above

- (1) Both reaction are roasting
 (2) Both reaction are calcination
 (3) 1st reaction is calcination and 2nd reaction is roasting
 (4) 1st reaction is roasting and 2nd reaction is calcination.

Ans. (3)



11. For a reaction $\Delta G^\circ = -51.4 \text{ KJ/mol}$ and $\Delta H^\circ = 49.4 \text{ KJ/mol}$ at 300K, then value of ΔS° in J/K is

Ans (336)

Sol. $\Delta G^\circ = \Delta H^\circ - T \Delta S^\circ$
 $-51.4 = 49.4 - T \Delta S^\circ$
 $\Delta S^\circ = \left[\frac{49.4 + 51.4}{300} \right]$
 $= 0.336 \text{ KJ/K} = 336 \text{ J/K}$

12. In 13th group from the element with electronic configuration $4s^2 4p^1$ if we move diagonally then the electronic configuration of 5th period element is:

- (1) $5s^2 5p^3$ (2) $4s^2 4p^1$ (3) $4s^2 4p^2$ (4) $5s^2 5p^2$

2 nd period	$2s^2 2p^1$	B	C	N
3 rd period	$3s^2 3p^1$	Al	Si	P
4 th period	$4s^2 4p^1$	Ga	Ge	As
5 th period	$5s^2 5p^1$	In	Sn	Sb

That element is ${}_{50}\text{Sn} \Rightarrow [\text{Kr}] 4d^{10} 5s^2 5p^2$

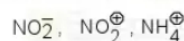
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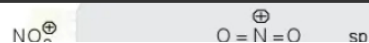
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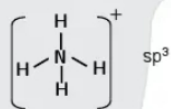
13. Identify the correct hybridisation of



- (1) sp^2 , sp , sp^3 (2) sp , sp^2 , sp^3 (3) sp^3 , sp^2 , sp (4) sp^2 , sp^3 , sp

Ans (1)





14. Which of the following statement is incorrect about Enzymes
- (1) Enzymes are non-specific (2) Enzymes are temperature and pH specific
(3) Almost all enzymes are proteins (4) Enzymes act as catalyst.

Ans. (1)

Sol. Enzymes are highly specific in nature

15. A metal crystallize in FCC lattice in addition to 50% occupancy of tetrahedral voids, find the effective

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Sol. Metal crystallize in fcc unit cell

$$\text{Effective No. of Atoms} = 4 [\text{FCC}] + 8 [\text{TV}]1/2$$

$$\text{Ans} = 8$$

16. PCl_5 decompose according to 1st order reaction as $\text{PCl}_5(\text{g}) \longrightarrow \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$.

Initially we take 50 moles of PCl_5 and after 120 minutes final moles of PCl_5 is 10 then the value of rate constant of reaction is $[x] \times 10^{-4}$ minutes, then value of 'x' is:

Ans (133)

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Sol. $\text{PCl}_5(\text{g}) \longrightarrow \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$

t = 0 50 moles

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

$$= \frac{2.303}{120} \log \left(\frac{50}{10} \right)$$

$$= \frac{2.303 \times 0.693}{120} = 0.0133 \text{ minutes}$$

$$= 133 \times 10^{-4} \text{ minutes}$$

17. Among H_2SO_4 and HNO_3 , which act as acid and base respectively during nitration ?

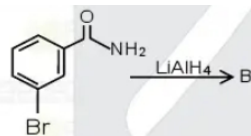
(1) H_2SO_4 , HNO_3 (2) HNO_3 , H_2SO_4 (3) HNO_3 , HNO_3 (4) H_2SO_4 , H_2SO_4

Ans. (1)

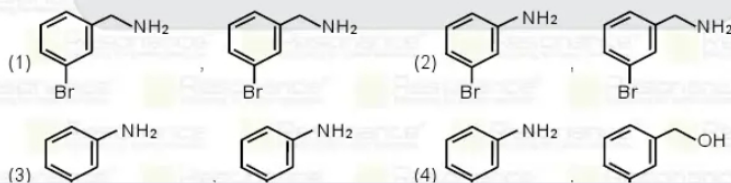
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18.





A and B are respectively:



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Ans. (2)

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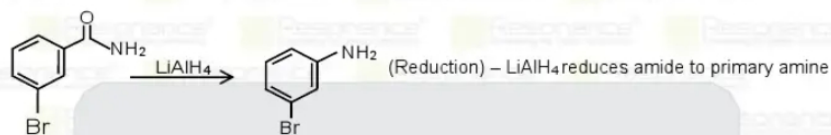
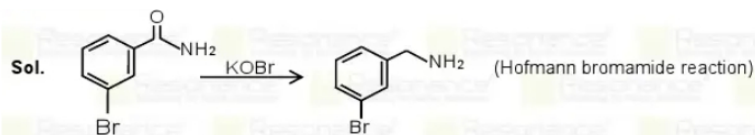
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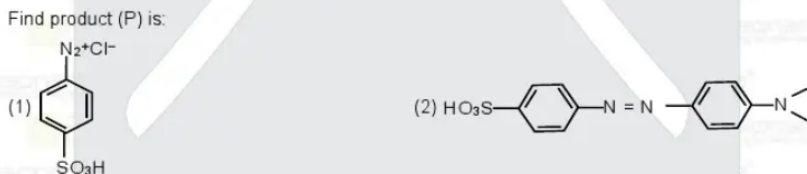
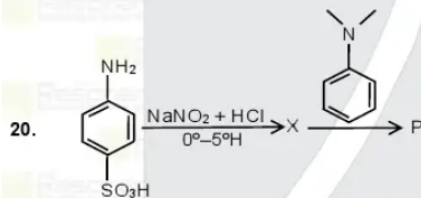


19. Which gas retards photosynthesis?

- (1) CO (2) CFC (3) CO₂ (4) NO₂

Ans. (4)

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Ans. (2)

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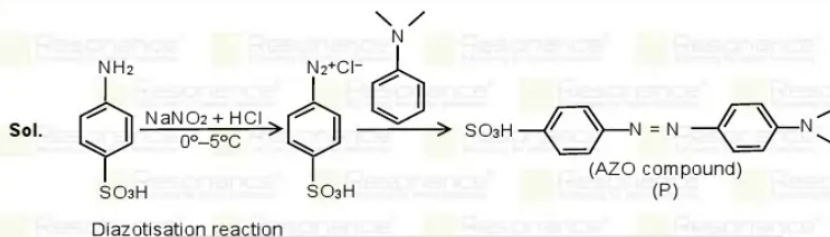
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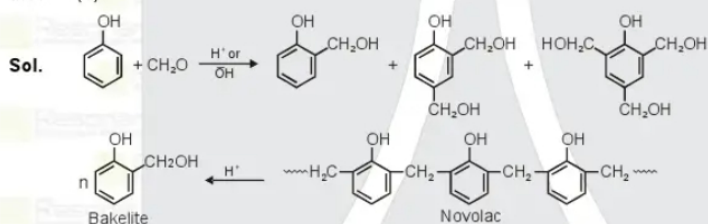
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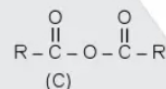
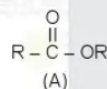
24. Which one is form as intermediates during the formation of Bakelite

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Ans. (1)



22. Rate of hydrolysis of given compounds ester, acid chloride, acid anhydride is:

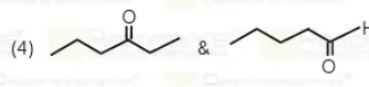
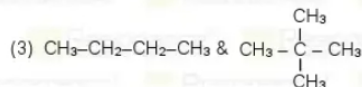
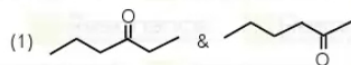


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Sol. Rate of hydrolysis is directly proportional to δ positive charged present on carbon of C=O group.

Rate of hydrolysis – Acid chloride > Acid anhydride > ester

23. Which of following compounds are metamers?



Ans. (1)

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Ans. (2)






Sol. Here addition of HBr in presence of peroxide takes place according to antimarkovnikov rule.

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