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CENTRE:

1. The weight of Na^+ in the solution of Na_2SO_4 is $92g$. Find molality of Na^+ per kg of water?

(1) 2 (2) 4 (3) 6 (4) 8

Answer:

(2)

Solution:

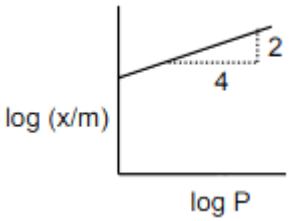
Given: $Na_2SO_4 \longrightarrow Na^+ = 92gm.$

To find: Molality of Na^+ per kg of water

Formula: $\text{Molality per kg} = \dfrac{\text{Wt of solute}}{\text{molecular wt of solute} \times \text{wt of solvent(kg)}}$

$$= \frac{92}{23} = 4$$

2. Which of the following options is correct for given curve?



(1) $\dfrac{x}{m} \propto (P)^{\frac{1}{2}}$ (2) $\dfrac{x}{m} \propto (P)$ (3) $\dfrac{x}{m} \propto (P)^2$ (4) $\dfrac{x}{m} \propto P^0$

Answer:

(1)

Solution:

According to Freundlich isotherm

$$\frac{x}{m} \propto P^{\frac{1}{n}} \text{ where } \frac{1}{n} \Rightarrow 0 \, to \, 1$$

$$\frac{x}{m} = k(P)^{\frac{1}{n}} \Rightarrow \log_{10}\frac{x}{m} = \log_{10} k + \frac{1}{n}\log_{10} P$$

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Slope $= \frac{1}{n}$ (From graph Slope $= \tan\theta \Rightarrow \frac{2}{4}$)

$$\frac{2}{4} = \frac{1}{n}$$

$$\frac{1}{2} = \frac{1}{n}$$

Ans: $\frac{x}{m} \propto P^{\frac{1}{2}}$

3. 20 ml of 0.1 M H_2SO_4 is added to 30 ml of 0.2 M NH_4OH then calculate pH of resultant solution. (Given that P^{Kb} of NH_4OH is 4.7)

(1) 9 (2) 9.4 (3) 5.2 (4) 5

Answer:

(1)

Solution:

Given:

$$H_2SO_4 = 20ml, 0.1M$$

$$NH_4OH = 30ml, 0.2M$$

$$H_2SO_4 + 2NH_4OH \longrightarrow (NH_4)_2 SO_4 + H_2O$$

	20 × 0.1	30 × 0.2		
t = 0	2 mm	6 mm	0 mm	0 mm
t = t	2 – 2	6 – 2 × 2		
	= 0 mm	2 mm	4 mm	2 mm

$\because$ It is a complete Neutralisation $r \times n$, So Buffer formula is applied

$$P^{OH} = P^{Kb} + \log_{10} \frac{Salt}{Base}$$

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$$= 4.7 + \log_{10}\frac{4}{2}$$

$$= 4.7 + \log_{10} 2$$

$$= 4.7 + 0.3010$$

$$P^{OH} = 5$$

$$P^{H} + P^{OH} = 14$$

$$P^{H} = 14 - 5 = 9$$

$$P^{H} = 9$$

4. Which of the following is not correct about Henry's law.
   (1) On increasing temperature value of K_H increases
   (2) Value of K_H increases solubility of gas increases
   (3) Value of K_H for two different gases at same temperature is not same
   (4) None of these

Answer:

(2)

Solution:

According to Henry's law

$$P = K_H \times \text{Solubility}$$

P = Partial pressure of gas

K_H = Henry's constant

Solubility $\alpha \frac{1}{K_H}$ ($\because K_H$ is different for different gas)

According to this expression, if the solubility of gas increases the value of K_H decreases

5. 2A + B $\longrightarrow$ Product

[A]	[B]	Rate (M min^{-1})

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CENTRE:

0.1	0.20	6.93×10^{-3}
0.1	0.25	6.93×10^{-3}
0.2	0.3	1.386×10^{-2}

Time when concentration of A becomes half

(1) 1 (2) 10 (3) 100 (4) 5

Answer:

(2)

Solution:

Rate $= k[\mathrm{A}]^x[\mathrm{B}]^y$

$6.93\times10^{-3} = k\left[0.1\right]^x\left[0.20\right]^y$ … (1)

$6.93\times10^{-3} = k\left[0.1\right]^x\left[0.25\right]^y$ … (2)

$1.386\times10^{-2} = k\left[0.2\right]^x\left[0.30\right]^y$ … (3)

Divide equation (1) by (2)

$$\frac{eq(1)}{eq(2)} = \left[\frac{0.20}{0.25}\right]^y \quad y = 0$$

Divide equation (1) by (3)

$$\frac{eq(1)}{eq(3)} = \frac{1}{2} = \left(\frac{1}{2}\right)^x \times 1 \quad x = 1$$

From equation (i) and (iii) we get $x = 1,$ so it is first order with respect to A.

$$\Rightarrow 6.93\times10^{-3} = k\left(0.1\right)$$

$$k = 6.93\times10^{-2}\ \mathrm{min}^{-1}$$

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$$t_{\frac{1}{2}} = \frac{0.693}{k}$$

$$t_{\frac{1}{2}} = \frac{0.693}{6.93\times10^{-2}} = 10$$

6. 0.05 F charge is passed through a lead storage battery. In the anodic reaction, what is the amount of $PbSO_4$ precipitated (Molar mass of $PbSO_4$ is 303 g/mol)

(1) 30.3 g (2) 15.15 g (3) 7.6 g (4) 60.6 g

Answer:

(1)

Solution:

Charge = 0.05 F

Amount of $PbSO_4$ precipitated = W

Molar mass of $PbSO_4$ = 303 g/mol

$\Rightarrow$ According to Faraday's 1st law of electrolysis

1st method:

$$W = E \times Q$$

E = M/2; Q = 0.05

$$W = \frac{303\times0.05}{2} = 7.6g$$

2nd method:

$\Rightarrow$ $Pb_{(s)} + SO_4^{2-} \longrightarrow PbSO_4 + 2e^-$

For 2f current passed, $PbSO_4$ deposited = 303 g/mol

For 0.05 F current passed, $PbSO_4$ deposited = W

$$W = \frac{303\times0.05}{2} = 7.6g$$

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CENTRE:

7. In hydrogen emission spectrum electron transition takes place from n = 8 to n = nf. If we plot this graph of $\bar{V}$ vs $\frac{1}{nf^2}$. Which of the following statement is correct.

(1) Slope $= -R_H$ (2) Slope $= R_H$ (3) Intercept $= R_H$ (4) Graph is non-linear

Answer:

(2)

Solution:

Transition state = n = 8 to n = nf

Graph $\left[\bar{\upsilon} \; vs \; \frac{1}{n^2}\right]$

$$\bar{\upsilon} = R_H z^2 \left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$$ (Z = 1 for hydrogen emission spectrum)

$$\bar{\upsilon} = R_H \times (1)^2 \left[\frac{1}{nf^2} - \frac{1}{8^2}\right]$$

$$\bar{\upsilon} = \boxed{R_H} \times \frac{1}{nf^2} - \frac{R_H}{64}$$

$$y = \boxed{m} \times + C$$

Slope $= R_H$

8. Given a mixture with 0.5 mole of gas A and X moles of gas B. Total pressure is 200 pa at 1000 k temperature in a vessel of volume $10m^3$. Then, find x. (R is universal gas constant).

(1) $\frac{4-R}{2R}$ (2) $\frac{4+R}{2R}$ (3) $\frac{2-R}{2R}$ (4) $\frac{2}{2}$

Answer:

(1)

Solution:

Given: Mix – Gas A + Gas B

0.5 mole x mole

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CENTRE:

Total pressure = 200 pa

T = 1000 k

V = 10 m^3

x = ?

$$Pv = nRT$$

$$200 \times 10 = (0.5 + x) R \times 1000$$

$$2 = (0.5 + x) R$$

$$\frac{2}{R} - 0.5 = x$$

$$\frac{2}{R} - \frac{1}{2} = x \Rightarrow \frac{4 - R}{2R} = x$$

9. Which of the following are isotope of hydrogen
(1) Deutrium, Protium (2) Deutrium, Tritium
(3) Deutrium, Tritium, Protium (4) Protium

Answer:

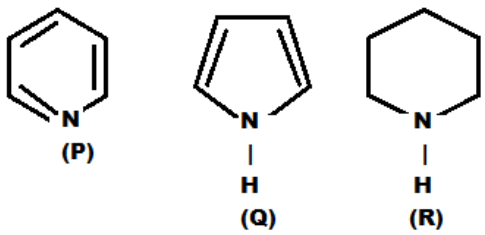
(3)

Solution:

$1H^1, 1H^2, 1H^3$

Protium, Deutrium and Tritium

10. Arrange the following in order of K_b value



(1) P > Q > R (2) Q > P > R (3) R > P > Q (4) R > Q > P

Answer:

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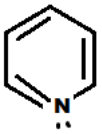
CENTRE:

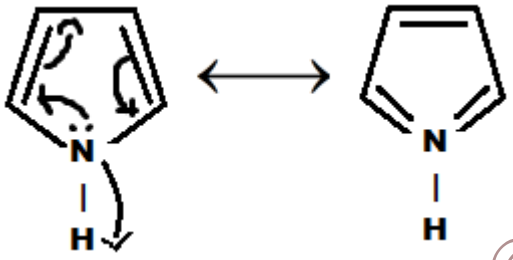
(3)

Solution:



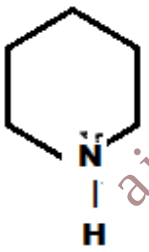
SP^2 Hybridisation (L.P is consider for hybridisation). The lone pair is not conjugation.

→ (P)



→ (Q) ← SP^2 hybridised.

This nitrogen contains 3σ bond and its hybridisation is SP^2. Since the lone pair is delocalised inside the ring it doesn't take part in hybridisation and make this compound to be aromatic in nature.

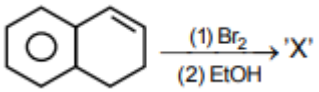


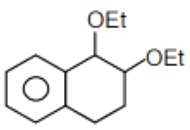
(R) → No delocalisation of Lone pair, Hybridisation is SP^3.

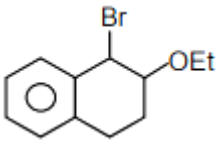
Higher the P-character, more it is basic in nature

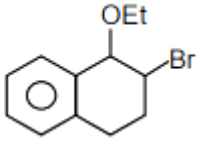
Hence the order is R > P > Q

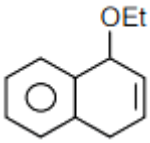
11. Product 'x' major will be



(1) 

(2) 

(3) 

(4) 

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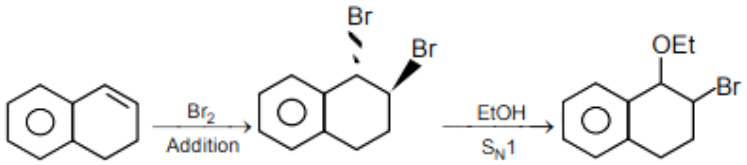
CENTRE:

Answer:

(3)

Solution:

It involves Electrophilic addition of alkenes, followed by Nucleophilic substitution mechanism.



12. Arrange the following in order of K_a value

FCH_2COOH $ClCH_2COOH$ O_2NCH_2COOH $NCCH_2COOH$

(P) (Q) (R) (S)

(1) P > Q > R > S (2) R > S > P > Q (3) R > P > S > Q (4) R > S > Q > P

Answer:

(2)

Solution:

Based on the order of – I effect.

More the -I effect greater its acidic strength.

$-NO_2 > CN > F > Cl$

Hence the correct order is $R > S > P > Q$

13. Presence of which makes water unsuitable for drinking.

(1) Fe = 0.2 ppm (2) Cu = 2 ppm (3) Mn = 0.5 ppm (4) Zn = 0.05 ppm

Answer:

(3)

Solution:

Fact from NCERT

Presence of $Mn \geq 0.05$ ppm concentration makes water unsuitable for drinking.

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CENTRE:

14. Which of the following is strongest acid

(1) $CHCl_3$ (2) CHI_3 (3) $CHBr_3$ (4) $CH(CN)_3$

Answer:

(4)

Solution:

Order lies with –I and –M effect.

-I and –M effect in CN is more when compared to Cl, I and Br. After losing H^+ the negative ion on the C will be delocalised to CN making it more stable and acidic.

Ans: $CH(CN)_3$

15. Which of the following alkaline earth metal nitrate does not crystalline with water of crystallization?

(1) $Ca(NO_3)_2$ (2) $Mg(NO_3)_2$ (3) $Sr(NO_3)_2$ (4) $Ba(NO_3)_2$

Answer:

(4)

Solution:

- It depends on the polarization power of cation.
- The atom which is having larger size will have lesser polarization power and does not have water of crystallization.
- Ba^{2+} ion is larger in size in comparison $\bar{c}$, Ca^{2+}, Mg^{2+} and Sr^{2+} ion.
- $Ba(NO_3)_2$ is the correct option.

16. Which of the following ore contains iron and copper

(1) Malachite (2) Azurite (3) Copper pyrite (4) None of these

Answer:

(3)

Solution:

Malachite – Copper ore $CuCO_3.Cu(OH)_2$

Azurite – Copper ore $2CuCO_3.Cu(OH)_2$

Copper pyrite - $Cu + Fe$ $CuFes_2$ - Copper + Iron ore

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CENTRE:

17. Considering MOT comment on the stability:
(1) Li_2^+ stable Li_2^- unstable
(2) Li_2^+ unstable Li_2^- stable
(3) Li_2^+ unstable Li_2^- unstable
(4) Li_2^+ stable Li_2^- stable

Answer:

(3)

Solution:

(I) $Li_2^+ \rightarrow 5e^-$

$\sigma 1s^2 \sigma^* 1s^2 \sigma 2s^1$

Bond order $= \frac{N_b - N_A}{2} = \frac{3-2}{2} = \frac{1}{2}$

$Li_2^- \rightarrow 7e^-$

$\sigma 1s^2 \sigma^+ 1s^5 \sigma 2s^2 \sigma^* 2s^1$

Bond order = $\frac{N_b - N_A}{2} = \frac{4-3}{2} = \frac{1}{2}$

Both Li_2^+, Li_2^- have same bond order. Unlikely 0.5 bond order does not exist so both Li_2^+ and Li_2^- are unstable.

If option were given as 1) $Li_2^+ > Li_2^-$

2) $Li_2^+ < Li_2^-$

3) $Li_2^+ = Li_2^-$

4) None of these

We can consider if same B.O is present, the species which is having lesser number of electrons present in anti-bonding orbital will be more stable so $Li_2^+ > Li_2^-$.

18. Which of the following property in a group decrease down the group and increase down the group respectively.
(1) electronegativity and atomic radius
(2) electronegativity and electro gain enthalpy
(3) atomic radius and electronegativity
(4) electro gain enthalpy and electronegativity

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CENTRE:

Answer:

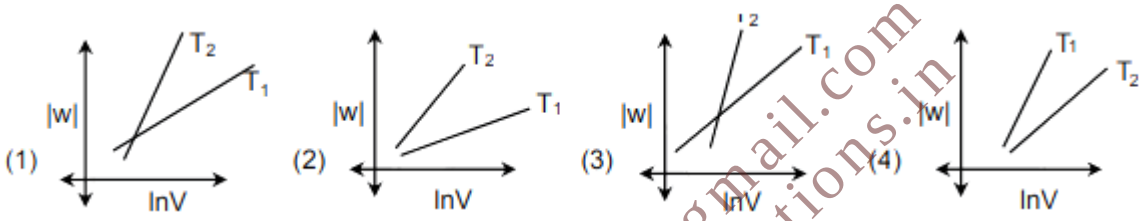
(1)

Solution:

On moving down the group electronegativity decreases.

On moving down the group atomic shell increases there by atomic radius increases.

19. Reversible isothermal expansion of gas for two temperature T_1 and T_2 $(T_2 > T_1)$. Graph versus $(|w|)$ and $\ln v$.



Answer:

(2)

Solution:

$w = -nRT\ \ell n\ \frac{v_f}{v_i} \rightarrow$ constant is given same in all case.

Take magnitude for W.

$|w| = nRT\ \ell n v_f - nRT\ V_i$

$T_2 > T_1$

Lines cannot intersect and Intercept will be negative.

20. Which of the following properties is/are true for a silicone polymer?
A) Thermally resistant and have low dielectric constant
B) Resistant towards oxidation and used in grease
C) Biocompalible
D) Hydrophobic in nature
(1) A & B (2) A, B & C (3) B, C, & D (4) A, B, C & D

Answer:

(4)

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CENTRE:

Solution:

All, A, B, C and D are true for a silicone polymer – Concept from NCERT

21. Which of the following is a piezo electric material?
(1) Silica (2) Quartz (3) Mica (4) Beryl

Answer:

(2)

Solution:

NCERT – SOLID STATE

Piezoelectric $\rightarrow$ These are the material that produce electrical potential when pressure is applied on parallel and perpendicular phases.

EX - Quarts.

22. Aluminium exist in +3 stable where as thallium exist in both +1 & +3 oxidation state. Reason for this is
(1) Inert pair effect (2) Lanthanoid contraction
(3) Diagonal relationship (4) None of these

Answer:

(1)

Solution:

Due to inert pair effect thallium exist both 1+ and +3 oxidation state. But Thallium is stable in +1 oxidation state.

23. Maximum spin only magnetic moment for transition metal complex may be
(1) 5.92 BM (2) 6.92 BM (3) 4.89 BM (4) 3.87 BM

Answer:

(1)

Solution:

In Transition metal complex maximum number of unpaired electron possible is 5 and it will be present in d sub shell

Formula $\rightarrow = \sqrt{n(n+2)}BM$

$n \Rightarrow$ no of impaired electron

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CENTRE:

$$= \sqrt{5(5+2)} = 5.92\,BM$$

24. Match the following drugs with correct functional group test

A) Chloroxylenol	P) Carbylamine
B) Penicillin	Q) Baeyer's reagent
C) Sulpha Pyridine	R) $FeCl_3$ test
D) Norethindrone	S) Sodium hydrogen sulphate

(1) A $\rightarrow$ R, B $\rightarrow$ P, C $\rightarrow$ S, D $\rightarrow$ Q
(2) A $\rightarrow$ S, B $\rightarrow$ R, C $\rightarrow$ P, D $\rightarrow$ Q
(3) A $\rightarrow$ R, B $\rightarrow$ S, C $\rightarrow$ P, D $\rightarrow$ Q
(4) A $\rightarrow$ Q, B $\rightarrow$ R, C $\rightarrow$ P, D $\rightarrow$ S

Answer:

(2)

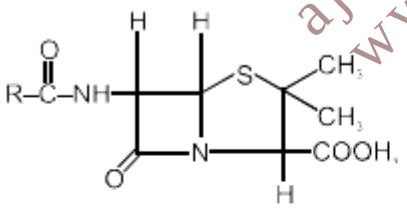
Solution:

Penicillin contains COOH group – respond to sodium hydrogen sulphate test.

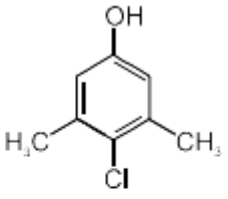
Chloroxylenol contains OH group – respond to neutral $FeCl_3$ test

Sulpha pyridine NH_2 group – respond to carbylamines test

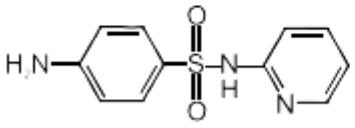
Norethindrone $C \equiv CH$ – respond to Bayers test



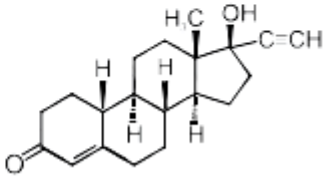
Penicillin



Chloroxylenol

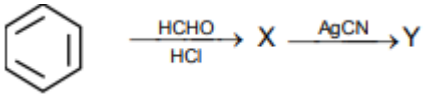


Sulphapyridine



Norethindrone

25. Product X $\rightarrow$ Y will be



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CENTRE:

(1) $Ph-CH_2-Cl$ $Ph-CH_2-NC$

(2) $PhCH_2OH$ $Ph-CH_2-CN$

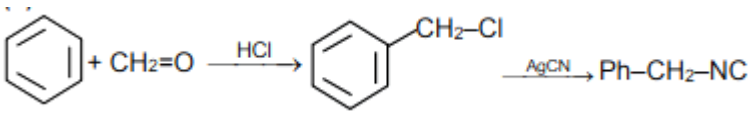
(3) $PhCH_2Cl$ $Ph-CH_2-CN$

(4) $Ph-OH$ $Ph-CH_2-CN$

Answer:

(1)

Solution:



26. $R-C\equiv N \xrightarrow[2)\ H_2O]{1)\ DiBAl-H} X$

X will be

(1) $R-CH=0$ (2) $R-CH_2-NH_2$ (3) $R\ COOH$ (4) $R-NH_2$

Answer:

(1)

Solution:

Classical reduction $\longrightarrow$ Aldehyde is formed.

27. Arrange the following amino acids in order of their PKa order.
Lysine, Aspartic acid, Arginine, Glycine.

(1) lys > Arg > Gly > Asp (2) Arg > Lys > Asp > Gly

(3) Gly > Asp > Arg > Lys (4) Arg > Lys > Gly > Asp

Answer:

(4)

Solution:

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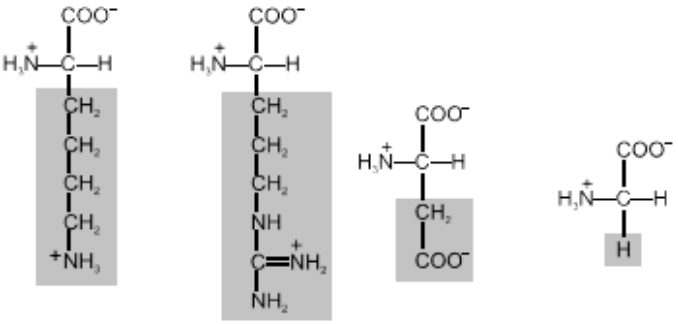
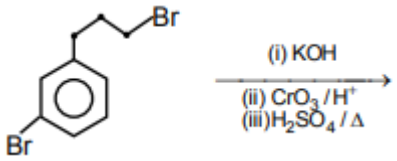
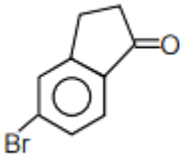
CENTRE:

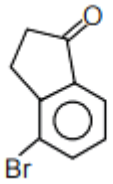


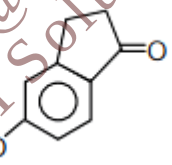
	* Lysine	* Arginine	Aspartate	Glycine
pI Value	**(9.8)**	**(10.8)**	**(3.0)**	**(6.0)**

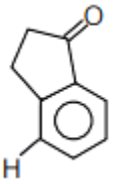
28. Write the product of given reaction:



(1) 

(2) 

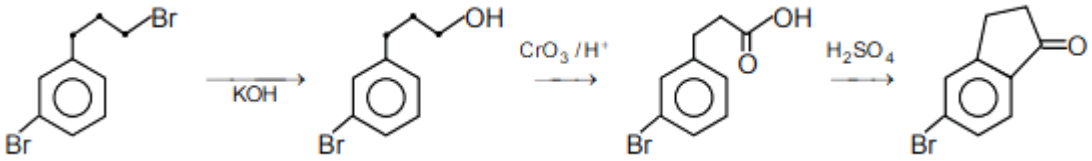
(3) 

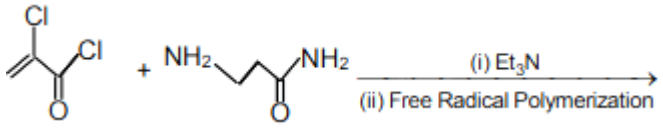
(4) 

Answer:

(1)

Solution: It involves nucleophilic substitution reaction (SN^2) followed by oxidation with oxidising agent and removal of water molecule.

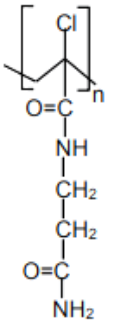


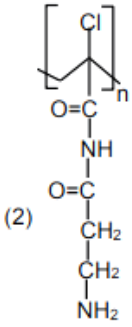
29. 

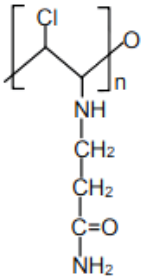
DATE: **CHEMISTRY – TEST PAPER – JEE – 2019**

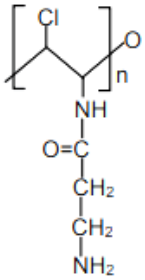
CLASS: XII **9TH JANUARY – 2019 – SHIFT 1**

CENTRE:

(1) 

(2) 

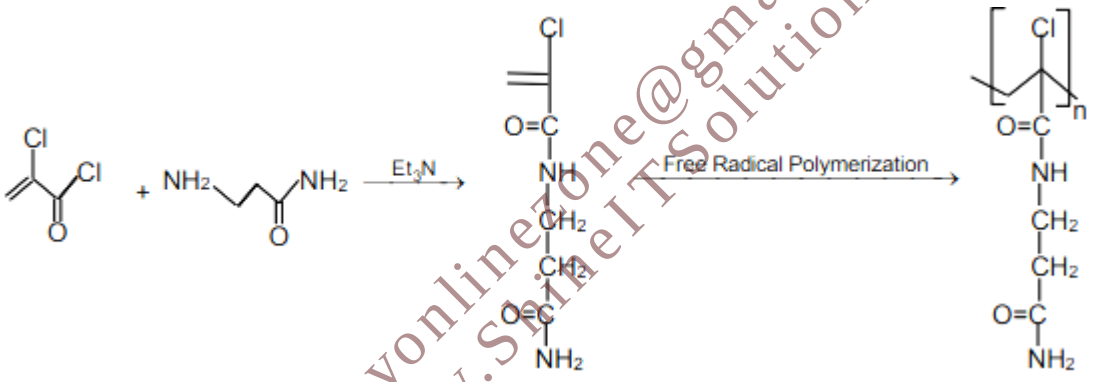
(3) 

(4) 

Answer:

(1)

Solution:



30. Consider the compound A $\left[Cr\left(H_2O\right)_6\right]Cl_3$; yellow $B\left[Cr\left(NH_3\right)_6\right]Cl_3$; violet. Then which of the following is incorrect.

(1) $\left(\Delta_0\right)_A < \left(\Delta_0\right)_B$

(2) The crystal field splitting parameter can be measured by wavelengths of complementary colors for (A) and (B) respectively

(3) Both are paramagnetic with three unpaired electrons each.

(4) the crystal field splitting parameter can be measured by wavelength of yellow and violet colors for (A) and (B) respectively.

Answer:

(4)

Solution:

The crystal field splitting parameter can't be measured by wavelength of yellow and violet colours for (A) & (B) respectively.