

DATE:

CHEMISTRY – TEST PAPER – JEE – 2019



CLASS: XII

9<sup>TH</sup> JANUARY – 2019 – SHIFT 1

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:**

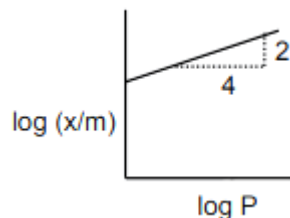
Given:  $Na_2SO_4 \longrightarrow Na^+ = 92gm.$

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

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

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

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



(1)  $\frac{x}{m} \propto (P)^{\frac{1}{2}}$

(2)  $\frac{x}{m} \propto (P)$

(3)  $\frac{x}{m} \propto (P)^2$

(4)  $\frac{x}{m} \propto P^0$

**Answer:**

(1)

**Solution:**

According to Freundlich isotherm

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

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

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

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

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

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

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

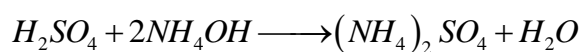
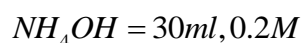
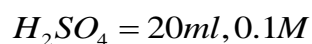
(4) 5

**Answer:**

(1)

**Solution:**

Given:



$$20 \times 0.1 \quad 30 \times 0.2$$

$$t = 0 \quad 2 \text{ mm} \quad 6 \text{ mm} \quad 0 \text{ mm} \quad 0 \text{ mm}$$

$$t = t \quad 2 - 2 \quad 6 - 2 \times 2$$

$$= 0 \text{ mm} \quad 2 \text{ mm} \quad 4 \text{ mm} \quad 2 \text{ mm}$$

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

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

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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

$$\text{Solubility} \propto \frac{1}{K_H} \quad (\because K_H \text{ is different for different gas})$$

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

5.  $2A + B \longrightarrow \text{Product}$

[A]	[B]	Rate ( $\text{M min}^{-1}$ )
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CENTRE:

0.1	0.20	$6.93 \times 10^{-3}$
0.1	0.25	$6.93 \times 10^{-3}$
0.2	0.3	$1.386 \times 10^{-2}$

Time when concentration of A becomes half

(1) 1

(2) 10

(3) 100

(4) 5

**Answer:**

(2)

**Solution:**

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

$$6.93 \times 10^{-3} = k[0.1]^x [0.20]^y \quad \dots (1)$$

$$6.93 \times 10^{-3} = k[0.1]^x [0.25]^y \quad \dots (2)$$

$$1.386 \times 10^{-2} = k[0.2]^x [0.30]^y \quad \dots (3)$$

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.

$$\Rightarrow 6.93 \times 10^{-3} = k(0.1)$$

$$k = 6.93 \times 10^{-2} \text{ min}^{-1}$$

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

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

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

⇒ According to Faraday's 1<sup>st</sup> law of electrolysis

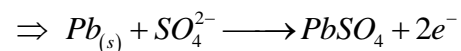
1<sup>st</sup> method:

$$W = E \times Q$$

$$E = M/2; Q = 0.05$$

$$W = \frac{303 \times 0.05}{2} = 7.6g$$

2<sup>nd</sup> method:



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

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

$$W = \frac{303 \times 0.05}{2} = 7.6g$$



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Total pressure = 200 pa

T = 1000 k

V = 10 m<sup>3</sup>

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:

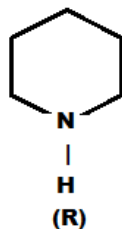
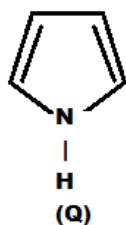
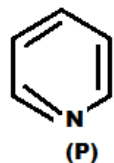
(3)

Solution:



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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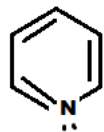
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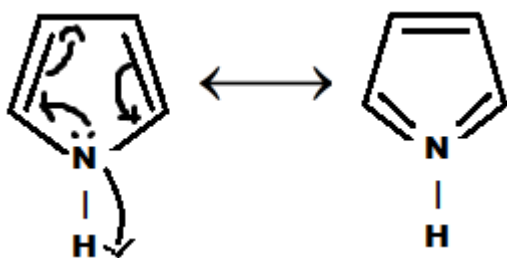
(3)

Solution:



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

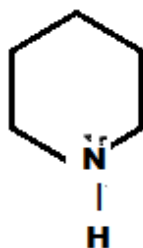
→ (P)



→ (Q)

←  $SP^2$  hybridised.

This nitrogen contains  $3\sigma$  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.



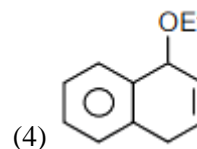
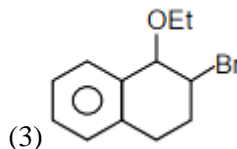
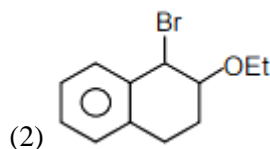
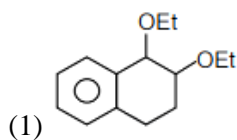
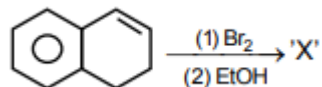
(R)

→ 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





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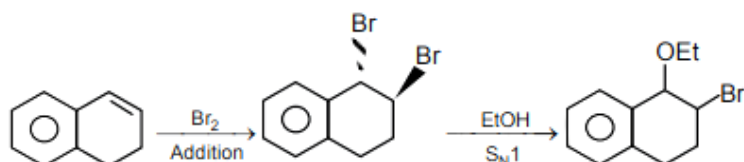
CENTRE:

**Answer:**

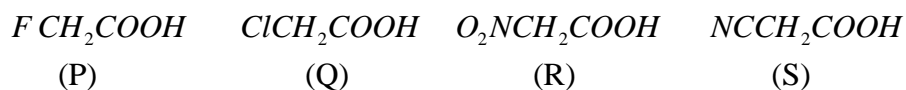
(3)

**Solution:**

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



12. Arrange the following in order of  $K_a$  value



(1)  $P > Q > R > S$   
> P

(2)  $R > S > P > Q$

(3)  $R > P > S > Q$

(4)  $R > S > Q$

**Answer:**

(2)

**Solution:**

Based on the order of  $-I$  effect.

More the  $-I$  effect greater its acidic strength.



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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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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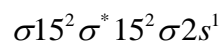
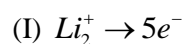
17. Considering MOT comment on the stability:

- (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

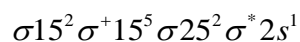
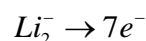
**Answer:**

(3)

**Solution:**



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



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

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:**

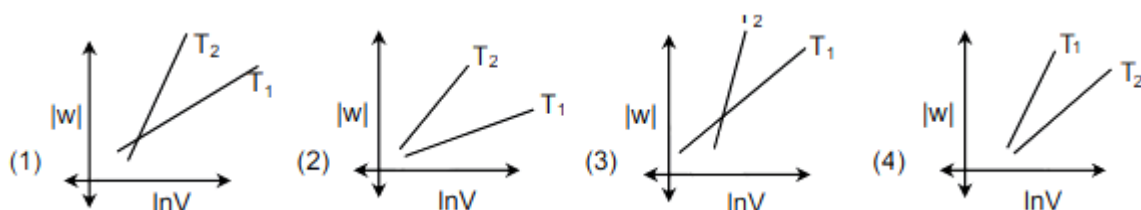
(1)

**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:**

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

Take magnitude for W.

$$|w| = nRT \ln v_f - nRT V_i$$

$$T_2 > T_1$$

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) Biocompatible

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 → 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

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

$n \Rightarrow$  no of impaired electron

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CENTRE:

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

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 → R, B → P, C → S, D → Q

(2) A → S, B → R, C → P, D → Q

(3) A → R, B → S, C → P, D → Q

(4) A → Q, B → R, C → P, D → S

**Answer:**

(2)

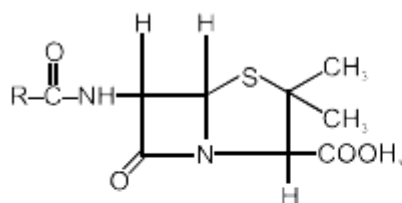
**Solution:**

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

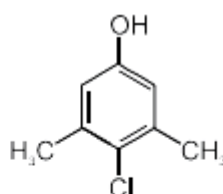
Chloroxylenol contains OH group – respond to neutral  $FeCl_3$  test

Sulpha pyridine  $NH_2$  group – respond to carbylamines test

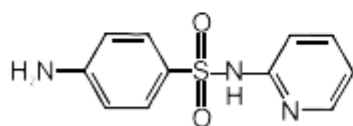
Norethindrone  $C \equiv CH$  – respond to Bayer's test



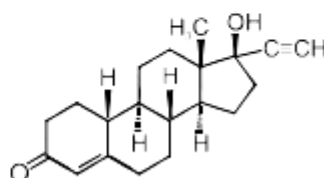
Penicillin



Chloroxylenol

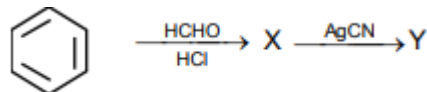


Sulphapyridine



Norethindrone

25. Product X → Y will be



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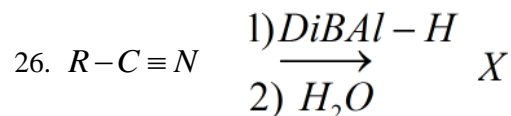
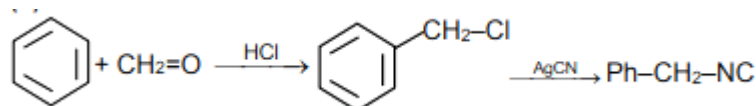
CENTRE:

- |                  |              |
|------------------|--------------|
| (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:**



X will be

- (1)  $R-CH=O$       (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:**

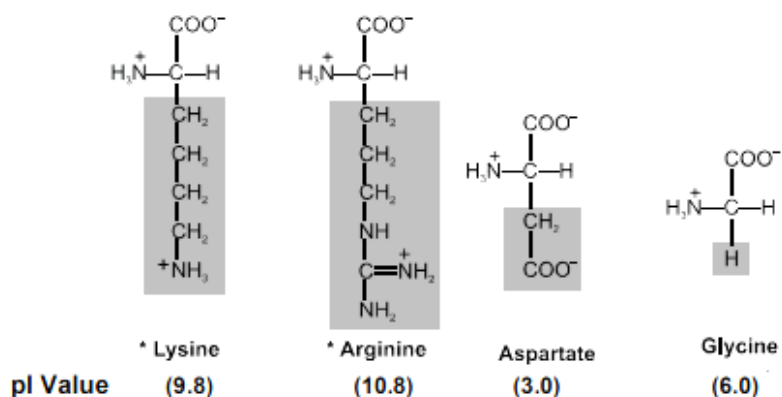
DATE:

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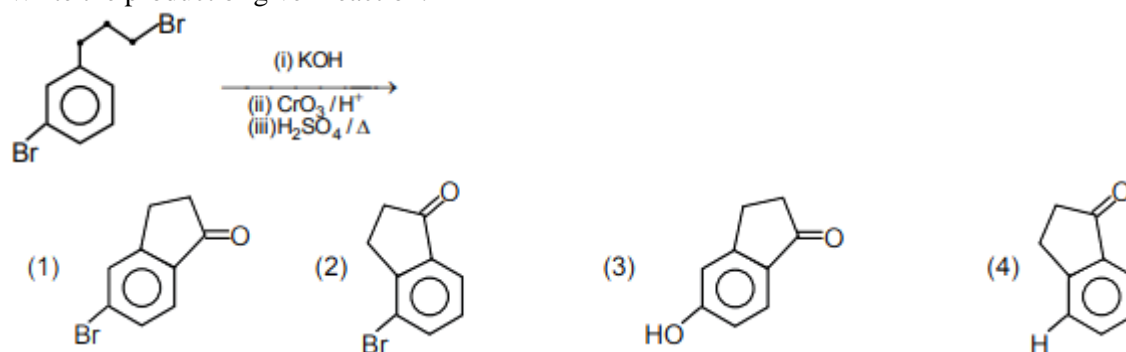
CLASS: XII

9<sup>TH</sup> JANUARY – 2019 – SHIFT 1

CENTRE:

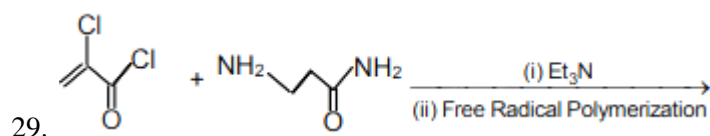
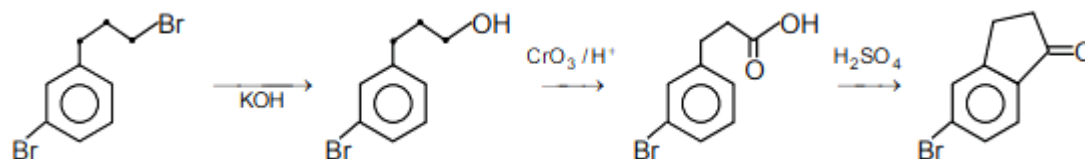


28. Write the product of given reaction:

**Answer:**

(1)

**Solution:** It involves nucleophilic substitution reaction (SN<sup>2</sup>) followed by oxidation with oxidising agent and removal of water molecule.





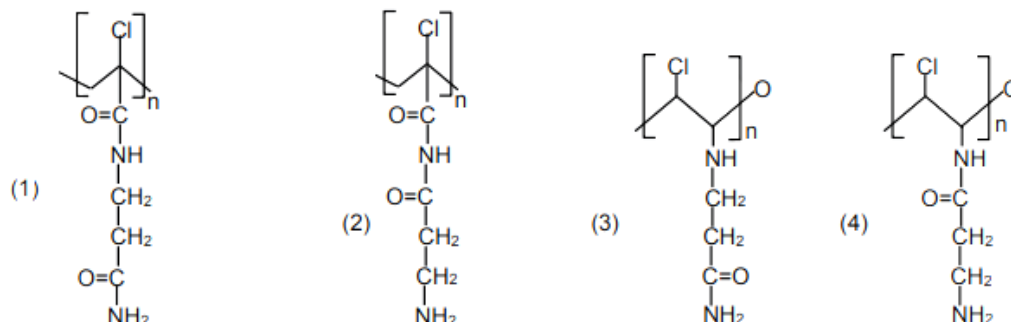
DATE:

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CLASS: XII

9<sup>TH</sup> JANUARY – 2019 – SHIFT 1

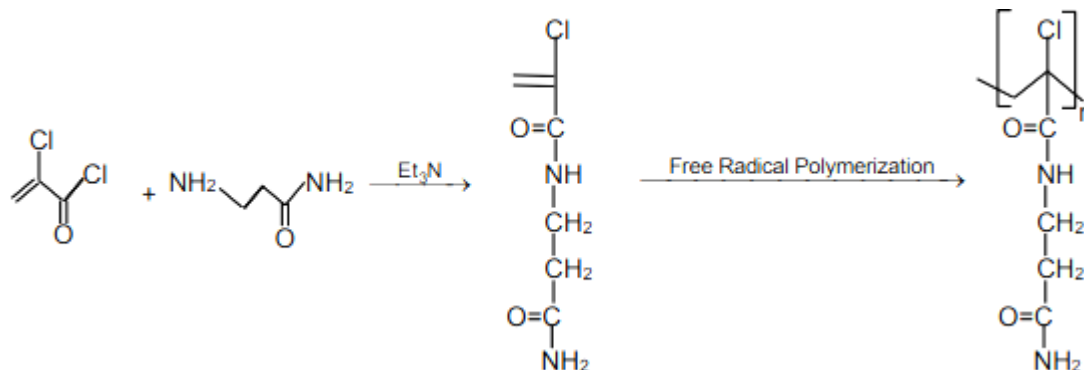
CENTRE:



**Answer:**

(1)

**Solution:**



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

- (1)  $(\Delta_0)_A < (\Delta_0)_B$
- (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.