CHEMISTRY

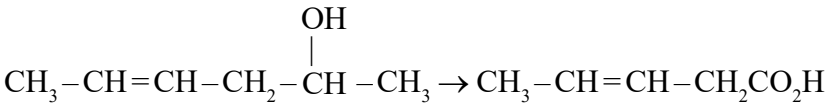
10 Jan. 2019 [Session : 2:30 PM to 5 : 30 PM]

JEE MAIN PAPER ONLINE

RED COLOUR CONSIDER OFFICIAL ANSWER-KEY (JEE-MAIN)

1. Which is the most suitable reagent for the following transformation?

निम्नलिखित रूपान्तरण के लिए सर्वाधिक उपयुक्त अभिकर्मक क्या है।



(1) CrO_2Cl_2/CS_2 (2) alkaline $KMnO_4$ (3) $I_2/NaOH$ (4) Tollen's reagent

A. 3

Question ID : 41652910442

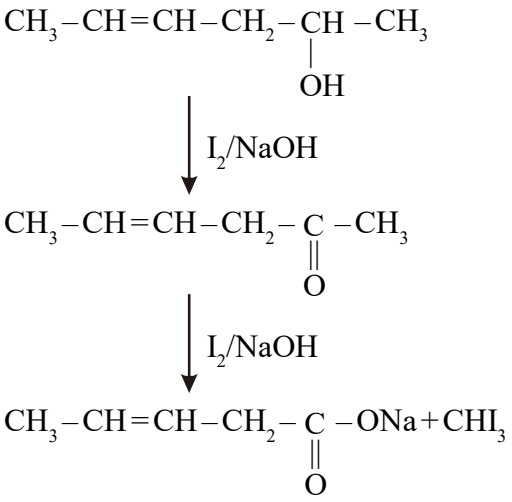
Option 1 ID : 41652941229

Option 2 ID : 41652941228

Option 3 ID : 41652941227

Option 4 ID : 41652941226

sol.



2. In the cell

Pt(s) $|H_2(g, 1bar)|HCl(aq)|AgCl(s)|Ag(s)|$ Pt(s)

the potential is 0.92 V when a 10^{-6} molar HCl solution is used. The standard electrode potential of (AgCl/Ag, Cl^-) electrode is:

निम्नलिखित सेल में

Pt(s) $|H_2(g, 1bar)|HCl(aq)|AgCl(s)|Ag(s)|$ Pt(s)

यदि 10^{-6} molal HCl विलयन का उपयोग होता है तो सेल का विभव 0.92 V है। (AgCl/Ag, Cl^-) इलेक्ट्रोड का मानक विभव है दिया गया है।

$\left\{\text{Given}, \frac{2.303RT}{F} = 0.06 \text{ at } 298\,K\right\}$

(1) 0.20 V (2) 0.40 V (3) 0.94 V (4) 0.76 V

A. 1

Question ID : 41652910463

Option 1 ID : 41652941312

Option 2 ID : 41652941310

Option 3 ID : 41652941313

Option 4 ID : 41652941311

sol. Cell : $Pt(s)|H_2(g, 1\ bar)|HCl(aq)|AqCl(s)|Ag(s)|Pt(s)$

$E_{cell} = 0.92\ V$

$$E^o_{AgCl(s)|Ag(s)|cr^-} - E^o_{H_2(g)|H^{\oplus}(aq)} - \frac{0.06}{n}\log Q$$

$$\text{Anode}: \frac{1}{2}H_2(g) \longrightarrow H^+(aq) + e^-$$

$$\text{Cathode}: AgCl(s) + e^- \longrightarrow Ag(s) + Cl^-$$

Net cell reaction:

$$\frac{1}{2}H_2(g) + AgCl(s) \longrightarrow Ag(s) + H^+_{(aq)} + Cl^-(aq)$$

$$\therefore\ Q = \frac{[H^+][Cl^-]}{(P_{H_2})^{\frac{1}{2}}}$$

10^{-6} molar HCl solution is taken

$$Q = \frac{10^{-6}\times 10^{-6}}{1} = 10^{-12}$$

$$\therefore\ 0.92 = E^o_{AgCl(s)|Ag(s),Cl^-} - \frac{0.06}{1}\log 10^{-12}$$

$$\therefore\ E^o_{AgCl(s)|Ag(s),Cl^-} = 0.92 + [0.06\times(-12)]$$

$$= 0.92 - 0.72$$

$$= 0.20\ V$$

3. The 71st electron of an element X with an atomic number of 71 enters into the orbital:
एक तत्व X जिसकी परमाणु संख्या 71st है इसका 71 वॉ इलेक्ट्रॉन जिस कक्षक में प्रवेश करता है, वह है

(1) 6s (2) 6p (3) 4f (4) 5d

A. 4

Question ID : 41652910446

Option 1 ID : 41652941242

Option 2 ID : 41652941245

Option 3 ID : 41652941243

Option 4 ID : 41652941244

Sol. Atomic number = 71

Electronic configuration:

$[Xe]6s^2\ 4f^{14}\ 5d^1 \leftarrow$ last electron

$\therefore$ Orbital occupied by last e^- is 5d

4. The pair that contains two P – H bonds in each of the oxoacids is:
निम्नलिखित युग्मों मे से जिस युग्म के प्रत्येक आक्सोअम्लों में दो P – H आंबध है, वह है

(1) H_3PO_3 and H_3PO_2 (2) $H_4P_2O_5$ and $H_4P_2O_6$ (3) $H_4P_2O_5$ and H_3PO_3 (4) H_3PO_2 and $H_4P_2O_5$

A. 4

Question ID : 41652910450

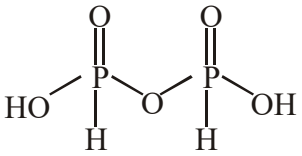
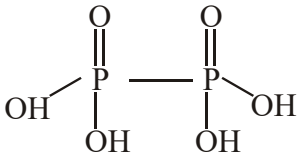
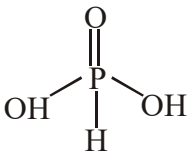
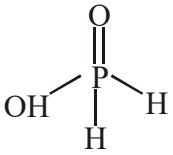
Option 1 ID : 41652941258

Option 2 ID : 41652941261

Option 3 ID : 41652941259

Option 4 ID : 41652941260

Sol.

Acid	No of P-H bond	
$H_4P_2O_5$	2	
$H_4P_2O_6$	0	
H_3PO_3	1	
H_3PO_2	2	

5. In the reaction of oxalate with permanganate in acidic medium, the number of electrons involved in producing one molecule of CO_2 is:

अम्लीय माध्यम में आक्सैलेट की परमैंगनेट के साथ अभिक्रिया में CO_2 के एक अणु को बनाने में निहित इलेक्ट्रॉनों की संख्या है:

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

A. 4

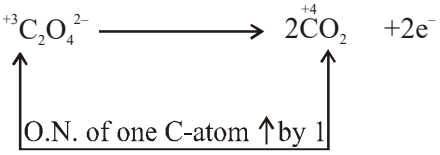
Question ID : 41652910452

Option 1 ID : 41652941268

Option 2 ID : 41652941269

Option 3 ID : 41652941266

Option 4 ID : 41652941267

sol. 

$\therefore$ No. of electrons involved in producing one mole of CO_2 is 1.

6. The reaction that is NOT involved in the ozone layer depletion mechanism in the stratosphere is:

समतापमंडल में ओजोन परतों के अवक्षय में जो अभिक्रिया नहीं सम्मिलित होती है वह है

(1) $HOCl(g) \xrightarrow{h\upsilon} \dot{O}H(g) + \dot{C}l(g)$

(2) $Cl\dot{O}(g) + O(g) \rightarrow \dot{C}l(g) + O_2(g)$

(3) $CF_2Cl_2(g) \xrightarrow{uv} \dot{C}l(g) + \dot{C}F_2Cl(g)$

(4) $CH_4 + 2O_3 \rightarrow 3CH_2 = O + 2H_2O$

A. 4

Question ID : 41652910455

Option 1 ID : 41652941278

Option 2 ID : 41652941279

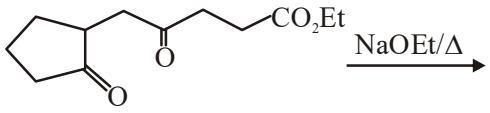
Option 3 ID : 41652941281

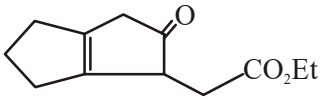
Option 4 ID : 41652941280

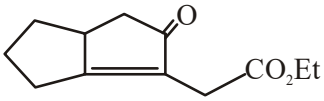
sol. $CH_4 + 2O_3 \rightarrow 3CH_2 = O + 3H_2O$ is not involved in the ozone layer deptetion mechanism.

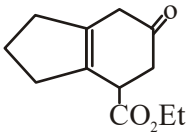
7. The major product obtained in the following reaction is:

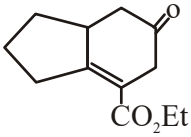
निम्नलिखित अभिक्रिया में प्राप्त होने वाला मुख्य उत्पाद है।



(1) 

(2) 

(3) 

(4) 

A. 2

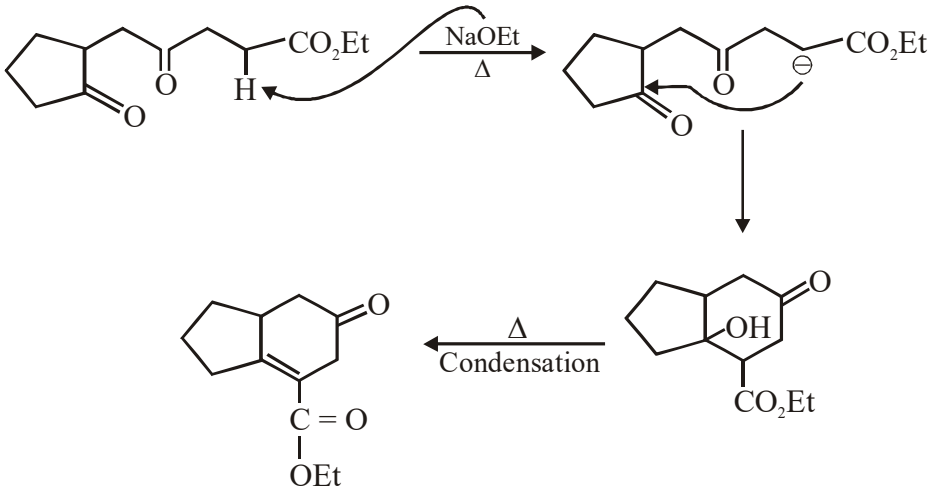
Question ID : 41652910439

Option 1 ID : 41652941216

Option 2 ID : 41652941214

Option 3 ID : 41652941215

Option 4 ID : 41652941217

sol. 

8. The difference in the number of unpaired electrons of a metal ion in its high-spin and low-spin octahedral complexes is two. The metal ion is:

एक धातु आयन के उच्च प्रचक्रण तथा निम्न प्रचक्रण वाले अष्टफलकीय संकुलों के अयुग्मित इलेक्ट्रॉनों की संख्याओं में दो का अन्तर है। धातु आयन है

(1) $Ni^{2}+$ (2) $Fe^{2}+$ (3) $Co^{2}+$ (4) $Mn^{2}+$

A. 3

Question ID : 41652910453

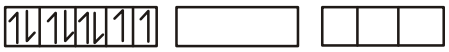
Option 1 ID : 41652941270

Option 2 ID : 41652941273

Option 3 ID : 41652941272

Option 4 ID : 41652941271

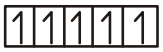
sol. $Ni^{2+} = |Ar|\ 4s^{o}\ 3d^{8}$



3 d^{8} 4 s 4 p

No of unpaired electron remain two with S.F.L or W.F.L

$Mn^{2+} = |Ar|\ 4s^{o}\ 3d^{5}$

 → 5 unpaired electron with W.F.L

$Fe^{2+} = |Ar|\ 4s^{o}\ 3d^{6}$

→ 4 unpaired electron with W.F.L

$Co^{2+} = |Ar|\ 4s^{o}\ 3d^{7}$

→ 3 unpaired electron with W.F.L

9. Haemoglobin and gold sol are examples of:

हिमोग्लोबिन तथा गोल्ड सॉल उदाहरण है

(1) positively and negatively charged sols, respectively

क्रमशः धनात्मक तथा ऋणात्मक आवेशित सॉलों के

(2) positively charged sols

धनात्मक आवेशित सॉलों के

(3) negatively and positibely charged sols, respectively

क्रमशः ऋणात्मक तथा धनात्मक आवेशित सॉलों के

(4) negatively charged sols

ऋणात्मक आवेशित सॉलों के

A. 1

Question ID : 41652910465

Option 1 ID : 41652941320

Option 2 ID : 41652941318

Option 3 ID : 41652941321

Option 4 ID : 41652941319

sol. Haemoglobin → Positive sol

Metal → Negative sol

10. A reaction of cobalt (III) chloride and ethylenediamine in a 1 : 2 mole ratio generates two isomeric products A (violet coloured) and B (green coloured). A can show optical activity, but, B is optically inactive. What type of isomers does A and B represent?

(1) Geometrical isomers (2) Coordination isomers

(3) Linkage isomers (4) Ionisation isomers

कोबाल्ट (III) क्लोराइड तथा ऐथिलीडाऐमीन की 1 : 2 मोल अनुपात में अभिक्रिया से दो समावयवी उत्पाद A (बैगनी रंग का)

तथा उत्पाद B (हरे रंग का) उत्पन्न होते है। A ध्रुवण घूवर्णकता प्रदर्शित करता है परन्तु B ध्रुवण घूर्णक नहीं है किस प्रकार की समावयवता A तथा B निरूपित करते है।

(1) ज्यामितीय समावयता (2) उपसहसेयाजन समावयता

(3) बंधनी समावयवता (4) आयनन समावयवता

A. 1

Question ID : 41652910454

Option 1 ID : 41652941275

Option 2 ID : 41652941274

Option 3 ID : 41652941277

Option 4 ID : 41652941276

sol. $[CoCl_6]^{3-} + 2(en) \rightarrow [CoCl_2(en)_2]^+$

(1 : 2 mole ratio) (cis-trans isomer)

A - optically active (cis-isomer)

B - optically inactive (trans isomer)

11. Sodium metal on dissolution in liquid ammonia gives a deep blue solution due to the formation of:

(1) sodium ion-ammonia complex (2) sodamide

(3) ammoniated electrons (4) sodium-ammonia complex

द्रव अमोनिया में सोडियम धातु को विलयित करने पर एक गहरे नीले रंग का विलयन देता है इसका कारण है

(1) सोडियम आयन अमोनियम संकुल का बनना (2) सोडामाइड का बनना

(3) अमोनियित इलेक्ट्रॉनों का बनना (4) सोडियम अमोनियम संकुल का बनना

A. 3

Question ID : 41652910449

Option 1 ID : 41652941256

Option 2 ID : 41652941254

Option 3 ID : 41652941257

Option 4 ID : 41652941255

Sol. Sodium metal on dissolution in liquid ammonia gives a deep blue solution due to ammoniated electrons.

12. 5.1 g NH_4SH is introduced in 3.0 L evacuated flask at 327°C. 30% of the solid NH_4SH decomposed to NH_3 and H_2S as gases. The Kp of the reaction at 327°C is (R = 0.082 L atm mol^{-1} K^{-1}, Molar mass of S = 32 g mol^{-1}, molar mass of N = 14 g mol^{-1})

5.1 g NH_4SH को 327°C पर 3.0 L के एक रिक्त किये गये फ्लास्क मे डाला जाता है। 30% ठोस NH_4SH,NH_3 तथा H_2S गैसों में अपघटित हो जाता है। 327°C पर इस अभिक्रिया का Kp है: (R = 0.082 L atm mol^{-1} K^{-1}, मोलर द्रव्यमान S = 32 g mol^{-1},मोलर द्रव्यमान N = 14 g mol^{-1})

(1) 4.9×10^{-3} atm^2 (2) 0.242 atm^2 (3) 1×10^{-4} atm^2 (4) 0.242×10^{-4} atm^2

A. 2

Question ID : 41652910462

Option 1 ID : 41652941307

Option 2 ID : 41652941308

Option 3 ID : 41652941306

Option 4 ID : 41652941309

sol. $NH_4SH \rightarrow NH_3(g) + H_2S(g)$

Initial moles $5.1/51 = 0.1$ mol

Moles at equilibrium	NH_4SH	$\rightarrow NH_3(g) + H_2S(g)$	
	$0.1(1-0.3)$	0.1×0.3	0.1×0.3

$$\therefore\ K_C = [NH_3]\,[H_2S] = \left(\frac{0.03}{3}\right)^2 = 10^{-4}$$

$$K_P = K_C(RT)^{\Delta n_g} = 10^{-4} \times (0.082 \times 600)^2$$

$$= 0.242\ atm^2$$

13. The ground state energy of hydrogen atom is – 13.6 eV. The energy of second excited state of He^+ ion in eV is:

हाइड्रोजन परमाणु की मूल अवस्था ऊर्जा – 13.6 eV है। He^+ आयन की द्वितीय उत्तेजित अवस्था की ऊर्जा eV में है।

(1) – 54.4 (2) – 27.2 (3) – 3.4 (4) – 6.04

A. 4

Question ID : 41652910458

Option 1 ID : 41652941290

Option 2 ID : 41652941291

Option 3 ID : 41652941292

Option 4 ID : 41652941293

sol. Energy in n^{th} state as per Bohr's model

$= -13.6\times Z^2/n^2$ eV

$\therefore$ 2^{nd} excited state

$\Rightarrow n = 3$

$\therefore E_{3,He^+} = -13.6 \times 2^2/3^2$ eV

$= -6.04$ eV

14. The number of 2-centre-2-electron and 3-centre-2-electron bonds in B_2H_6, respectively, are:

B_2H_6 में 2-केन्द्र– 2-इलेक्ट्रॉन तथा 3-केन्द्र –2- इलेक्ट्रॉन आंबधों की संख्या क्रमशः है

(1) 2 and 1 (2) 4 and 2 (3) 2 and 2 (4) 2 and 4

A. 2

Question ID : 41652910451

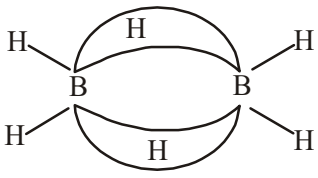
Option 1 ID : 41652941265

Option 2 ID : 41652941263

Option 3 ID : 41652941262

Option 4 ID : 41652941264

sol.

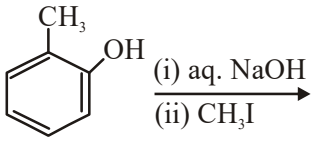


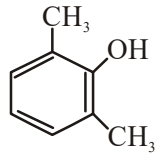
No. of 2-C-2-e^- bond = 4

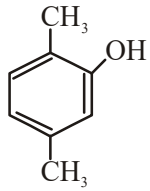
No. of 3-C-2-e^- bond = 2

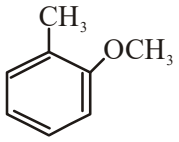
15. The major product of the following reaction is :

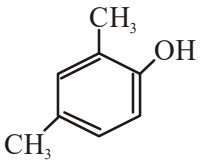
निम्न अभिक्रिया का मुख्य उत्पाद है



(1) 

(2) 

(3) 

(4) 

A. 3

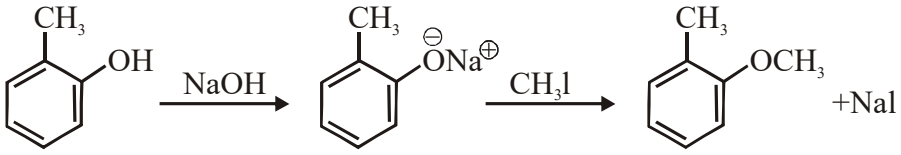
Question ID : 41652910440

Option 1 ID : 41652941218

Option 2 ID : 41652941220

Option 3 ID : 41652941221

Option 4 ID : 41652941219

sol. 

16. Elevation in the boiling point for 1 molal solution of glucose is 2 K. The depression in the freezing point of 2 molal solution of glucose in the same solvent is 2 K. The relation between K_b and K_f is :
ग्लूकोसा के 1 मोलल में विलयन क्वथनांक में उन्नयन 2K है। ग्लूकोस के उसी विलायक में 2 मोलल विलयन के हिमांक में अवनमन 2K है। K_b तथा K_f में संबंध है

(1) $K_b = 0.5\ K_f$ (2) $K_b = 2\ K_f$ (3) $K_b = 1.5\ K_f$ (4) $K_b = K_f$

A. 2

Question ID : 41652910461

Option 1 ID : 41652941303

Option 2 ID : 41652941305

Option 3 ID : 41652941302

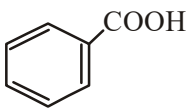
Option 4 ID : 41652941304

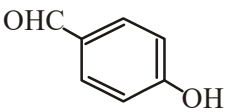
sol. $\Delta T_b = k_b m \Rightarrow k_b(1) = 2 \Rightarrow k_b = 2\ km^{-1}$

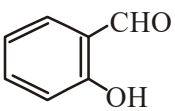
$\Delta T_f = k_f m \Rightarrow k_f(2) = 2 \Rightarrow k_f = 1\ km^{-1}$

$k_f = 0.5\ k_b \Rightarrow k_b = 2\ k_f$

17. An aromatic compound 'A' having molecular formula $C_7H_6O_2$ on treating with aqueous ammonia and heating forms compound 'B'. The compound 'B' on reaction iwth molecular bromine and potassium hydroxide provides compound 'C' having molecular formula C_6H_7N. The structure of 'A' is:
एक कार्बनिक यौगिक 'A' जिसका आण्विक सूत्र $C_7H_6O_2$ है, जलीय अमोनिया के साथ गर्म करने पर यौगिक 'B' बनाता है। यौगिक 'B' आण्विक ब्रोमीन तथा पोटेशियम हाइड्राक्साइड के साथ अभिक्रिया करके यौगिक 'C' देता है। जिसका आण्विक सूत्र C_6H_7N है। 'A' की संरचना है।

(1) 

(2) 

(3) 

(4)

A. 1

Question ID : 41652910441

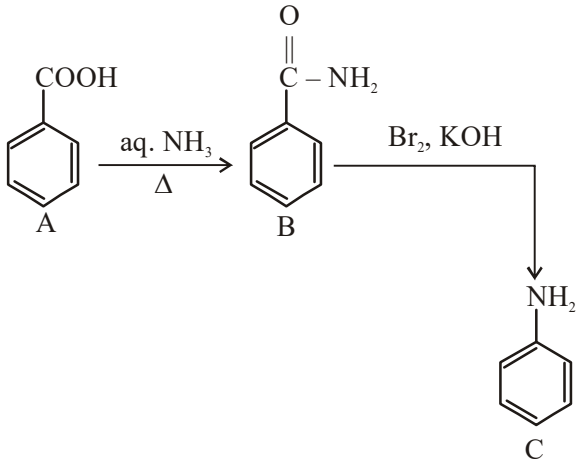
Option 1 ID : 41652941222

Option 2 ID : 41652941224

Option 3 ID : 41652941223

Option 4 ID : 41652941225

sol. $C_7H_6O_2$ – A



∴ A is Benzoic Acid

18. The electrolytes usually used in the electroplating of gold and silver, respectively, are :
सोना तथा चाँदी के वैद्युत लेपन में उपयोग होने वाले वैद्युत अपघट्य क्रमशः है

(1) $[Au(CN)_2]^-$ and $[Ag(CN)_2]^-$ (2) $[Au(CN)_2]^-$ and $[Ag(Cl_2]^-$

(3) $[Au(NH_3)_2]^+$ and $[Ag(CN)_2]^-$ (4) $[Au(OH)_4]^-$ and $[Ag(OH)_2]^-$

A. 1

Question ID : 41652910447

Option 1 ID : 41652941246

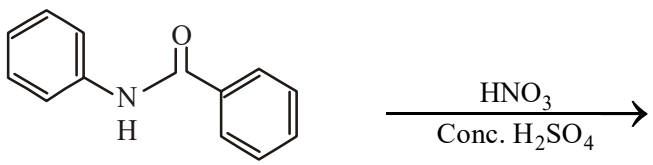
Option 2 ID : 41652941248

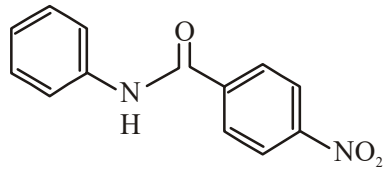
Option 3 ID : 41652941247

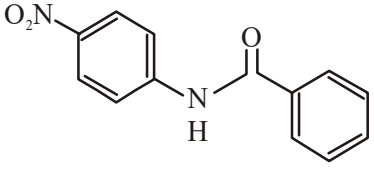
Option 4 ID : 41652941249

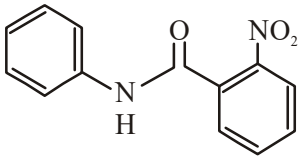
Sol. $[Au(CN)_2]^-$ and $[Ag(CN)_2]^-$ are used in the electroplating of Au and Ag respectively.

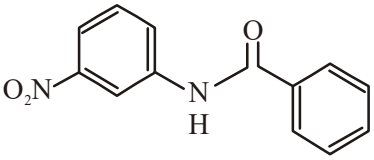
19. What will be the major product in the following mononitration reaction ?
निम्नलिखित मोनोनाइट्रेशन अभिक्रिया में कौन सा मुख्य उत्पाद होगा



(1) 

(2) 

(3) 

(4) 

A. 2

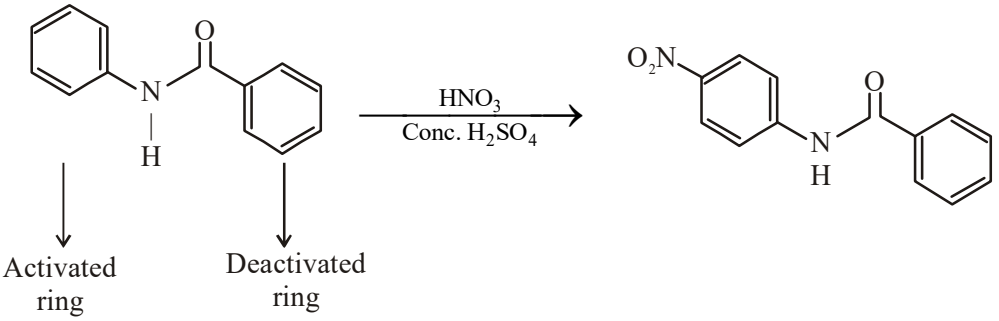
Question ID : 41652910437

Option 1 ID : 41652941208

Option 2 ID : 41652941209

Option 3 ID : 41652941207

Option 4 ID : 41652941206

sol. 

20. Which of the following tests cannot be used for identifying amino acids?

(1) Barfoed test (2) Biuret test (3) Ninhydrin test (4) Xanthoproteic test

ऐमीनो अम्लों को पहचानने के लिए निम्नलिखितम में से कौन से परीक्षण का उपयोग नहीं कर सकते है

(1) बार्फोड परीक्षण (2) बाइयूरेट परीक्षण (3) निनहाइड्रिन परिक्षण (4) जेन्थोप्रोइटीक परीक्षण

A. 1

Question ID : 41652910444

Option 1 ID : 41652941235

Option 2 ID : 41652941236

Option 3 ID : 41652941237

Option 4 ID : 41652941234

sol. Barfoed test is used for carbohydrate to check reducing nature of sugar.

21. Among the following reactions of hydrogen with halogens, the one that requires a catalyst is:

हैलोजन के साथ हाइड्रोजन की निम्नलिखित अभिक्रियाओं में से जिसमें एक उत्प्रेरक की आवश्यकता होती है वह है

(1) $H_2 + F_2 \rightarrow 2\ HF$ (2) $H_2 + I_2 \rightarrow 2\ HI$ (3) $H_2 + Br_2 \rightarrow 2\ HBr$ (4) $H_2 + Cl_2 \rightarrow 2\ HCl$

A. 2

Question ID : 41652910448

Option 1 ID : 41652941250

Option 2 ID : 41652941253

Option 3 ID : 41652941252

Option 4 ID : 41652941251

sol. Reaction of I_2 with H_2 requires catalyst. While all other halogens reacts with H_2 without catalyst.

22. The correct match between item 'I' and item 'II' is :

मदों 'I' तथा 'II' के मध्य सही सुमेल है

Item 'I'/मद'I' (Compound/योगिक)	Item 'II'/मद'II' (reagent/अभिकर्मक)
(A) Lysine/लाइसीन	(P) 1-naphthol/नैफ्थॉल
(B) Furfural/फरफ्यूरल	(Q) ninhydrin/निनहाइड्रिन
(C) Benzyl alcohol/बिन्जिल एल्कोहाल	(R) $KMnO_4$
(D) Styrene/स्टाइरीन	(S) Ceric ammonium nitrate/सेरिक अमोनियम नाइट्रेट

(1) (A) → (Q): (B) → (P); (C) → (S); (D) → (R)

(2) (A) → (Q): (B) → (P); (C) → (R); (D) → (S)

(3) (A) → (R): (B) → (P); (C) → (Q); (D) → (S)

(4) (A) → (Q): (B) → (R); (C) → (S); (D) → (P)

A. 1

Question ID : 41652910445

Option 1 ID : 41652941240

Option 2 ID : 41652941238

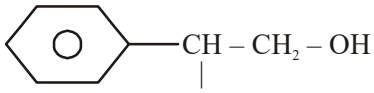
Option 3 ID : 41652941239

Option 4 ID : 41652941241

sol. Lysine (amino - acid) reacts with ninhydrin to give a coloured product (blue purple)

– In furfural test (to distinguish between glucose and fructose) dilute sugar solution is added to 1-naphthol (in alcohol) and conc. HCl.

– Benzyl alcohol is oxidised to aldedydes using ceric ammonium nitrate

Styrene is converted to  using $KMnO_4$

23. The process with negative entrophy change is :

(1) Sublimation of dry ice

(2) Dissolution of iodine in water

(3) Dissociation of $CaSO_4(s)$ into $CaO(s)$ and $SO_3(g)$

(4) Synthesis of ammonia from N_2 and H_2

ऋणात्मक एन्ट्रापी परिवर्तन वाला प्रक्रम है

(1) शुष्क बर्फ का ऊर्ध्वपातन

(2) आयोडीन का जल मे विलयन

(3) $CaSO_4(s)$ का $CaO(s)$ तथा $SO_3(g)$ में वियोजन

(4) N_2 तथा H_2 से अमोनिया का संश्लेषण

A. 4

Question ID : 41652910460

Option 1 ID : 41652941298

Option 2 ID : 41652941299

Option 3 ID : 41652941300

Option 4 ID : 41652941301

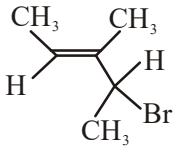
Sol. $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

$\Rightarrow$ Number of gaseous moles are decreasing

$\Rightarrow$ Change in entropy will be negative.

24. What is the IUPAC name of the following compound ?

निम्नलिखित यौगिक का IUPAC नाम क्या है



(1) 3-Bromo -3-methyl-1, 2-dimethylprop-1-ene

(2) 3-Bromo-1, 2-dimethylbut-1-ene

(3) 2-Bromo-3-methlpent-3-ene

(4) 4-Bromo-3-methylpent-2-ene

A. 4

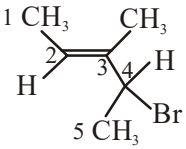
Question ID : 41652910436

Option 1 ID : 41652941202

Option 2 ID : 41652941203

Option 3 ID : 41652941205

Option 4 ID : 41652941204

sol. 

4-Bromo-3-methylpent-2-ene

25. A compound of formula A_2B_3 has the hcp lattice. Which atom forms the hcp lattice and what fraction of tetahedral voids is occupied by the other atoms:

A_2B_3 सूत्र वाले एक यौगिक में hcp जालक है। कौन सा परमाणु hcp जालक बनाता है तथा चतुष्फलकीय रिक्तियों का कौन सा अंश दुसरे परमाणु द्वारा अध्यासित होता है।

(1) hcp lattice/जालक - A, $\frac{2}{3}$ Tetrahedral voids//चतुष्फलकीय रिक्तिया - B

(2) hcp lattice/जालक - B, $\frac{1}{3}$ Tetrahedral voids/चतुष्फलकीय रिक्तियॉ - A

(3) hcp lattice/जालक - A, $\frac{1}{3}$ Tetrahedral voids/चतुष्फलकीय रिक्तियॉ - B

(4) hcp lattice/जालक - B, $\frac{2}{3}$ Tetrahedral voids/चतुष्फलकीय रिक्तियॉ - A

A. 2

Question ID : 41652910457

Option 1 ID : 41652941286

Option 2 ID : 41652941289

Option 3 ID : 41652941288

Option 4 ID : 41652941287

Sol. A_2B_3 can be written as $\Rightarrow A_4B_6$

H.C.P has Six atom so 'B' form

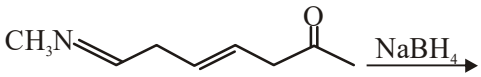
H.C.P lattice and A is present in void.

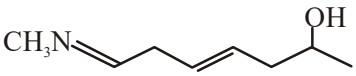
Total tetrahedral void = 12

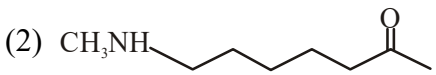
Fraction of tetrahedral void occupied by

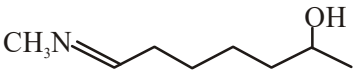
A = 4/12 = 1/3

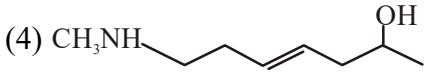
26. The major product of the following reaction is:
निम्नलिखित अभिक्रिया का मुख्य उत्पाद है



(1) 

(2) 

(3) 

(4) 

A. 4

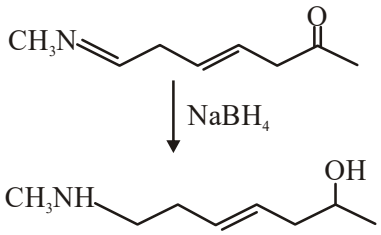
Question ID : 41652910438

Option 1 ID : 41652941212

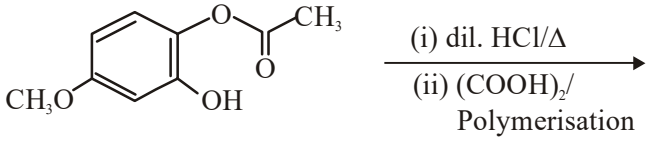
Option 2 ID : 41652941213

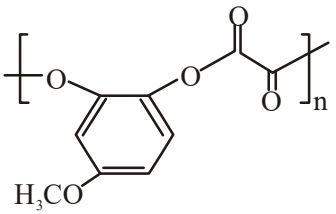
Option 3 ID : 41652941211

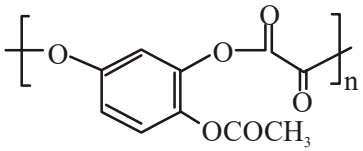
Option 4 ID : 41652941210

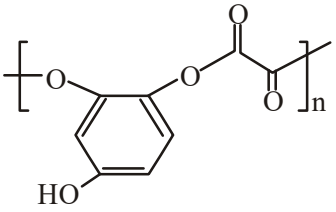
sol. 

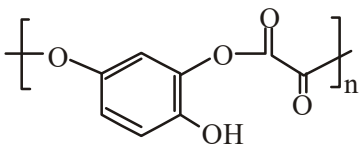
27. The major product of the following reaction is :
निम्नलिखित अभिक्रिया का मुख्य उत्पाद है



(1) 

(2) 

(3) 

(4) 

A. 1

Question ID : 41652910443

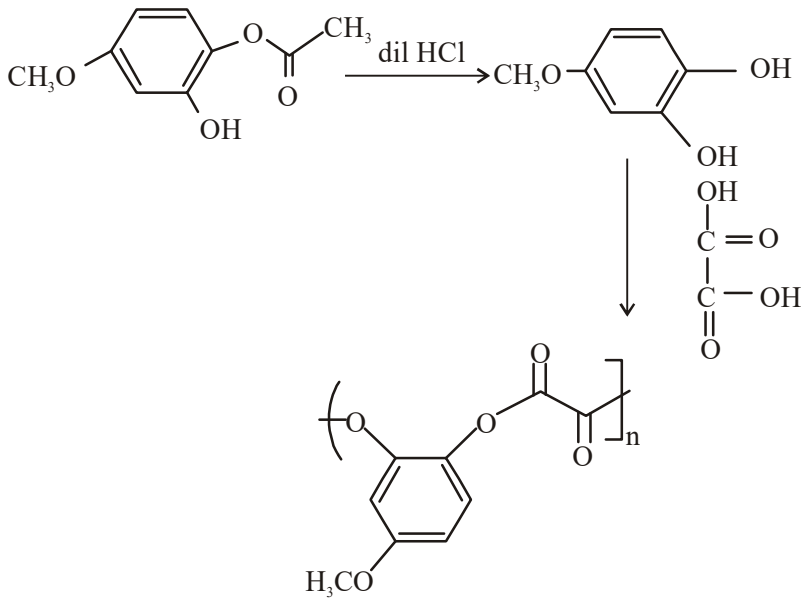
Option 1 ID : 41652941231

Option 2 ID : 41652941230

Option 3 ID : 41652941233

Option 4 ID : 41652941232

sol.



28. The amount of sugar ($C_{12}H_{22}O_{11}$) required to prepare 2L of its 0.1 M aqueous solution is:
शर्करा के दो लीटर 0.1 M जलीय विलयन को बनाने के लिए शर्करा ($C_{12}H_{22}O_{11}$) की आवश्यकता मात्रा है

(1) 34.2 g (2) 68.4 g (3) 136.8 g (4) 17.1 g

A. 2

Question ID : 41652910456

Option 1 ID : 41652941282

Option 2 ID : 41652941283

Option 3 ID : 41652941285

Option 4 ID : 41652941284

sol. $\text{Molarity} = \dfrac{\text{Mole of sugar}}{\text{Volume of solution(in L)}}$

$\Rightarrow 0.1 = \dfrac{\text{Mole of sugar}}{2\text{L}}$

Mole of sugar = 0.2 mol

Mass of sugar = Mole × Molar mass of sugar

= 0.2 × 342 = 68.4 g

29. An ideal gas undergoes isothermal compression from 5 m^3 to 1 m^3 against a constant external pressure of 4 Nm^{-2}. Heat released in this process is used to increase the temperature of 1 mole of Al. If molar heat capacity of Al is 24 J $mol^{-1}K^{-1}$, the temperature of Al increases by :

4Nm^{-2} के स्थिर बाह्य दाब के विरूद्व एक आदर्श गैस का समतापी संपीडन 5 m^3 से 1 m^3 तक किया जाता है। इस प्रक्रम में उत्सर्जित ऊष्मा का प्रयोग 1 मोल Al के ताप बढाने के लिए किया जाता है यदि Al की मोलर ऊष्मा धारिता 24 J mol^{-1} K^{-1}

है। तो A1 का ताप जितना बढता है वह है

(1) $\frac{3}{2}K$ (2) 1 K (3) $\frac{2}{3}K$ (4) 2K

A. 3

Question ID : 41652910459

Option 1 ID : 41652941297

Option 2 ID : 41652941294

Option 3 ID : 41652941295

Option 4 ID : 41652941296

sol. $w = -P_{ext}(V_f - V_i) = -4\ Nm^{-2}\ (1-5)m^3$

$= 16\ Nm \Rightarrow 16\ J$

For isothermal process

$\Delta U = q + w \Rightarrow q = -w = -16\ J$

$(\therefore \Delta U = 0$ for isothermal process)

From calorimetry

Heat given = $nc\Delta T$

$16 = \frac{1 \times 24J \times \Delta T}{mol\ K}$

$\Delta T = \frac{2}{3}K$

30. For an elementary chemical reaction, $A_2 \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} 2A$, the expression for $\frac{d[A]}{dt}$ is:

एक सरल/प्रारम्भिक रासायनिक अभिक्रिया $A_2 \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} 2A$, के लिए व्यंजक $\frac{d[A]}{dt}$ है।

(1) $k_1[A_2] + k_{-1}[A]^2$ (2) $k_1[A_2] - k_{-1}[A]^2$ (3) $2k_1[A_2] - k_{-1}[A]^2$ (4) $2k_1[A_2] - 2k_{-1}[A]^2$

A. 4

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sol. $A_2 \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} 2A$

$-\frac{1}{2}\frac{d[A]}{dt} = k_{-1}[A]^2 - k_1[A_2]$

$\frac{d[A]}{dt} = -2k_{-1}[A]^2 + 2k_1[A_2]$

$$\Rightarrow \frac{d[A]}{dt} = 2k_1[A_2] - 2k_{-1}[A]^2$$