JEE-Main-26-07-2022-Shift-2 (Memory Based)

Chemistry

Question: Which of the following undergoes Vulcanization?
Options:
(a) Neoprene and sulphur
(b) Isoprene and sulphur
(c) Neoprene and styrene
(d) Isoprene and styrene
Answer: (b)
Solution: Vulcanization process consists of heating a mixture of natural rubber (Isoprene) with sulphur and an appropriate additive at a temperature range between 373 K to 415 K

Question: Correct order of covalent character of the following compound.
CaF_2, $CaBr_2$, $CaCl_2$, CaI_2
Options:
(a) $CaF_2 > CaBr_2 > CaCl_2 > CaI_2$
(b) $CaI_2 > CaBr_2 > CaCl_2 > CaF_2$
(c) $CaCl_2 > CaBr_2 > CaF_2 > CaI_2$
(d) $CaBr_2 > CaF_2 > CaCl_2 > CaI_2$
Answer: (b)
Solution: Cation is same in all the given compounds, while anions are different.
According to Fajan's rule, the larger the size of the anion, greater is the covalent character of the bond.
Therefore, correct order of covalent character is
$CaI_2 > CaBr_2 > CaCl_2 > CaF_2$

Question: Which of the following is not extracted from its sulphide ore?
Options:
(a) Aluminium
(b) Zinc
(c) Copper
(d) None of these
Answer: (a)
Solution: Aluminium is extracted from its oxide ore (Bauxite) by electrolysis

Question: Which of the following is other name of animal starch?
Options:
(a) Amylose
(b) Amylopectin
(c) Glycogen
(d) Maltose
Answer: (c)

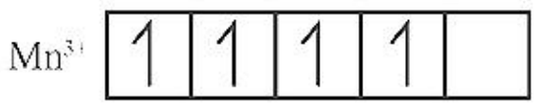
Solution: Glycogen is the other name of animal starch.

Question: 0.34 percent iron by mass in hemoglobin find number of particles of iron in 3.3 g of hemoglobin.
Options:
(a) 2×10^{-4}
(b) 4×10^{-3}
(c) 2×10^{-2}
(d) 2
Answer: (a)
Solution: 0.34% iron by mass in hemoglobin
Weight of hemoglobin = 3.3 g

$$\text{Mass of Fe in 3.3 g hemoglobin} = \frac{0.34}{100} \times 33 = 0.01122 \text{ g}$$

$$\text{Number of particles of Fe atom} = \frac{0.01122}{56} = 0.000200 = 2 \times 10^{-4}$$

Question: MnF_4, MnF_3, MnF_2 find magnetic moment of strongest oxidising agent.
Options:
(a) $2\sqrt{6}$
(b) $\sqrt{15}$
(c) $2\sqrt{2}$
(d) $\sqrt{35}$
Answer: (a)
Solution: Among MnF_4, MnF_3, MnF_2
MnF_3 is the strongest oxidizing agent
Mn^{3-} - Electronic configuration $3d^4$



n = 4

$$\mu = \sqrt{n(n+2)} = \sqrt{4(4+2)} = \sqrt{24} = 2\sqrt{6}$$

Question: Which of the following has least melting point nearest to a metalloid?
Options:
(a) Al
(b) Ga
(c) Se
(d) B
Answer: (b)
Solution: Ga has the least melting point and B has the highest Melting point among the given elements.

Question: Assertion: LiF insoluble in water
Reason: LiF has low hydration enthalpy

Options:
(a) Both assertion and reason are true, reason is correct explanation of assertion
(b) Both assertion and reason are true, but reason is not a correct explanation of the assertion.
(c) Assertion is true, but reason is false.
(d) Assertion is false, but reason is true
Answer: (c)
Solution: The low solubility of LiF in water is due to its high lattice enthalpy
The hydration enthalpies of alkali metal ions decrease with increase in ionic sizes.
$Lc^+ > Na^+ > K^+ > Rb^+ > Cs^+$

Question: Match the following.

Column-I	Column-II
(A) Micro organisms	(i) Strip mining
(B) Plants nutrients	(ii) Domestic sewage
(C) Toxic Heavy metals	(iii) Chemical fertilizers
(D) Sediment	(iv) Chemical industry

Options:
(a) A → (i); B → (iv); C → (iii); D → (ii)
(b) A → (ii); B → (iii); C → (iv); D → (i)
(c) A → (iii); B → (ii); C → (i); D → (iv)
(d) A → (iv); B → (i); C → (iii); D → (ii)
Answer: (b)
Solution:
(A) Micro organisms ⇒ Domestic sewage
(B) Plants nutrients ⇒ Chemical fertilizers
(C) Toxic Heavy metals ⇒ Chemical industry
(D) Sediment ⇒ Strip mining

Question: Which of the following are broad spectrum antibiotic?
Options:
(a) Penicillin
(b) Salvarsan
(c) Furacine
(d) Chloramphenicol
Answer: (d)
Solution: Chloramphenicol is broad spectrum antibiotic

Question: 100 ml of CH_3CH_2MgBr react with methanol to produce a gas of 2.24ml. The mass of the gas produced is
Options:
(a) 0.003 g
(b) 30 g
(c) 0.03 g
(d) 3 g
Answer: (a)
Solution:

$$CH_3OH + CH_3CH_2MgBr \rightarrow \underset{2.24\,mL}{CH_3} - CH_3 + CH_3OMgBr$$

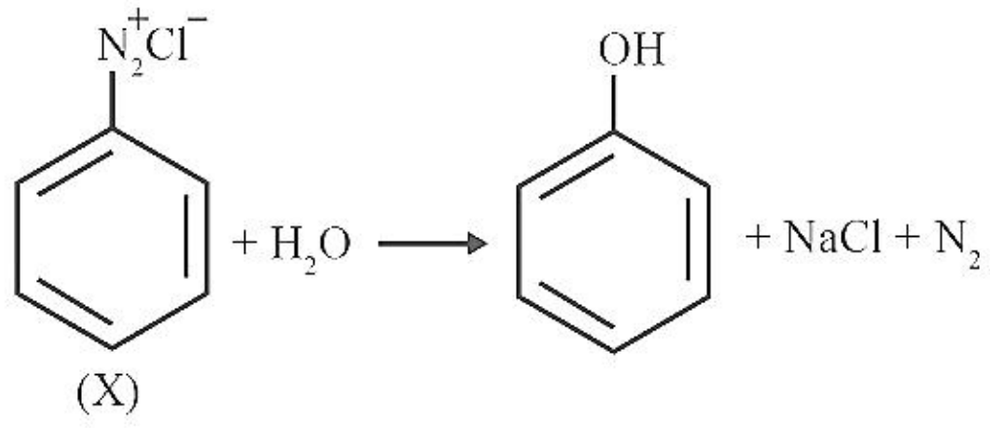
Gas formed is ethane

Number of moles of ethane formed $= \frac{2.24}{22400} = 0.0001$ mole

Mass of ethane produced $= 0.0001 \times 30 = \frac{30}{10000} = 0.003$ g

Question: Assertion: Boric acid is a weak acid.
Reason: It is not able to release H^+ on its own. It receives OH^- ion from water molecule to complete its octet and in turn releases H^- ions
Options:
(a) Both assertion and reason are true, reason is correct explanation of assertion
(b) Both assertion and reason are true, but reason is not a correct explanation of the assertion.
(c) Assertion is true, but reason is false.
(d) Assertion is false, but reason is true
Answer: (a)
Solution: Boric acid is a weak acid because it does not completely ionize in water or other aqueous solution. It is not able to release H^+ ions on its own because firstly it receives hydroxide ions (OH^-) from water molecule in order to complete its octet and then it releases H^+ ions.
Therefore, both the assertion and reason are true.

Question: Hydrolysis of X gives carbolic acid. Identify X
Options:
(a) Nitrobenzene
(b) Benzene diazonium chloride
(c) Benzene
(d) Benzyl chloride
Answer: (b)
Solution:

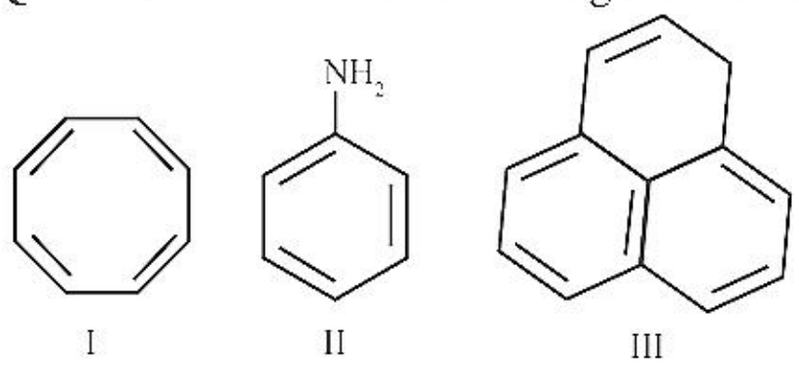


(X)

Question: Assertion: Phenolphthalein is a pH based indicator it is colourless in acidic solution and shows colour in basic solution.
Reason: Phenolphthalein is a weak base which do not dissociate.
Options:
(a) Both assertion and reason are true, reason is correct explanation of assertion
(b) Both assertion and reason are true, but reason is not a correct explanation of the assertion

(c) Assertion is true, but reason is false
(d) Assertion is false, but reason is true
Answer: (c)
Solution: Phenolphthalein is colorless in acidic solution and shows pink color in basic solution. Phenolphthalein is a weak acid which dissociates in water.

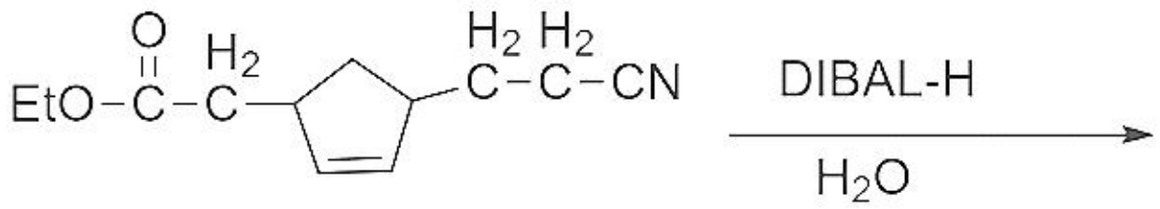
Question: Which of the following is not a benzenoid structure?



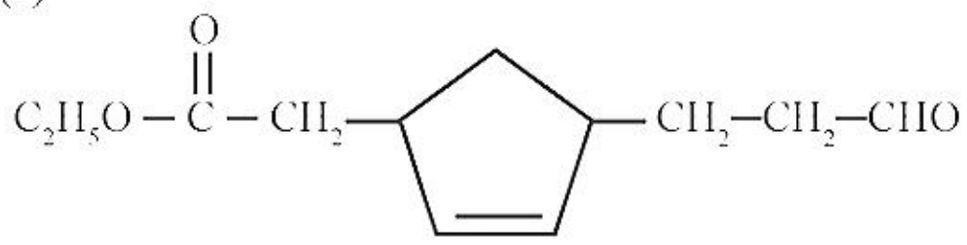
I II III

Options:
(a) I
(b) II
(c) III
(d) II and III
Answer: (a)
Solution: The compound which contains atleast 1 benzene ring in it is called benzenoid structure.

Question:

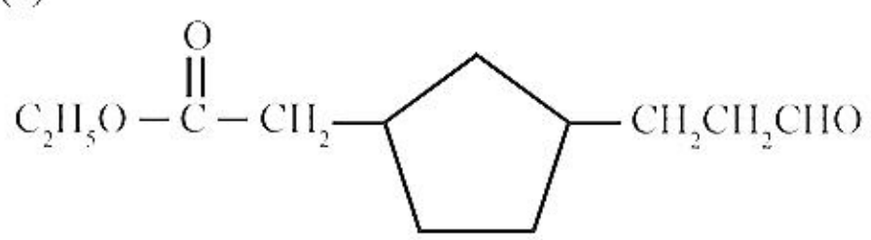


Options:
(a)

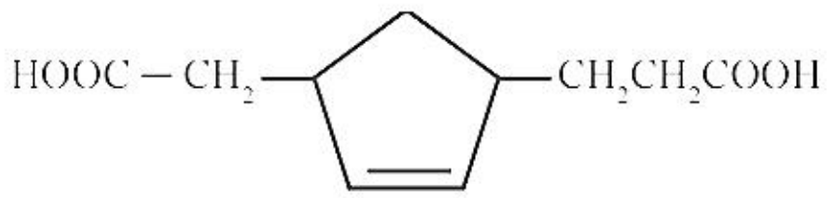


(b)

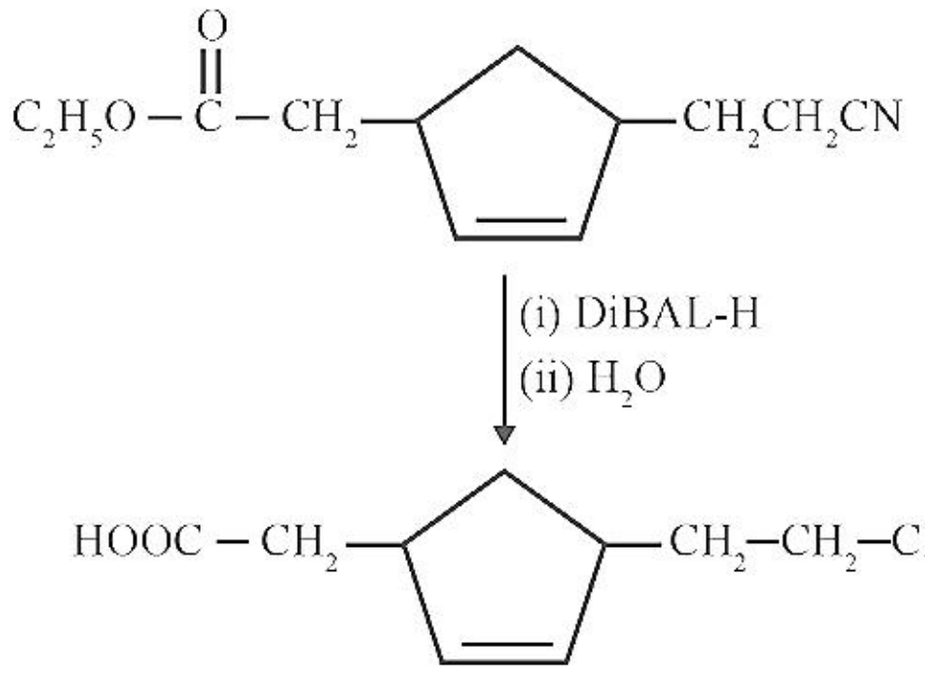
(c)



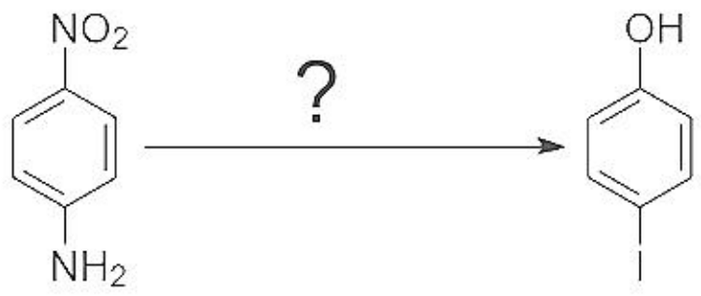
(d)



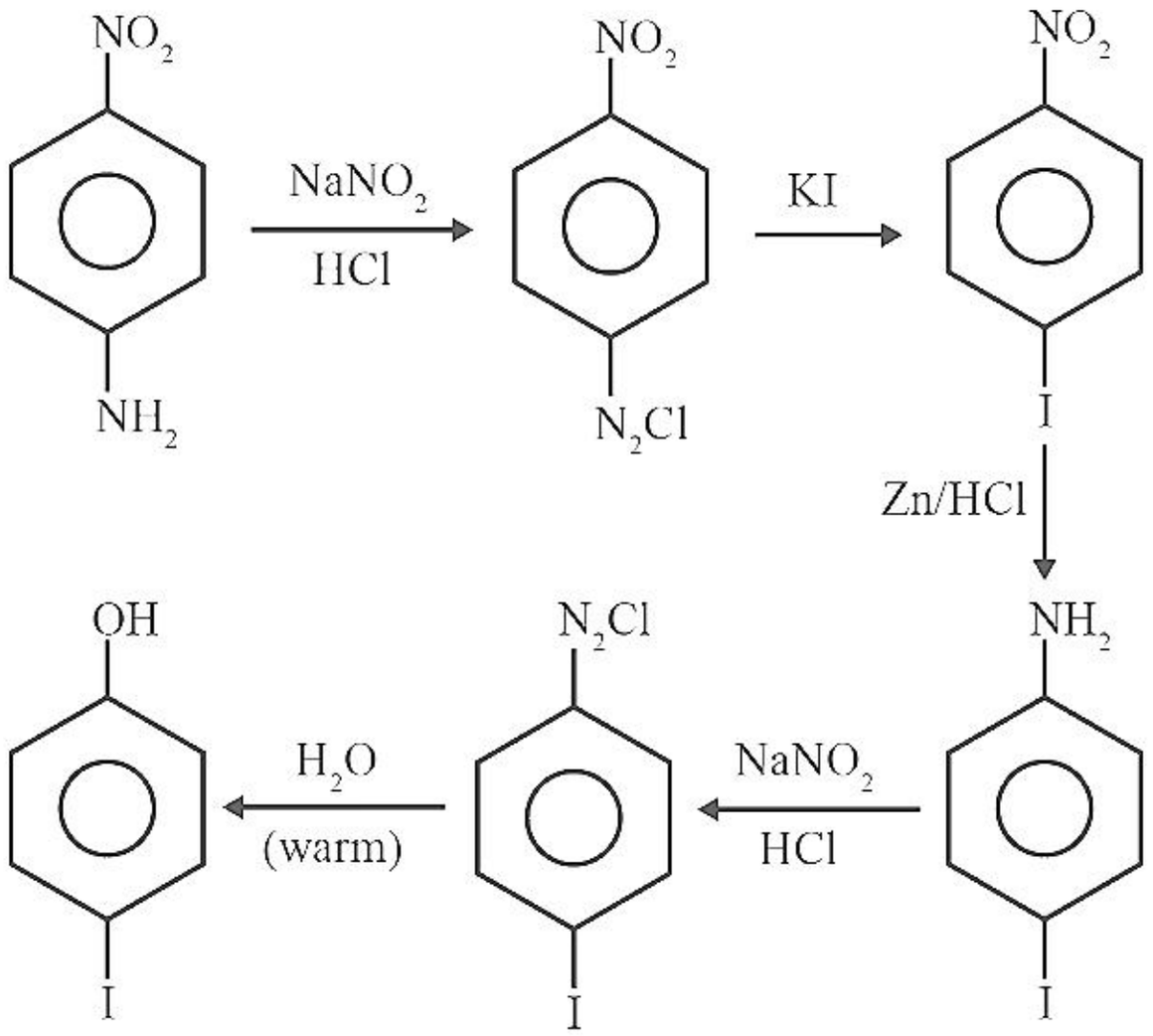
Answer: (b)
Solution:



Question:



Options:
(a) $NaNO_2$ + HCl, KI, Zn/HCl, $NaNO_2$ + HCl, H_2O (warm)
(b) $NaNO_2$ + HCl, H_2O (warm), Zn/HCl, $NaNO_2$ + HCl, KI
(c) $NaNO_2$ + HCl, Zn/HCl, H_2O (warm), $NaNO_2$ + HCl, KI
(d) Zn/HCl, $NaNO_2$ + HCl, H_2O (warm), $NaNO_2$ + HCl, KI
Answer: (a)
Solution:



Question: $CH_3COOH + PCl_3 \rightarrow A$

$A + PCl_3 \rightarrow B$

No of ionisable H^+ in B is

Answer: 2.00

Solution:

$$CH_3COOH + PCl_3 \rightarrow 3CH_3COCl + \underset{(A)}{H_3PO_3}$$

$$\underset{(A)}{H_3PO_3} + + PCl_3 + 2H_2O \rightarrow \underset{(B)}{H_4P_2O_5} + 3HCl$$

Number of ionisable hydrogens in $H_4P_2O_5$ is 2

Question: ΔT_b of 1 molal solution is 3K, ΔT_f of 2 molal solution is 6K. Find K_b/k_f =?

Answer: 1.00

Solution:

$\Delta T_b = 3$ K, $m_b = 1$ molal

$\Delta T_f = 6$ K, $m_f = 2$ molal

$\Delta T_b = K_b m_b$ ..... (1)

$\Delta T_f = K_f m_f$ ..... (2)

Dividing eq. (1) and (2)

$$\frac{K_b}{K_f} = \frac{\Delta T_b}{\Delta T_f} \times \frac{m_f}{m_b}$$

$$= \frac{3}{6} \times \frac{2}{1} = 1$$

Question: $t_{1/2}$ of reaction is 200 sec, find the time taken for 80 percent completion of reaction (Round off to nearest integer)

Answer: 464.00
Solution: $t_{1/2} = 200$ scc

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

$$k = \frac{0.693}{200} s^{-1}$$

$$k = \frac{2.303}{t} \log \frac{[R]_o}{[R]}$$

$$\frac{0.693}{200} = \frac{2.303}{t} \log \frac{100}{100-80}$$

$$\frac{0.693}{200} = \frac{2.303}{t} \log \frac{100}{20}$$

$t = 463.9 \approx 464.00$ scc

Question: Number of compounds including stereoisomers formed on monochlorination of cyclohexane
Answer: 1.00
Solution: Only one compound including stereoisomers is formed by monochlorination of cyclohexane as all the carbon atoms are exactly same.

Question: How many of the following are diamagnetic species?
I. $K_3[Fe(F_6)]$
II. $K_4[Fe(CN_6)]$
III. $K_3[Cu(CN)_4]$
IV. $K_2[Cu(CN)_4]$
Answer: 2.00
Solution:
$K_4[Fe(CN_6)]$ is diamagnetic
$K_3[Cu(CN)_4]$ is diamagnetic
$K_2[Cu(CN)_4]$ is paramagnetic as it has one unpaired electron
$K_3[Fe(F_6)]$ is paramagnetic as it has 5 unpaired electrons.
Therefore, only 2 compounds $K_4[Fe(CN_6)]$ and $K_3[Cu(CN)_4]$ are diamagnetic