

SECTION-A

1. Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R :

Assertion A : Size of Bk^{3+} ion is less than Np^{3+} ion.

Reason R : The above is a consequence of the lanthanoid contraction.

In the light of the above statements, choose the correct answer from the options given below :

- (1) A is false but R is true
- (2) Both A and R are true but R is not the correct explanation of A
- (3) Both A and R are true and R is the correct explanation of A
- (4) A is true but R is false

Official Ans. by NTA (3)

Official Ans. by ALLEN (4)

- Sol.** Size of ${}_{97}Bk^{3+}$ ion is less than that of ${}_{93}Np^{3+}$ due to actinoid contraction.

As we know that in a period from left to right ionic radius decreases and in actinide series it is due to actinoid contraction.

2. Which among the following pairs of Vitamins is stored in our body relatively for longer duration ?

- (1) Thiamine and Vitamin A
- (2) Vitamin A and Vitamin D
- (3) Thiamine and Ascorbic acid
- (4) Ascorbic acid and Vitamin D

Official Ans. by NTA (2)

- Sol.** Vitamin-A & Vitamin-D

3. Given below are two statements :

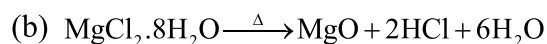
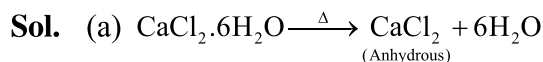
Statement I : Both $CaCl_2 \cdot 6H_2O$ and $MgCl_2 \cdot 8H_2O$ undergo dehydration on heating.

Statement II : BeO is amphoteric whereas the oxides of other elements in the same group are acidic.

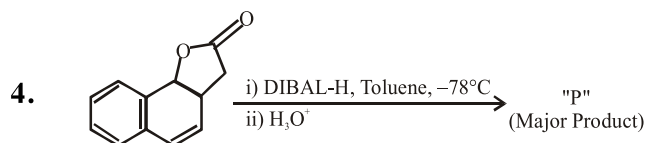
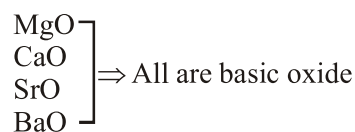
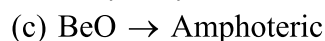
In the light of the above statements, choose the correct answer from the options given below :

- (1) Statement I is false but statement II is true
- (2) Both statement I and statement II are false
- (3) Both statement I and statement II are true
- (4) Statement I is true but statement II is false

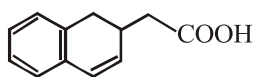
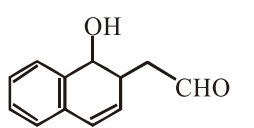
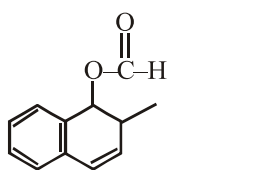
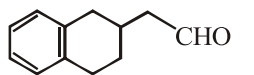
Official Ans. by NTA (2)



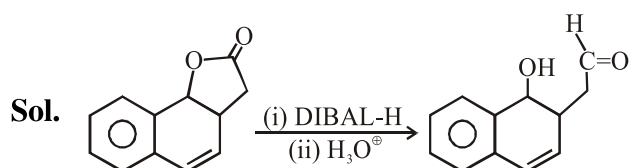
The dehydration of hydrated chloride of calcium can be achieved. The corresponding hydrated chloride of magnesium on heating suffer hydrolysis.



The product "P" in the above reaction is :

- (1) 
- (2) 
- (3) 
- (4) 

Official Ans. by NTA (2)



DIBAL can not reduce double bond
It can reduce cyclic ester.

5. Match List-I with List-II :

List-I	List-II
Industrial process	Application
(a) Haber's process	(i) HNO ₃ synthesis
(b) Ostwald's process	(ii) Aluminium extraction
(c) Contact process	(iii) NH ₃ synthesis
(d) Hall-Heroult process	(iv) H ₂ SO ₄ synthesis

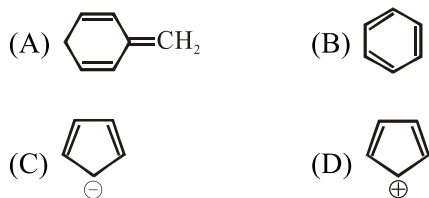
Choose the correct answer from the options given below :

- (1) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
 (2) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
 (3) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
 (4) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

Official Ans. by NTA (3)

- Sol.** (a) Haber's process is used for NH₃ synthesis.
 (b) Ostwald's process is used for HNO₃ synthesis.
 (c) Contact process is used for H₂SO₄ synthesis.
 (d) In Hall-Heroult process, electrolytic reduction of impure alumina can be done. (Aluminium extraction)

6. Among the following, the aromatic compounds are :

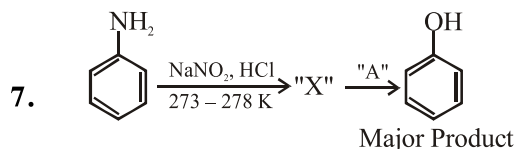


Choose the correct answer from the following options :

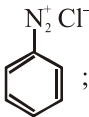
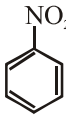
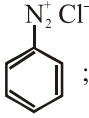
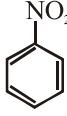
- (1) (A) and (B) only
 (2) (B) and (C) only
 (3) (B), (C) and (D) only
 (4) (A), (B) and (C) only

Official Ans. by NTA (2)

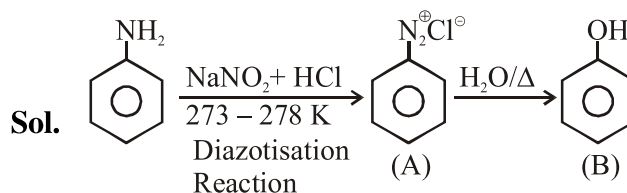
- Sol.** (A) Non-Aromatic (B) Aromatic
 (C) Aromatic (D) Anti-Aromatic



In the above chemical reaction, intermediate "X" and reagent/condition "A" are :

- (1) X-  ; A- H₂O/NaOH
 (2) X-  ; A- H₂O/Δ
 (3) X-  ; A- H₂O/Δ
 (4) X-  ; A- H₂O/NaOH

Official Ans. by NTA (3)



8. Given below are two statements :

Statement I : The E° value of Ce⁴⁺ / Ce³⁺ is + 1.74 V.

Statement II : Ce is more stable in Ce⁴⁺ state than Ce³⁺ state.

In the light of the above statements, choose the most appropriate answer from the options given below :

- (1) Both statement I and statement II are correct
 (2) Statement I is incorrect but statement II is correct
 (3) Both statement I and statement II are incorrect
 (4) Statement I is correct but statement II is incorrect

Official Ans. by NTA (4)

Sol. The E° value for Ce^{4+}/Ce^{3+} is +1.74 V because the most stable oxidation state of lanthanide series elements is +3. It means Ce^{3+} is more stable than Ce^{4+} .

9. The functions of antihistamine are :

- (1) Antiallergic and Analgesic
- (2) Antacid and antiallergic
- (3) Analgesic and antacid
- (4) Antiallergic and antidepressant

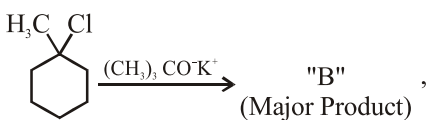
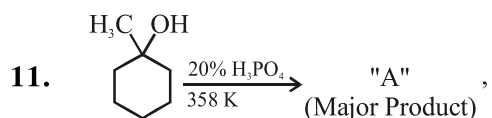
Official Ans. by NTA (2)

10. Which of the following is Lindlar catalyst ?

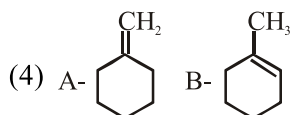
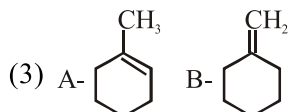
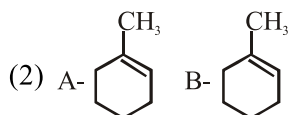
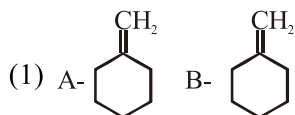
- (1) Zinc chloride and HCl
- (2) Cold dilute solution of $KMnO_4$
- (3) Sodium and Liquid NH_3
- (4) Partially deactivated palladised charcoal

Official Ans. by NTA (4)

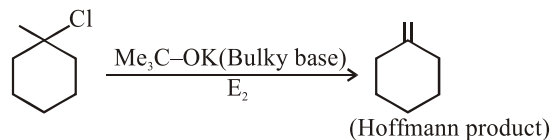
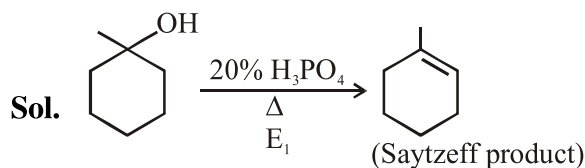
Sol. Partially deactivated palladised charcoal ($H_2/pd/CaCO_3$) is lindlar catalyst.



The product "A" and "B" formed in above reactions are :



Official Ans. by NTA (3)



12. Given below are two statements :

Statement I : H_2O_2 can act as both oxidising and reducing agent in basic medium.

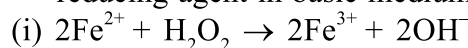
Statement II : In the hydrogen economy, the energy is transmitted in the form of dihydrogen.

In the light of the above statements, choose the correct answer from the options given below :

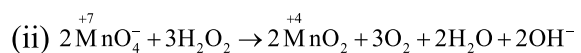
- (1) Both statement I and statement II are false
- (2) Both statement I and statement II are true
- (3) Statement I is true but statement II is false
- (4) Statement I is false but statement II is true

Official Ans. by NTA (2)

Sol. (a) H_2O_2 can acts as both oxidising and reducing agent in basic medium.



In this reaction, H_2O_2 acts as oxidising agent.



In this reaction, H_2O_2 acts as reducing agent.

(b) The basic principle of hydrogen economy is the transportation and storage of energy in the form of liquids or gaseous dihydrogen.

Advantage of hydrogen economy is that energy is transmitted in the form of dihydrogen and not as electric power

13. The type of pollution that gets increased during the day time and in the presence of O_3 is :

- (1) Reducing smog
- (2) Oxidising smog
- (3) Global warming
- (4) Acid rain

Official Ans. by NTA (2)

Sol. In presence of ozone(O_3), oxidising smog gets increased during the day time because automobiles and factories produce main components of the photochemical smog (oxidising smog) results from the action of sunlight on unsaturated hydrocarbon and nitrogen oxide.

Ozone is strong oxidising agent and can react with the unburnt hydrocarbons in the polluted air to produce chemicals.

14. Assertion A : Enol form of acetone $[\text{CH}_3\text{COCH}_3]$ exists in $< 0.1\%$ quantity. However, the enol form of acetyl acetone $[\text{CH}_3\text{COCH}_2\text{OCCH}_3]$ exists in approximately 15% quantity.

Reason R : enol form of acetyl acetone is stabilized by intramolecular hydrogen bonding, which is not possible in enol form of acetone.

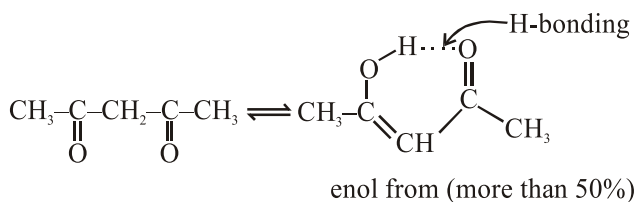
Choose the correct statement :

- (1) A is false but R is true
- (2) Both A and R are true and R is the correct explanation of A
- (3) Both A and R are true but R is not the correct explanation of A
- (4) A is true but R is false

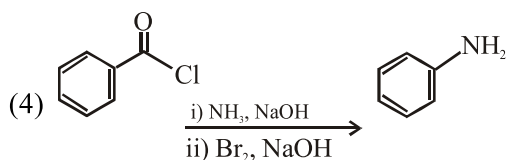
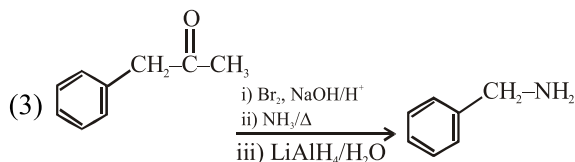
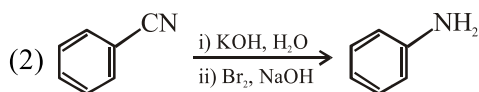
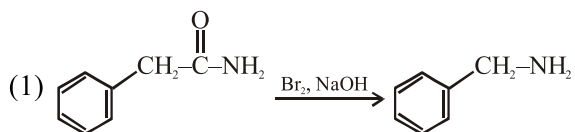
Official Ans. by NTA (2)

Sol.
$$\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3 \rightleftharpoons \text{CH}_2=\overset{\text{OH}}{\text{C}}-\text{CH}_3$$

(Keto form) (enol form)
enol form of acetone is very less ($< 0.1\%$)

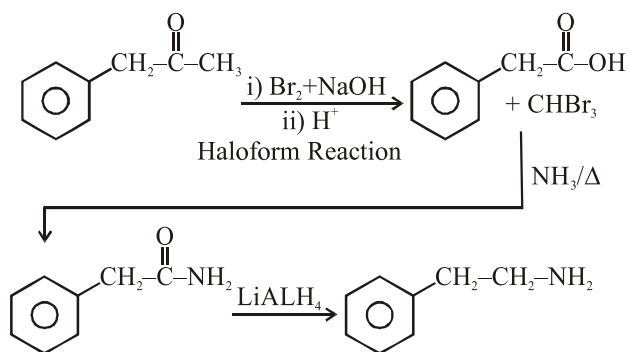


15. Which of the following reaction DOES NOT involve Hoffmann Bromamide degradation ?



Official Ans. by NTA (3)

Sol.



\Rightarrow This reaction does not involve haffmann bromamide degradation.

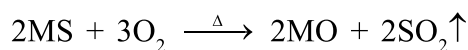
\Rightarrow Rest all options involve haffmann bromamide degradation during the reaction of $\text{Br}_2 + \text{NaOH}$ with amide.

16. The process that involves the removal of sulphur from the ores is :

- (1) Smelting
- (2) Roasting
- (3) Leaching
- (4) Refining

Official Ans. by NTA (2)

Sol. In roasting process, metal sulphide (MS) ore are converted into metal oxide and sulphur is remove in the form of SO_2 gas.



17. Match List-I with List-II :

List-I

List-II

Name of oxo acid

Oxidation state of 'P'

- | | |
|---------------------------|----------|
| (a) Hypophosphorous acid | (i) +5 |
| (b) Orthophosphoric acid | (ii) +4 |
| (c) Hypophosphoric acid | (iii) +3 |
| (d) Orthophosphorous acid | (iv) +2 |
| | (v) +1 |

Choose the correct answer from the options given below :

- (1) (a)-(v), (b)-(i), (c)-(ii), (d)-(iii)
- (2) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
- (3) (a)-(iv), (b)-(v), (c)-(ii), (d)-(iii)
- (4) (a)-(v), (b)-(iv), (c)-(ii), (d)-(iii)

Official Ans. by NTA (1)

