

1. A sample of NaClO_3 is converted by heat to NaCl with a loss of 0.16 g of oxygen. The residue is dissolved in water and precipitated as AgCl . The mass of AgCl (in g) obtained will be : (Given : Molar mass of $\text{AgCl} = 143.5 \text{ g mol}^{-1}$)

- A. 0.35
- B. 0.41
- C. 0.48
- D. 0.54

2. Which of the following arrangements shows the schematic alignment of magnetic moments of antiferromagnetic substance?

- A. $\uparrow \uparrow \uparrow \uparrow \uparrow \uparrow$
- B. $\uparrow \downarrow \downarrow \downarrow \downarrow \uparrow$
- C. $\uparrow \downarrow \uparrow \downarrow \uparrow \downarrow$
- D. $\uparrow \uparrow \downarrow \uparrow \uparrow \downarrow$

3. The minimum volume of water required to dissolve 0.1 g lead(II) chloride to get a saturated solution (K_{sp} of $\text{PbCl}_2 = 3.2 \times 10^{-8}$; atomic mass of $\text{Pb} = 207 \text{ u}$) is :

- A. 0.36 L
- B. 17.98 L
- C. 0.18 L
- D. 1.798 L

4. In which of the following reactions, an increase in the volume of the container will favor the formation of products?

- A. $2\text{NO}_2(\text{g}) \rightleftharpoons 2\text{NO}(\text{g}) + \text{O}_2(\text{g})$
- B. $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2\text{HI}(\text{g})$
- C. $4\text{NH}_3(\text{g}) + 5\text{O}_2(\text{g}) \rightleftharpoons 4\text{NO}(\text{g}) + 6\text{H}_2\text{O}(\text{l})$
- D. $3\text{O}_2(\text{g}) \rightleftharpoons 2\text{O}_3(\text{g})$

5. When an electric current is passed through acidified water, 112 mL of hydrogen gas at N.T.P. was collected at the cathode in 965 seconds. The current passed, in ampere, is :

- A. 1.0
- B. 0.5
- C. 0.1
- D. 2.0

6. N_2O_5 decomposes to NO_2 and O_2 and follows first order kinetics. After 50 minutes, the pressure inside the vessel increases from 50 mmHg to 87.5 mmHg. The pressure of the gaseous mixture after 100 minutes at constant temperature will be :

- A. 175.0 mmHg
- B. 116.25 mmHg
- C. 136.25 mmHg
- D. 106.25 mmHg

7. For which of the following reactions, ΔH is equal to ΔU ?

- A. $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$
- B. $2HI(g) \rightarrow H_2(g) + I_2(g)$
- C. $2NO_2(g) \rightarrow N_2O_4(g)$
- D. $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$

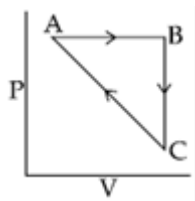
8. Which of the following statements about colloids is False?

- A. Freezing point of colloidal solution is lower than true solution at same concentration of a solute.
- B. Colloidal particles can pass through ordinary filter paper.
- C. When silver nitrate solution is added to potassium iodide solution, a negatively charged colloidal solution is formed.
- D. When excess of electrolyte is added to colloidal solution, colloidal particle will be precipitated.

9. Ejection of the photoelectron from metal in the photoelectric effect experiment can be stopped by applying 0.5 V when the radiation of 250 nm is used. The work function of the metal is :

- A. 4 eV
- B. 4.5 eV
- C. 5 eV
- D. 5.5 eV

10. An ideal gas undergoes a cyclic process as shown in Figure.



$$\Delta U_{BC} = -5 \text{ kJ mol}^{-1}, q_{AB} = 2 \text{ kJ mol}^{-1}$$

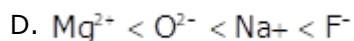
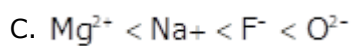
$$W_{AB} = -5 \text{ kJ mol}^{-1}, W_{CA} = 3 \text{ kJ mol}^{-1}$$

Heat absorbed by the system during process CA is :

- A. -5 kJ mol^{-1}
- B. $+5 \text{ kJ mol}^{-1}$
- C. 18 kJ mol^{-1}
- D. -18 kJ mol^{-1}

11. For Na^+, Mg^{2+}, F^- and O^{2-} ; the correct order of increasing ionic radii is :

- A. $O^{2-} < F^- < Na^+ < Mg^{2+}$
- B. $Na^+ < Mg^{2+} < F^- < O^{2-}$



12. In the molecular orbital diagram for the molecular ion, N_2^+ , the number of electrons in the σ_{2p} molecular orbital is :

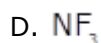
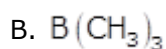
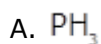
A. 0

B. 1

C. 2

D. 3

13. Which of the following is a Lewis acid?



14. In graphite and diamond, the percentage of p-characters of the hybrid orbitals in hybridisation are respectively :

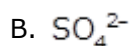
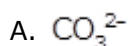
A. 33 and 25

B. 33 and 75

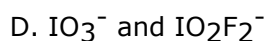
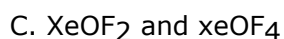
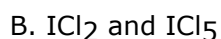
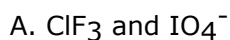
C. 50 and 75

D. 67 and 75

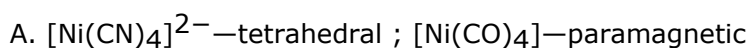
15. A white sodium salt dissolves readily in water to give a solution which is neutral to litmus. When silver nitrate solution is added to the aforementioned solution, a white precipitate is obtained which does not dissolve in dil. nitric acid. The anion is :



16. Identify the pair in which the geometry of the species is T-shape and square pyramidal, respectively :



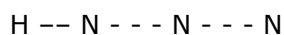
17. The correct combination is :



C. $[\text{NiCl}_4]^{2-}$ —square-planar ; $[\text{Ni}(\text{CN})_4]^{2-}$ —paramagnetic

D. $[\text{NiCl}_4]^{2-}$ —diamagnetic ; $[\text{Ni}(\text{CO})_4]$ —square-planar

18.(I) (II)



In hydrogen azide (above) the bond orders of bonds (I) and (II) are :

A. (I)<2, (II)>2

B. (I)>2, (II)<2

C. (I)>2, (II)>2

D. (I)<2, (II)<2

19.The decreasing order of bond angles in BF_3 , NH_3 , PF_3 and I_3^- is :

A. $\text{I}_3^- > \text{NH}_3 > \text{PF}_3 > \text{BF}_3$

B. $\text{I}_3^- > \text{BF}_3 > \text{NH}_3 > \text{PF}_3$

C. $\text{BF}_3 > \text{I}_3^- > \text{PF}_3 > \text{NH}_3$

D. $\text{BF}_3 > \text{NH}_3 > \text{PF}_3 > \text{I}_3^-$

20.Xenon hexafluoride on partial hydrolysis produces compounds 'X' and 'Y'. Compounds 'X' and 'Y' and the oxidation state of Xe are respectively :

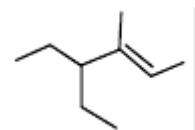
A. $\text{XeO}_2(+4)$ and $\text{XeO}_3(+6)$

B. $\text{XeOF}_4(+6)$ and $\text{XeO}_3(+6)$

C. $\text{XeO}_2\text{F}_2(+6)$ and $\text{XeO}_2(+4)$

D. $\text{XeOF}_4(+6)$ and $\text{XeO}_2\text{F}_2(+6)$

21.The IUPAC name of the following compound is :



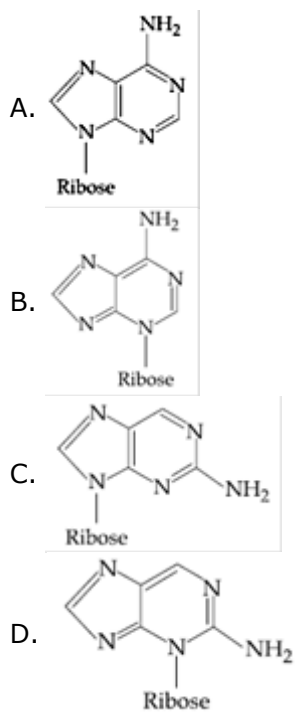
A. 4-methyl-3-ethylhex-4-ene

B. 3-ethyl-4-methylhex-4-ene

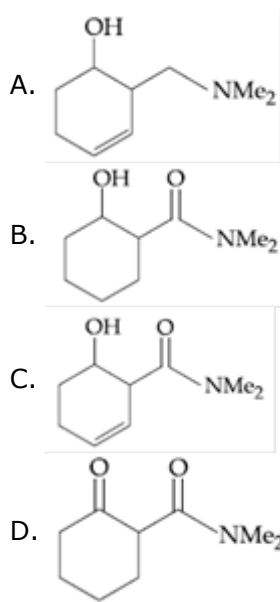
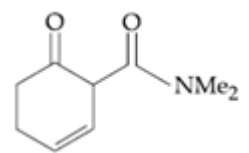
C. 4-ethyl-3-methylhex-2-ene

D. 4, 4-diethyl-3-methylbut-2-ene

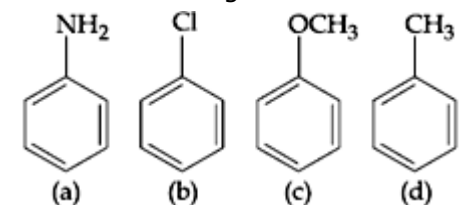
22.Which of the following is the correct structure of Adenosine ?



23. The main reduction product of the following compound with NaBH_4 in methanol is :



24. The increasing order of nitration of the following compounds is :



- A. (b) < (a) < (c) < (d)
 B. (a) < (b) < (c) < (d)
 C. (b) < (a) < (d) < (c)
 D. (a) < (b) < (d) < (c)

25. The correct match between items of List-I and List-II is :

List - I

- (A) Coloured impurity
- (B) Mixture of o-nitrophenol and p-nitrophenol
- (C) Crude Naphtha
- (D) Mixture of glycerol and sugars reduced

List - II

- (P) Steam distillation
- (Q) Fractional distillation
- (R) Charcoal treatment
- (S) Distillation under pressure

- A. (A)-(R), (B)-(S), (C)-(P), (D)-(Q)
- B. (A)-(R), (B)-(P), (C)-(S), (D)-(Q)
- C. (A)-(R), (B)-(P), (C)-(Q), (D)-(S)
- D. (A)-(P), (B)-(S), (C)-(R), (D)-(Q)

26. The copolymer formed by addition polymerization of styrene and acrylonitrile in the presence of peroxide is :

- A. $\left[\text{CH}_2 - \overset{\overset{\text{C}_6\text{H}_5}{|}}{\text{CH}} - \overset{\overset{\text{CN}}{|}}{\text{CH}} - \text{CH}_2 \right]_n$
- B. $\left[\overset{\overset{\text{C}_6\text{H}_5}{|}}{\underset{\underset{\text{CH}_3}{|}}{\text{C}}} - \overset{\overset{\text{CN}}{|}}{\text{CH}} - \text{CH}_2 \right]_n$
- C. $\left[\overset{\overset{\text{CN}}{|}}{\text{CH}} - \underset{\underset{\text{C}_6\text{H}_5}{|}}{\text{CH}_2} - \text{CH}_2 - \text{CH} \right]_n$
- D. $\left[\text{CH}_2 - \overset{\overset{\text{C}_6\text{H}_5}{|}}{\text{CH}} - \text{CH}_2 - \overset{\overset{\text{CN}}{|}}{\text{CH}} \right]_n$

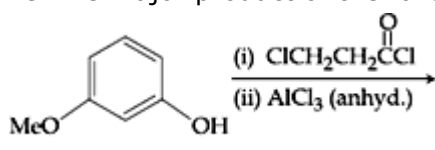
27. Which of the following will most readily give the dehydrohalogenation product?

- A.
- B.
- C.
- D.

28. Which of the following will not exist in zwitter ionic form at pH=7 ?

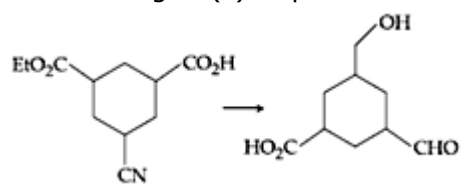
- A.
- B.
- C.
- D.

29. The major product of the following reaction is :



- A.
- B.
- C.
- D.

30. The reagent(s) required for the following conversion are :



- A. (i) B_2H_6
(ii) $SnCl_2 / HCl$
(iii) H_3O^+
- B. (i) B_2H_6
(ii) H_3O^+

C. (i) B_2H_6

(ii) DIBAL - H

(iii) H_3O^+

D. (i) $NaBH_4$

(ii) Raney Ni / H_2

(iii) H_3O^+