

## JEE Main - 2023

### Chemistry

#### Section A

This Section A contains 20 multiple choice questions from 1 to 20. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which only one is correct.

1. One atomic mass unit is defined as
  - (A) a mass of an electron.
  - (B) a mass of hydrogen atom.
  - (C) one-twelfth of the mass of one  $C-12$  atom.
  - (D) a mass of a proton.
2. If the Bohr's atomic radii of Helium for  $2^{\text{nd}}$  and  $5^{\text{th}}$  orbital are compared, the value of  $4R_5$  will be  
Given: radius of Helium for  $2^{\text{nd}}$  orbital is  $R_2$  and for  $5^{\text{th}}$  orbital is  $R_5$ 
  - (A)  $15R_2$
  - (B)  $20R_2$
  - (C)  $30R_2$
  - (D)  $25R_2$
3. Element with outer electronic configuration  $4f^7 5d^1 6s^2$  is
  - (A)  $Gd$
  - (B)  $Ga$
  - (C)  $Ge$
  - (D)  $Re$
4. In  $XeF_6$ ,  $XeF_2$ ,  $XeF_4$  the number of lone pairs of  $Xe$  are respectively
  - (A) 2,3,1
  - (B) 1,2,3
  - (C) 4,1,2
  - (D) 1,3,2

5. The compressibility factor for a real gas at high pressure is:
- (A)  $1 - \frac{Pv}{RT}$   
(B)  $1 + \frac{RT}{Pa}$   
(C) 1  
(D)  $1 + \frac{Pb}{RT}$
6. Consider the reaction between aqueous solutions of  $H_2SO_3$  with aqueous solution  $Sn^{4+}$ . Which of the following statements is correct?
- (A)  $H_2SO_3$  is the reducing agent and  $Sn^{4+}$  is the oxidizing agent  
(B)  $H_2SO_3$  is the reducing agent because it undergoes reduction  
(C)  $Sn^{4+}$  is the reducing agent and  $H_2SO_3$  is the oxidizing agent  
(D)  $Sn^{4+}$  is the oxidizing agent because it undergoes oxidation
7. **Assertion (A):** Nitrogen and Oxygen are the main components in the atmosphere and react to form oxides of nitrogen.  
**Reason (R):** The reaction between nitrogen and oxygen requires high temperature.
- (A) Both assertion and reason are correct, and the reason is the correct explanation for the assertion.  
(B) Both assertion and reason are correct, but the reason is the not correct explanation for the assertion.  
(C) The assertion is incorrect, but the reason is correct.  
(D) Both the assertion and reason are incorrect.
8. A propellant for rockets?
- (A) Liquid oxygen + liquid argon  
(B) Liquid hydrogen + liquid oxygen  
(C) Liquid nitrogen + liquid oxygen  
(D) Liquid hydrogen + liquid nitrogen
9. Metal that can be extracted by leaching with  $NaCN$  is
- (A)  $Ca$   
(B)  $Ag$   
(C)  $Cu$   
(D)  $K$

- 10.** Cerium is an important member of the lanthanoids. Which of the following statements about cerium is correct? [Atomic number of Cerium: 58]
- (A) The common oxidation states of cerium are +4 and +5  
 (B) Cerium (IV) acts as an oxidizing agent  
 (C) The +4 oxidation state of cerium is not known in solutions.  
 (D) The +3 oxidation state of cerium is less stable than the +4 oxidation state
- 11.** Regarding sulphur is correct, the correct statement is
- (A) At 600°C the gas mainly consists of  $S_6$  molecules  
 (B) The oxidation state of sulphur is never less than +4 in its compounds  
 (C)  $S_8$  molecule is diamagnetic  
 (D) The vapour at 200°C consists mostly of  $S_8$  rings

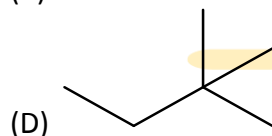
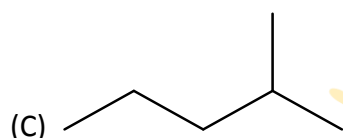
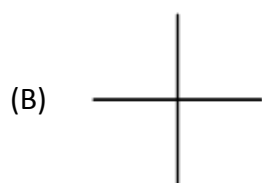
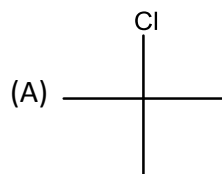
**12. Choose the correct match**

	Type of hybridisation		Distribution of hybrid orbitals in space
<b>A.</b>	$dsp^2$	<b>i.</b>	Octahedral
<b>B.</b>	$sp^3d^2$	<b>ii.</b>	Trigonal bipyramidal
<b>C.</b>	$sp^3d$	<b>iii.</b>	Tetrahedral
<b>D.</b>	$sp^3$	<b>iv.</b>	Square planar

- (A) A-iv, B- i, C-ii, D-iii  
 (B) A-iv, B- ii, C-i, D-iii  
 (C) A-i, B- iv, C-iii, D-ii  
 (D) A-ii, B- iii, C-iv, D-i
- 13.** Increasing order of stability among the three main conformations of 2-chloromethane is
- (A) Eclipse < Gauche < Anti  
 (B) Gauche < Eclipse < Anti  
 (C) Eclipse < Anti < Gauche  
 (D) Anti < Gauche < Eclipse
- 14.** Sample from bottle *A* and *B* were separately taken in test tubes and boiled with  $NaOH$  solution. The end solution in each tube was made acidic with dilute  $HNO_3$  and then some  $AgNO_3$  solution was added. Substance *B* gave a yellow precipitate. Which one of the following statements is true for this experiment if bottles containing  $C_6H_5I$  and *B*,  $C_6H_5CH_2I$ ?

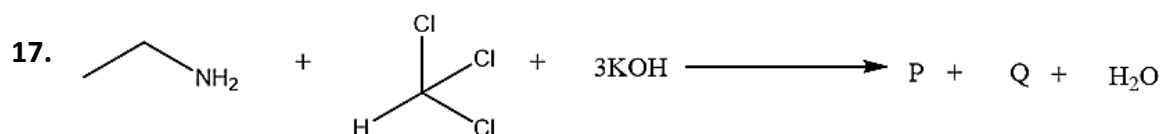
- (A)  $A$  and  $C_6H_5CH_2I$   
 (B)  $B$  and  $C_6H_5I$   
 (C) Addition of  $HNO_3$  was unnecessary  
 (D)  $A$  was  $C_6H_5I$

15. Which branched chain isomer of the hydrocarbon is found in gasoline with molecular mass 72u gives only one isomer of mono substituted alkyl halide?



16. The increasing order of the rate of nucleophilic addition of  $HCN$  to compounds  $A-D$  is

- (a) Formaldehyde  
 (b) Propan-2-one  
 (c) Acetophenone  
 (d) Benzophenone  
 (A)  $A < B < C < D$   
 (B)  $D < B < C < A$   
 (C)  $C < D < B < A$   
 (D)  $D < C < B < A$



In the chemical reaction, the compound ( $P$ ) and ( $Q$ ) are respectively

- (A)  $C_2H_5CN$  and  $3KCl$   
 (B)  $CH_3CH_2CONH_2$  and  $3KCl$   
 (C)  $C_2H_5NC$  and  $K_2CO_3$   
 (D)  $C_2H_5NC$  and  $3KCl$

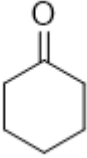
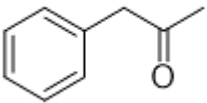
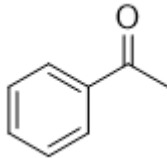
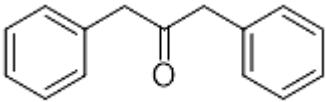
**18.** Consider the given statements

- (a) All amino acids except lysine are optically active  
 (b) All amino acids are optically active  
 (c) All amino acids except glycine are optically active  
 (d) All amino acids except glutamic acids are optically active

The correct statement(s) is (are):

- (A) A and B only  
 (B) B only  
 (C) C and D only  
 (D) C only

**19.** Among the following, which is aromatic ketone

- (A) 
- (B) 
- (C) 
- (D) 

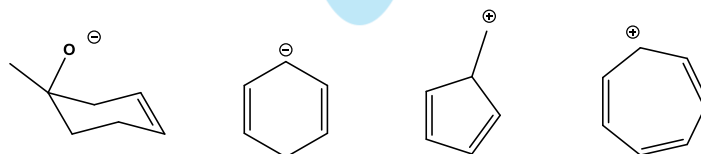
**20.** Example of condensation polymer?

- (A) Acrylonitrile  
 (B) Dacron  
 (C) Neoprene  
 (D) Teflon

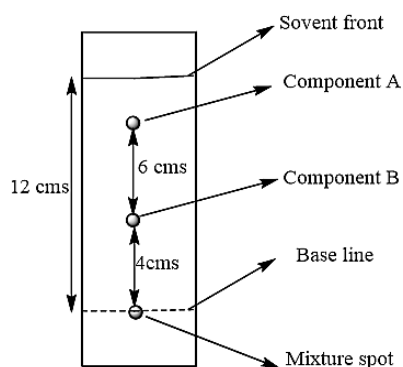
## Section B

This Section B contains 10 Integer Type Questions from 21 to 30. Attempt any 5 Questions.

21. Among the following given sulphate salts, number of earth alkaline metal sulphates having its hydration enthalpy greater than its lattice enthalpy is/are \_\_\_\_\_  
 $CaSO_4, BeSO_4, BaSO_4, SrSO_4$
22. The number of unit cells present in a cube shaped ideal crystal of  $NaCl$  of mass 0.25 g are \_\_\_\_\_  $10^{20}$ .
23. The solubility of inorganic salt  $AB_2$  is  $1.0 \times 10^{-5} \text{ mol}^{-1}$ . Its solubility product number will be \_\_\_\_\_  $\times 10^{-15}$
24. Photons having the wavelength 250 nm emitted from the surface of a metal, the energy possessed by one mole these photons will be \_\_\_\_\_
25. The entropy change involved in the isothermal reversible expansion of 5.5 moles of an ideal gas from a volume of  $10 \text{ dm}^3$  to a volume of  $100 \text{ dm}^3$  at  $27^\circ\text{C}$  is \_\_\_\_\_  $\text{J mol}^{-1} \text{ K}^{-1}$
26. Total number of neutrons in  ${}_{92}\text{U}^{238}$  atom are \_\_\_\_\_
27. The bond order of  $NO$  is \_\_\_\_\_  $\times 10^{-1}$
28. Among the following number of aromatic compound(s) is (are) \_\_\_\_\_



29. The  $R_f$  value of component A is \_\_\_\_\_  $\times 10^{-1}$



**30.** The number of correct statement(s) about triphenylmethanol is (are):

- (a) Triphenylmethanol is insoluble in water
- (b) Triphenylmethanol insoluble in petroleum ether
- (c) Triphenylmethanol will form stable carbocation when treated with acidic solution

