

## JEE Main - 2023

### Chemistry

### Answers

### Section A

#### 1. Correct Answer: C

one-twelfth of the mass of one  $C-12$  atom.

#### 2. Correct Answer: D

$$\text{Bohr's atomic radius} = \left(0.529 \times \frac{n^2}{Z}\right) \times 10^{-10}$$

Therefore,

$$R_2 = \left(0.529 \times \frac{2^2}{2}\right) \times 10^{-10}$$

$$R_5 = \left(0.529 \times \frac{5^2}{2}\right) \times 10^{-10}$$

So,

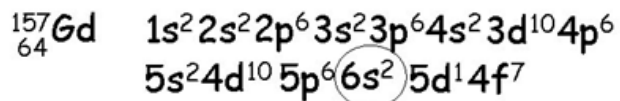
$$\frac{R_2}{R_5} = \frac{4}{25}$$

$$4R_5 = 25R_2$$

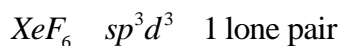
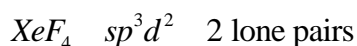
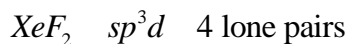
#### 3. Correct Answer: A

Example:

Write the electron configuration notation and electron dot notation for gadolinium.



**4. Correct Answer: D**



**5. Correct Answer: D**

$$\left(\frac{P+a}{V^2}\right)(V-b) = RT \quad [\text{Real gas equation}]$$

$\frac{a}{V^2}$  can be neglected at high pressure.

$$PV - Pb = RT$$

$$\frac{PV}{RT} = \left(\frac{RT}{RT}\right) + \left(\frac{Pb}{RT}\right)$$

$$\frac{PV}{RT} = 1 + \left(\frac{Pb}{RT}\right) \dots(1)$$

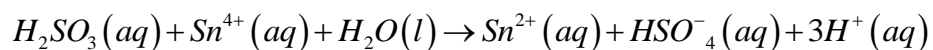
$$Z = \frac{PV}{RT} \dots(2)$$

Equating (1) and (2)

$$Z = 1 + \left(\frac{Pb}{RT}\right)$$

**6. Correct Answer: A**

Oxidation is the loss of electrons during a reaction by a molecule. In the given equation,  $H_2SO_3$  is the reducing agent because it undergoes oxidation.



**7. Correct Answer: C**

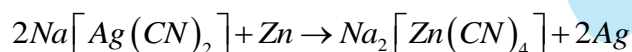
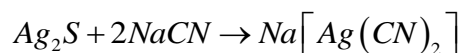
$N_2$  has triple bond and  $O_2$  has double bond and thermodynamically stable at low/room temperature.

**8. Correct Answer: B**

Liquid hydrogen and liquid oxygen are used as excellent fuel for rockets.  $H_2$  has low mass and high enthalpy of combustion whereas oxygen is a strong supporter of combustion.

**9. Correct Answers: B**

Silver ore forms a soluble complex with  $NaCN$  from which silver is precipitated using scrap zinc.



**10. Correct Answer: B**

Oxidation potential of  $Ce(IV)$  in aqueous solution is supposed to be -ve i.e.  $-0.784V$  at  $25^\circ C$

**11. Correct Answer: D**

Regarding sulphur is correct, the correct statement is the vapour at  $200^\circ C$  consists mostly of  $S_8$

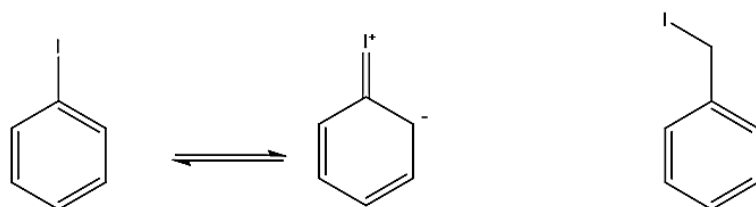
12. Correct Answer: A

13. Correct Answer: C

Eclipse is least stable and gauche is most stable.

14. Correct Answer: D

$C_6H_5I$  will not respond to silver nitrate test because  $C-I$  bond has a partial double bond character.

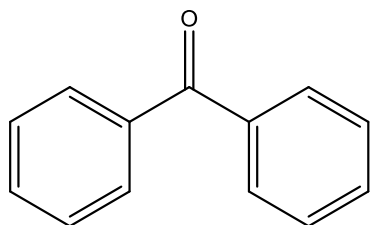


15. Correct Answer: B

Neopentane,  $(CH_3)_4C$ , on monochlorination gives only one isomer.

16. Correct Answer: D

Least reactive is benzophenone and most reactive is formaldehyde. Benzophenone is sterically hindered.



17. Correct Answer: D

It is example of carbylamine reaction. The product will be  $C_2H_5NC$  and  $3KCl$

**18. Correct Answer: D**

Lewis acids can initiate the cationic polymerisation.

**19. Correct Answer: C**

**20. Correct Answer: B**

Dacron is the condensation polymer Neoprene, teflon and acrylonitrile are addition polymers.



## Section B

### 21. Answer: 1

Among alkaline earth metal sulphates  $BeSO_4$  and  $MgSO_4$  are water soluble due to high hydration enthalpy of  $Be^{2+}$  and  $Mg^{2+}$ .

### 22. Answer: 6

$6.42 \times 10^{20}$  unit cell, so the integer value is 6.

$$\text{Moles of } NaCl = \frac{0.25}{58.51} \text{ moles}$$

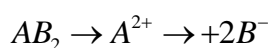
$$\text{No. of } NaCl \text{ molecule} = \frac{0.25}{58.51} \times 6.023 \times 10^{23} \text{ molecules}$$

There are 4 molecules of  $NaCl$  present in a unit cell.

$$\text{No. of unit cell} = \left( \frac{0.25 \times 6.023}{58.5 \times 4} \right) \times 10^{23} = 6.43 \times 10^{20} \text{ unit cells.}$$

### 23. Answer: 4

Solubility process is:



Using the relation of solubility and solubility product as:

$$K_{sp} = [A^{2+}][B^-]^2$$

$$K_{sp} = S.(2S)^2$$

Substituting  $S = 10^{-5} M$

$$K_{sp} = 10^{-5} \times (2 \times 10^{-5})^2$$

$$K_{sp} = 4 \times 10^{-15}$$

**24. Answer: 479**

479 kJ / mol

$$\begin{aligned} \text{Energy of one mole of photons} &= \frac{hc}{\lambda} \times N_A \\ &= \frac{6.63 \times 10^{-34} \times 3 \times 10^8 \times 6.02 \times 10^{23}}{250 \times 10^{-9}} \\ &= 478.95 \text{ KJ / mol} \end{aligned}$$

**25. Answer: 105**

105 J mol<sup>-1</sup> K<sup>-1</sup>

Isothermal reversible expansion of 2 moles of an ideal gas from a volume of 10 dm<sup>3</sup> at 270C is to a volume of 100 dm<sup>3</sup>. The entropy change involved in the above process be  $\Delta S$ .

$$\Delta S = nR \ln V_2 / V_1$$

$$= (2.303)(5.5)(8.314) \log \left( \frac{100}{10} \right)$$

$$= 105.325 \text{ J mol}^{-1} \text{ K}^{-1}$$

**26. Answer: 146**

$$238 - 92 = 146$$

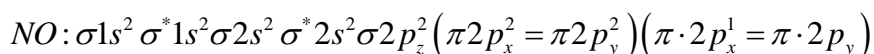
**27. Answer: 25**

The total no. of electrons in NO is 15.

Bond order is the number of bonded electron pairs between two atoms.

Bond order =  $\frac{1}{2} [( \text{Number of electrons in bonding molecules} ) - ( \text{Number of electrons in antibonding molecules} )]$

Molecular orbital configuration of Nitric oxide.



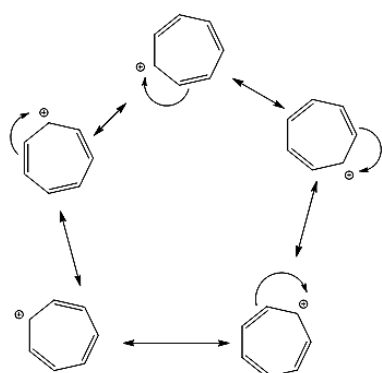
$$\text{Bond order} = \frac{1}{2}[10 - 5] = 2.5$$

So, the bond order of a nitric oxide molecule is 2.5 .

**28. Answer: 1**

Cyclic and follow Huckel's Rule

Reasonance:



**29. Answer: 8**

Distance travelled by solvent = 12 cms

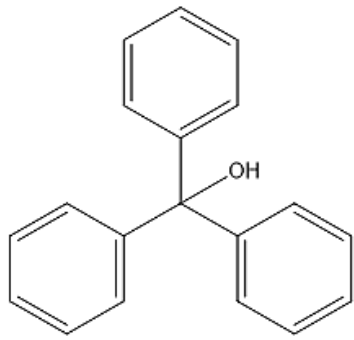
Distance travelled by component A = 4 + 6 = 10 cms

$$R_f \text{ value of component A} = \frac{10}{12} = 0.83$$

**30. Correct Answer: 3**

All three statements are correct





triphenylmethanol

