



# CHEMISTRY

## BOOKS - MTG CHEMISTRY (BENGALI ENGLISH)

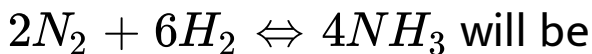
### QUESTION PAPER 2016

#### Chemistry

1. The equilibrium constant for the reaction

$N_2 + 3H_2 \rightleftharpoons 2NH_3$  is 'K'. Then the

equilibrium constant for the reaction



A.  $K$

B.  $K^2$

C.  $\sqrt{K}$

D.  $2K$

**Answer:**



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2. Which of the following is the correct option for free expansion of an ideal gas under adiabatic condition ?

A.  $q = 0, \Delta T \neq 0, W = 0$

B.  $q = 0, \Delta T \neq 0, W \neq 0$

C.  $q = 0, \Delta T = 0, W = 0$

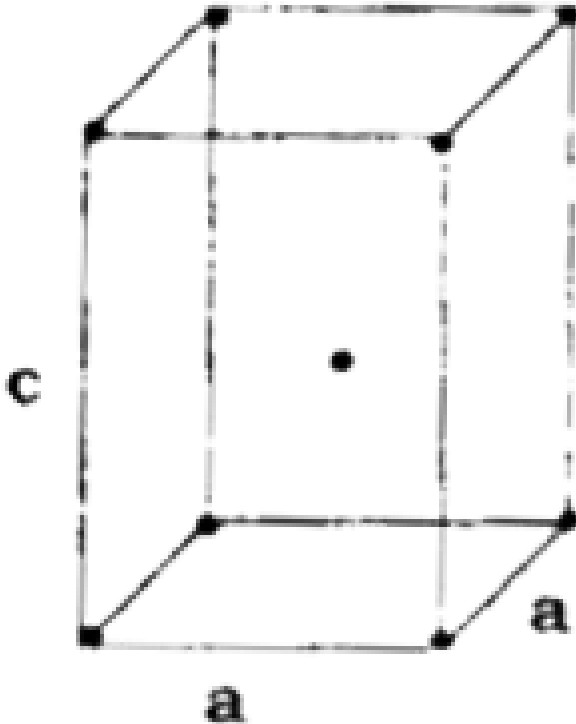
D.  $q = 0, \Delta T = 0, W \neq 0$

**Answer:**



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3. Assign the Bravais lattice type of the following unit cell structure.



A. Cubic I

B. Orthorhombic I

C. Tetragonal I

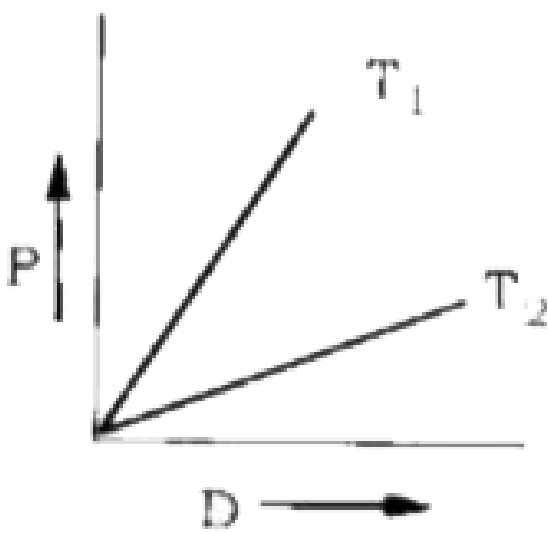
D. Monoclinic

**Answer:**



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4. Pressure (P) vs. density (D) curve for an ideal gas at two different temperatures  $T_1$  and  $T_2$  is shown below .



Identify the correct statement about  $T_1$  and  $T_2$ .

A.  $T_1 > T_2$

B.  $T_1 < T_2$

C.  $T_1 = T_2$

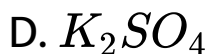
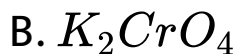
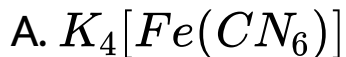
D. Cannot be said

**Answer:**



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5. Which of the following compounds is least effective in precipitating  $Fe(OH)_3$  sol ?



**Answer:**



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**6.** 75% of a first order reaction was completed in 32 min. When would 50% of the reaction be completed ?

A. 24 min

B. 16 min

C. 8 min

D. 64 min



**Answer:**



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7. Which one of the following does not produce  $O_2$  as the only gaseous product on heating?

- A. Lead Nitrate
- B. Potassium Chlorate
- C. Mercuric Oxide
- D. Potassium Nitrate

**Answer:**



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**8.** Which of the following is true in respect of adsorption ?

A.  $\Delta G < 0, \Delta S > 0, \Delta H < 0$

B.  $\Delta G < 0, \Delta S < 0, \Delta H < 0$

C.  $\Delta G > 0, \Delta S > 0, \Delta H < 0$

D.  $\Delta G < 0, \Delta S < 0, \Delta H > 0$

**Answer:**



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9. Which property that polyacetylene exhibits is unusual for an organic polymer ?

A. Electrical conductivity

B. Flexibility

C. High boiling point

D. Solubility

**Answer:**



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**10. Which statement is incorrect?**

A. Borazine has a 3D-layer structure like that of graphite

B. Boric acid has a hydrogen bonded layer structure in the solid state

C. Borazine molecule is  $(BN)_3$

D.  $[Al_6O_{18}]^{18-}$  contains a non-planar  $Al_6O_6$

- ring ?

**Answer:**



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**11.** In the aluminothermite process, aluminium acts as

A. a reducing agent

B. an oxidizing agent

C. an additive agent

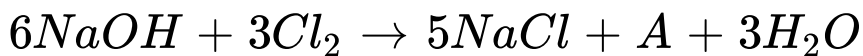
D. a flux

**Answer:**



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**12.** Consider the following reaction:



A. + 5

B. - 1

C. + 3

D. + 1

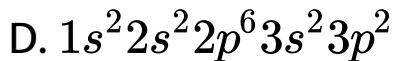
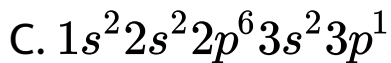
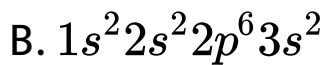
**Answer:**



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13. A sudden large difference between the values of second and third ionization energies of elements would be associated with which of the following electronic configurations?

A.  $1s^2 2s^2 2p^6 2s^1$



**Answer:**



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**14.**  $Na_2O_2$  is produced in reaction between  $H_2O_2$  and NaOH. Here the role of  $H_2O_2$  is

A. as an oxidising agent



B. as an acid

C. as a base

D. as a reducing agent

**Answer:**



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**15.** Which statement is incorrect about complexes formed by the lanthanoids ?

A. Hard donor ligands are favoured

B. High coordination numbers (more than six) are often observed

C. The 4f atomic orbitals do not play a significant part in metal-ligand bonding

D. Aqua ions are typically 6-coordinate

**Answer:**



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**16.** m - dinitrobenzene can be converted to m - nitroaniline by reduction with

A. Raney Nickel

B.  $LiAlH_4$

C.  $(NH_4)_2S$

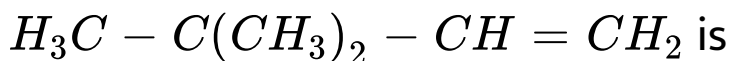
D.  $Na / C_2H_5OH$

**Answer:**



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**17.** The correct IUPAC name of



A. 3,3,3 - trimethyl prop - 1- ene

B. 1,1,1 - trimethyl  $\alpha$  - propene

C. 3,3 - dimethyl but -1- ene

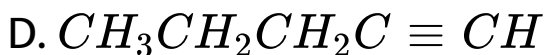
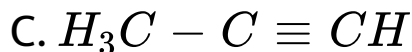
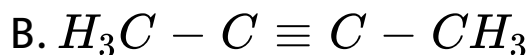
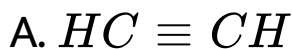
D. 2,2 dimethyl but -3- ene

**Answer:**



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**18.** Among the following compounds , the one which would not form a white precipitate with ammonical silver nitrate solution is



**Answer:**



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**19.** Which combination of reagents used in the indicated order will give m - nitropropylbenzene from benzene ?

A. 1) conc.  $HNO_3$  / conc.  $H_2SO_4$

2)  $CH_3CH_2CH_2$  /  $AlAl_3$

B. 1)  $CH_3CH_2CH_2Cl$  /  $Al$  /  $Cl_3$

2) conc.  $NHO_3$  / conc.  $H_2SO_4$

C. 1)  $CH_3CH_2COCl$  /  $AlCl_3$

2) conc.  $HNO_3$  / conc.  $H_2SO_4$

3)  $H_2NNH_2$  /  $NaOH$

D. 1) conc  $HNO_3$  / conc.  $H_2SO_4$

2)  $CH_3CH_2COCl$  /  $AlCl_3$

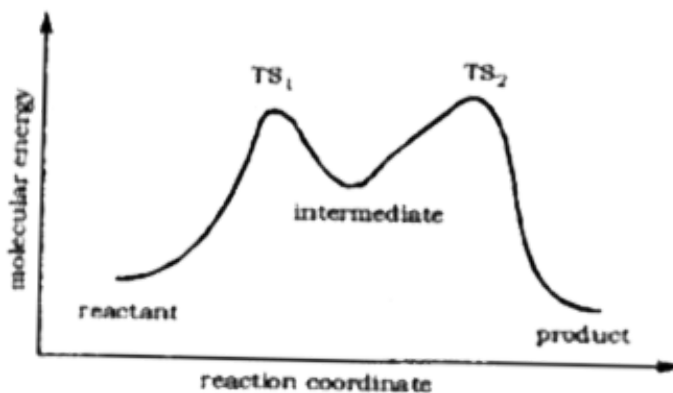
3)  $H_2NNH_2$  /  $NaOH$

**Answer:**



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**20.** Which of the statements (A) - (D) about the reaction profile below is false ?



- A. The product is more stable than the reactant.
- B. The second step is rate determining
- C. The reaction is exothermic
- D. The equilibrium constant is greater than 1 if the molar entropy change is negligible.

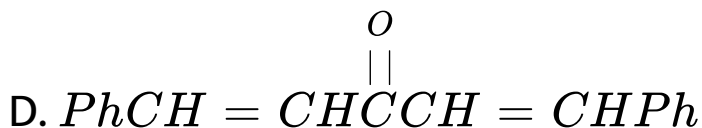
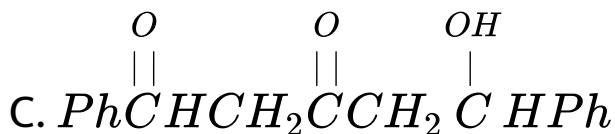
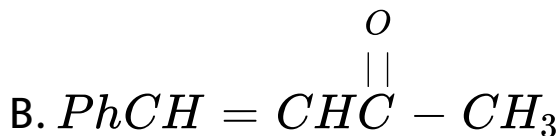
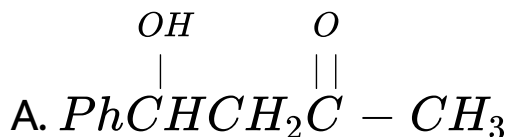
**Answer:**



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21. Which of the following is the major product when one mole of propanone and two mole of benzaldehyde react in presence of catalytic amount of NaOH ?

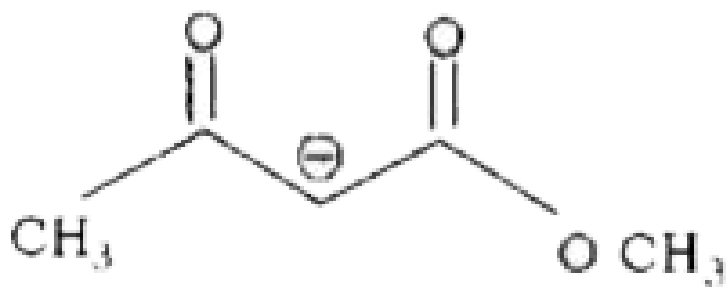


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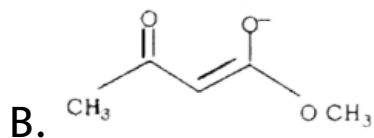
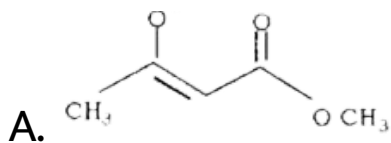


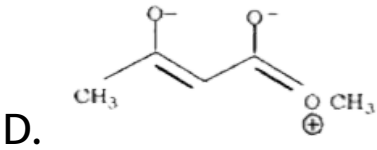
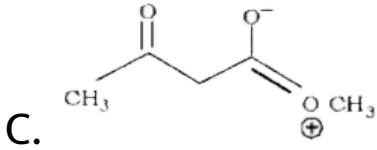
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22. For the following anion,



the resonance structure that contributes most is



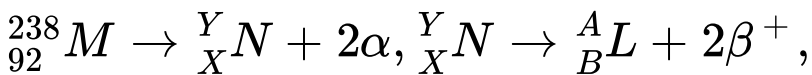


**Answer:**



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**23.** Consider the following nuclear reactions :



The number of neutrons in the element L is :

A. 142

B. 144

C. 140

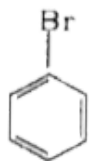
D. 146

**Answer:**

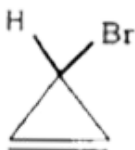


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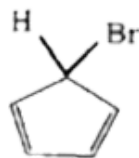
**24.** Consider the following compounds :



K



L



M

Which one of the following statements is correct ?

A. Only K forms a precipitate on treatment with alcoholic  $AgNO_3$  solution .

B. Only L forms a precipitate on treatment with alcoholic  $AgNO_3$  solution .

C. Only M forms a precipitate on treatment with alcoholic  $AgNO_3$  solution .

D. K.L . And M forms a precipitate on treatment with alcoholic  $AgNO_3$

solution .

**Answer:**



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**25.** The spin -only magnetic moment of

$[CrF_6]^{4-}$  (atomic number of  $Cr$  is 24) is

A. 0

B.  $1.73BM$

C.  $2.83BM$

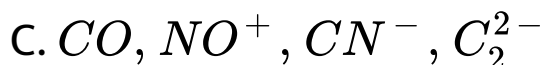
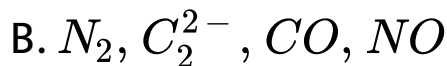
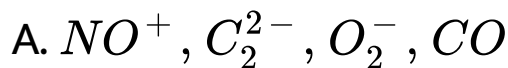
## D. 4.9BM

**Answer:**



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**26.** Among the following groupings , which one represents the set of iso-electronic species?



D.  $NO$ ,  $CN^-$ ,  $N_2$ ,  $O_2$

**Answer:**



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27. In the complex ion  $[Cu(CN)_4]^{3-}$  the hybridization state, oxidation state and number of unpaired electrons of copper are respectively.

A.  $dsp^2$ , +1, 1

B.  $sp^3$ , +1, zero



C.  $sp^3$ , + 2, 1

D.  $dsp^3$ , - 3, zero

**Answer:**



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**28.** The maximum number of 2p electrons with electronic spin =  $-\frac{1}{2}$  are

A. 6

B. 0

C. 2

D. 3

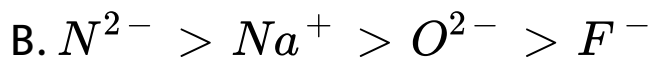
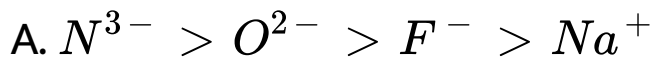
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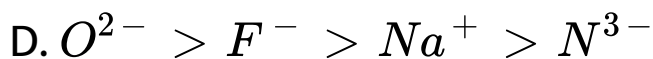
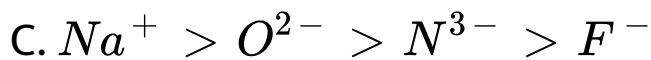


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**29.** For  $N^{3-}$ ,  $O^{2-}$ ,  $F$  and  $Na^{+}$  the order in

Which their ionic varies is





**Answer:**



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**30.** Of the following atoms , which one has the highest n/p ratio?



C.  $F^{16}$

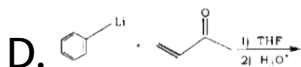
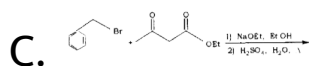
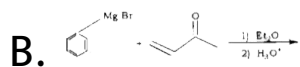
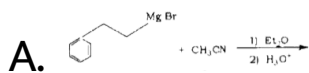
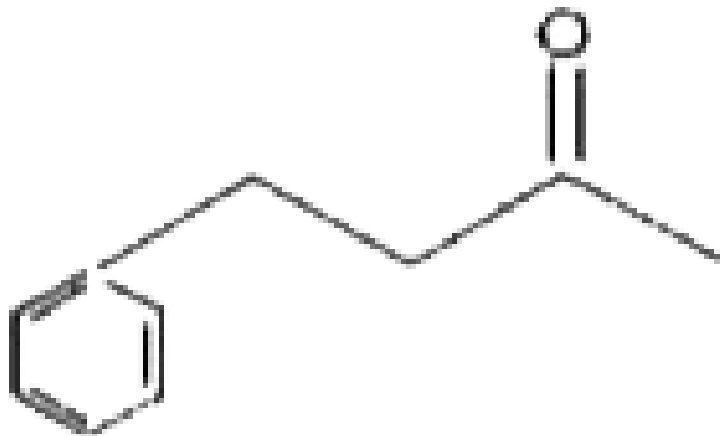
D.  $N^{16}$

**Answer:**



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**31.** Which reaction is not appropriate for the synthesis of the following ?

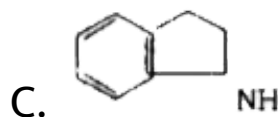
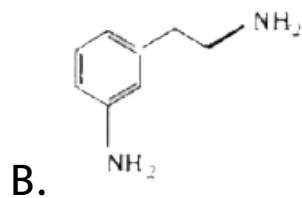
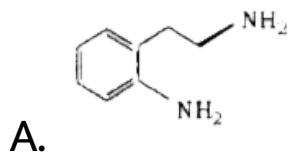
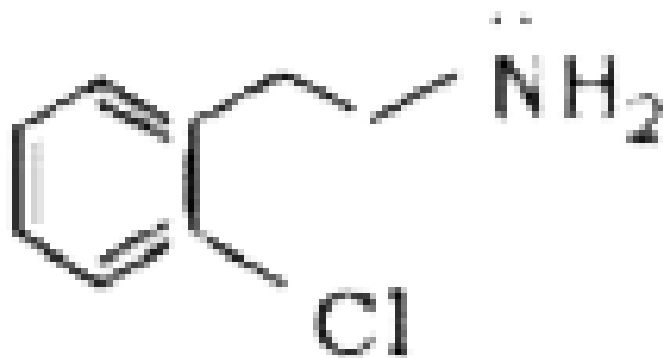


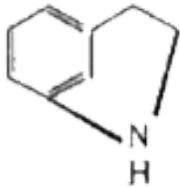
**Answer:**



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32. The major product obtained upon treatment of





D.

**Answer:**



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**33.** Which structures for  $XeO_3$  , and  $XeF_4$  are consistent with the VSEPR model ?

A.  $XeO_3$  , trigonal pyramidal,  $XeF_4$ , square planar

B.  $XeO_3$ , trigonal planar,  $XeF_4$ , square planar

C.  $XeO_3$  trigonal pyramidal,  $XeF_4$ , tetrahedral

D.  $XeO_3$  trigonal planar,  $XeF_4$  tetrahedral

**Answer:**



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34. If  $CO_2$  gas is passed through 500 ml of 0.5(M)  $Ca(OH)_2$  the amount of  $CaCO_3$ ,



produced is

A. 10 g

B. 20 g

C. 50 g

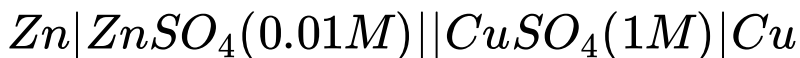
D. 25 g

**Answer:**



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35. The emf of a Daniel cell at 298 K is  $E_1$ . The cell is



When the concentration of  $\text{ZnSO}_4$  is changed to 1M and that of  $\text{CuSO}_4$ , to 0.01 M, the emf changes to  $E_2$ . The relationship between  $E_1$  and  $E_2$  will be

A.  $E_1 - E_2 = 0$

B.  $E_1 < E_2$

C.  $E_1 > E_2$

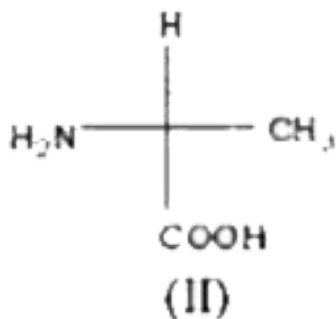
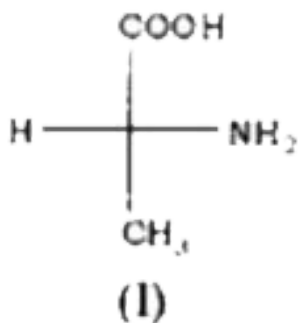
D.  $E_1 = 10^2 E_2$

**Answer:**



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**36.** Which of the following statements are correct for the following isomeric compounds I and II :



A. I and II are enantiomers

B. I and II are both optically active

C. I is D-alanine while I is L-alanine

D. I and II are diastereomers

**Answer:**



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**37.** Which of the following statements are correct with reference to isoelectric point of alanine ?

- A. At the isoelectric point, alanine bears no net charge
- B. At the isoelectric point, the concentration of the zwitterion is maximum
- C. It is not the average of  $pK_{a_1}$  and  $pK_{a_2}$  values
- D. Alanine will have a net positive charge at pH below the isoelectric point.

**Answer:**



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38. Consider the proposed mechanism for the destruction of ozone in the stratosphere.



Which of the statements about this mechanism is/are correct?

A. Cl is a catalyst

B.  $O_2$  is an intermediate

C. Equal amounts of Cl and ClO are present at any time

D. The number of moles of  $O$ , produced equals the number of moles of  $O_3$  consumed.

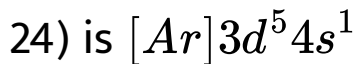
**Answer:**



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**39.** Which of the following statement(s) is (are) correct?

A. The electronic configuration of Cr (at. no:



B. The magnetic quantum number may have a negative value.

C. In Ag (at. no: 47), 23 electrons have spins of one type and 24 electrons have spins of opposite type.

D. The oxidation state of nitrogen in  $HN_3$  is

-3

**Answer:**

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40. Equal quantities of electricity are passed through 3 voltameters containing  $FeSO_4$ ,  $Fe_2(SO_4)_3$  and  $Fe(NO_3)_3$

Consider the following statements :

(1) The amounts of iron deposited in  $FeSO_4$  and  $Fe_2(SO_4)_3$  are equal.

(2) The amount of iron deposited in  $Fe(NO_3)_3$ , is  $2/3^{rd}$  of the amount deposited in  $FeSO_4$

(3) The amount of iron deposited in  $Fe_2(SO_4)_3$ , and  $Fe(NO_3)_3$ , are equal

A. (1) is correct

B. (2) is correct

C. (3) is correct

D. both (1) and (2) are correct

**Answer:**



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