CHEMISTRY

BOOKS - MTG CHEMISTRY (BENGALI ENGLISH)
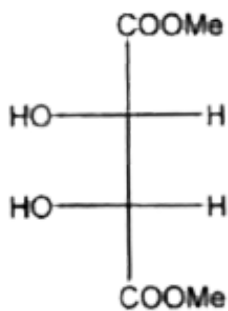
QUESTION PAPER 2013

Category I

1. In diborane, the number of electrons that account for bonding in the bridges is
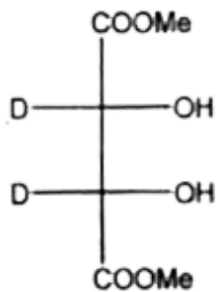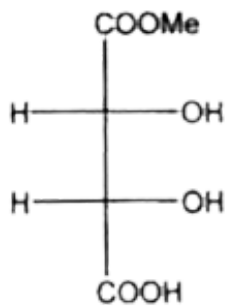
A. six

B. two

C. eight

D. four

Answer:

2. The optically active molecule is
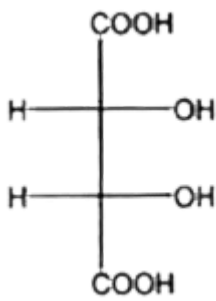
COOMe
HO———H
HO———H
COOMe

A.

COOMe
D———OH
D———OH
COOMe

B.

COOMe
H———OH
H———OH
COOH

C.

COOH
|
H————————OH
|
H————————OH
|
COOH

D.

Answer:

3. A van der Waals gas may behave ideally when

A. the volume is very low

B. the temperature is very high

C. the pressure is very low

D. the temperature, pressure and volume all are very high

Answer:

4. The half-life for decay of ^{14}C by β-emission is 5730 years. The fraction of ^{14}C decays, in a sample that is 22,920 years old, would be

A. $1/8$

B. $1/16$

C. $7/8$

D. $15/16$

Answer:

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5. 2-Methylpropane on monochlorination under photochemical condition give

A. 2-Chloro-2-methylpropane as major product

B. (1:1) Mixture of 1-chloro-2-methylpropane and 2-chloro-2-

methylpropane

C. 1-Chloro-2-methylpropane as a major product

D. (1:9) Mixture of 1-chloro-2-methylpropane and 2-chloro-2-

methylpropane

Answer:

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6. For a chemical reaction at $27°C$, the activation energy is 600 R. The

ratio of the rate constants at $327°C$ to that of at $27°C$ will be

A. 2

B. 40

C. e

D. e^2

Answer:

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7. Chlorine gas reacts with red hot calcium oxide to give

    A. bleaching powder and dichlorine monoxide

    B. bleaching powder and water

    C. calcium chloride and chlorine dioxide
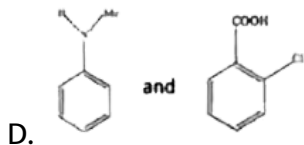
    D. calcium chloride and oxygen

Answer:

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8. Correct pair of compounds which gives blue colouration/precipitate and white precipitate, respectively, when their Lassaigne's test is separately done is

A. $NH_2NH_2.\,HCl$ and $ClCH_2COOH$

B. NH_2CSNH_2 and $PhCH_2Cl$

C. NH_2CH_2COOH and NH_2CONH_2

D.

Answer:

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9. The change of entropy (dS) is defined as

A. $dS = \delta q/T$

B. $dS = dH/T$

C. $dS = \delta q_{rev}/T$

D. $dS = (dH - dG)/T$

Answer:

10. In O_2 and H_2O_2, the O-O bond lengths are 1.21 and 1.48Å respectively. In ozone, the average O-O bond length is
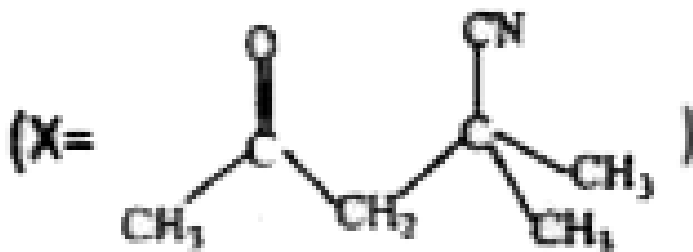
A. 1.28Å

B. 1.18Å

C. 1.44Å

D. 1.52Å

Answer:

11. The IUPAC name of the compound X is

$(X=$ ... $)$

A. 4-cyano-4-methyl-2-oxopentane

B. 2-cyano-2-methyl-4-oxopentane

C. 2,2-dimethyl-4-oxopentanenitrile

D. 4-cyano-4-methyl-2-pentanone

Answer:

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12. At $25°C$, the solubility product of a salt of MX_2 type is 3.2×10^{-8} in water The solubility (in moles/lit) of MX_2 in water at the same

temperature will be

A. 1.2×10^{-3}

B. 2×10^{-3}

C. 3.2×10^{-3}

D. 1.75×10^{-3}

Answer:

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13. In $SOCl_2$ the Cl-S-Cl and Cl-S-O bond angles are

A. $130°$ and $115°$

B. $106°$ and $96°$

C. $107°$ and $108°$

D. $96°$ and $106°$

Answer:

14. (+)-2-chloro-2-phenylethane in toluene racemises slowly in the presence of small amount of $SbCl_5$, due to the formation of

A. carbanion

B. carbene

C. free-radical

D. carbocation

Answer:

15. Acid catalysed hydrolyysis of ethyl acetate follows a pseudo-first order kinetics with respect to ester. If the reaction is carried out with large excess of ester, the order with respect to ester will be

A. 1.5

B. 0

C. 2

D. 1

Answer:

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16. The different colours of litmus in acidic, neutral and basic solutions are, respectively,

A. red, orange and blue

B. blue, violet and red

C. red, colourless and blue
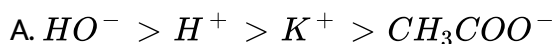
D. red, violet and blue
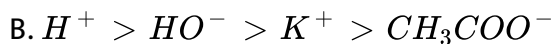
Answer:

17. Baeyer's reagent is

    A. alkaline potassium permanganate

    B. acidified potassium permanganate

    C. neutral potassium permanganate

    D. alkaline potassium manganate

Answer:

18. The correct order of equivalent conductances at infinite dilution in water at room temperature for H^+, K^+, CH_3COO^- and HO^- ions is

    A. $HO^- > H^+ > K^+ > CH_3COO^-$

B. $H^+ > HO^- > K^+ > CH_3COO^-$

C. $H^+ > K^+ > HO^- > CH_3COO^-$

D. $H^+ > K^+ > CH_3COO^- > HO^-$

Answer:

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19. Nitric acid can be obtained from ammonia via the formations of the intermediate compounds

A. nitric oxide and nitrogen dioxide

B. nitrogen and nitric oxide
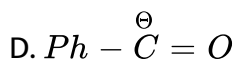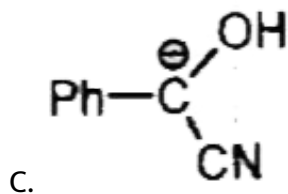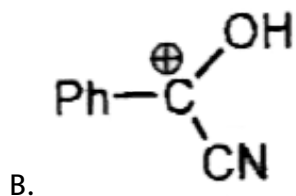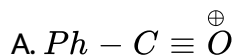
C. nitric oxide and dinitrogen pentoxide

D. nitrogen and nitrous oxide

Answer:

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20. In the following species, the one which is likely to be the intermediate during benzoin condensation of benzaldehyde, is

A. $Ph - C \equiv \overset{\oplus}{O}$

B.

C.

D. $Ph - \overset{\ominus}{C} = O$

Answer:

21. The correct order of acid strength of the following substituted phenols in water at $28°C$ is

A. p-nitrophenol $<$ p-fluorophenol $<$ p-chlorophenol

B. p-chlorophenol $<$ p-fluorophenol $<$ p-nitrophenol

C. p-chlorophenol $<$ p-chlorophenol $<$ p-nitrophenol

D. p-fluorophenol $<$ p-nitrophenol $<$ p-chlorophenol

Answer:

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22. For isothermal expansion of an ideal gas, the correct combination of the thermodynamic parameters will be

A. $\Delta U = 0, Q = 0, W \neq 0$ and $\Delta H \neq 0$

B. $\Delta U \neq 0, Q \neq 0, W \neq 0$ and $\Delta H = 0$

C. $\Delta U = 0, Q \neq 0, W = 0$ and $\Delta H \neq 0$

D. $\Delta U = 0, Q \neq 0, W \neq 0$ and $\Delta H = 0$

Answer:

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23. Addition of excess potassium iodide solution to a solution of mercuric

chloride gives the halide complex
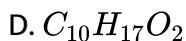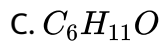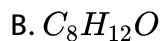
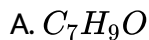A. tetrahedral $K_2[HgI_4]$

B. trigonal $K[HgI_3]$

C. linear Hg_2I_2

D. square planar $K_2[HgCl_2I_2]$

Answer:

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24. Amongst the following the one which can exist in free state as a stable compound is

A. C_7H_9O

B. $C_8H_{12}O$

C. $C_6H_{11}O$

D. $C_{10}H_{17}O_2$

Answer:

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25. A conductivity cell has been calibrated with a 0.01 M 1:1 electrolyte solution (specific conductance, $k = 1.25 \times 10^{-3}5cm^{-2}$) in the cell and the measured resistance was 800 ohms at $25°C$. The cell constant will be
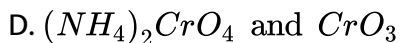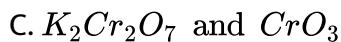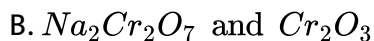
A. $1.02cm^{-1}$

B. $0.102cm^1$

C. $1.00 cm^{-1}$

D. $0.5 cm^{-1}$

Answer:

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26. The orange solid on heating gives a colourless gas and a green solid which can be reduced to metal by aluminium powder. The orange and the green solids are, respectively,

A. $(NH_4)_2Cr_2O_7$ and Cr_2O_3

B. $Na_2Cr_2O_7$ and Cr_2O_3

C. $K_2Cr_2O_7$ and CrO_3

D. $(NH_4)_2CrO_4$ and CrO_3
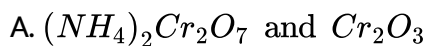
Answer:

27. The best method for the preparation of 2,2-dimethylbutane is via the reactionof

A. Me_3CBr and $MeCH_2Br$ in Na/ether

B. $(Me_3C)_2CuLi$ and $MeCH_2Br$

C. $(MeCH_2)_2CuLi$ and Me_3CBr

D. Me_3CMgl and $MeCH_2l$

Answer:

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28. The condition of spontaneity of a process is

A. lowering of entropy at constant temperature and pressure

B. lowering of Gibbs free energy of system at constant temperature and pressure

C. increase of entropy of system at constant temperature and

pressure

D. increase of Gibbs free energy of the universe at constant
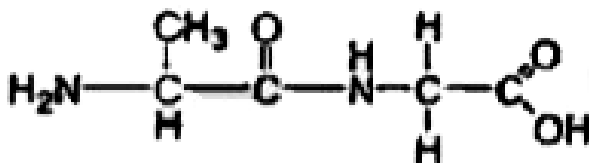
temperature and pressure

Answer:

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29. The increasing order of O-N-O bond angle in the species
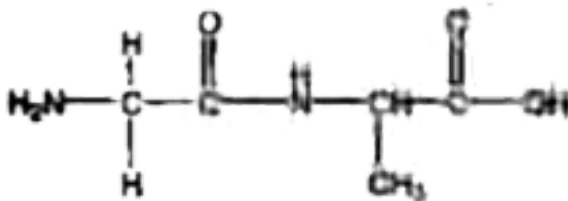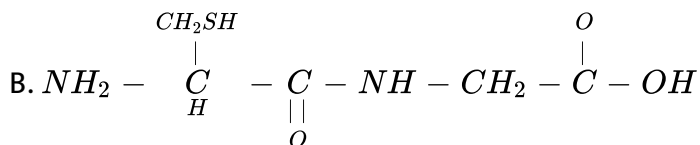
NO_2, NO_2^+ and NO_2^- is

A. $NO_2^+ < NO_2 < NO_2^-$

B. $NO_2 < NO_2^- < NO_2^+$

C. $NO_2^+ < NO_2^- < NO_2$

D. $NO_2 < NO_2^+ < NO_2^-$

Answer:

30. The correct structure of the dipeptide gly-ala is

A.

B. $NH_2 - \underset{H}{\overset{CH_2SH}{C}} \; -\underset{\underset{O}{||}}{C} - NH - CH_2 - \underset{O}{\overset{O}{C}} - OH$

C.

D. $H_2N - \underset{H}{\overset{H}{C}} - \underset{O}{\overset{O}{C}} - NH - \underset{CH_2SH}{\overset{H}{C}} \; -\underset{}{\overset{O}{C}} - OH$
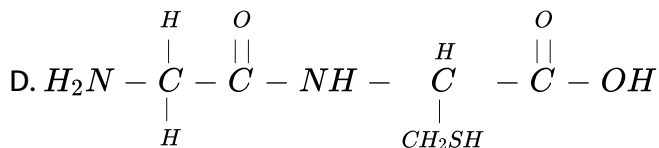
Answer:

31. Equivalent conductivity at infinite dilution for sodium-potassium oxalate $\left((COO^-)_2Na^+K^+\right)$ will be [given, molar conductivities of oxalate, K^+ and Na^+ ions at infinite dilution are 148.2, 50.1, 73.5 S cm^2mol^{-1}, respectively]

A. $271.8 Scm^{-2}eq^{-1}$

B. $67.95 Scm^2eq^{-1}$

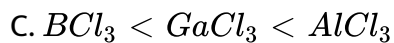C. $543.6 Scm^2eq^{-1}$

D. $135.9 Scm^2eq^{-1}$

Answer:

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32. For BCl_3, $AlCl_3$ and $GaCl_3$ the increasing order of ionic character is

A. $BaCl_3 < AlCl_3 < GaCl_3$

B. $GaCl_3 < AlCl_3 < BCl_3$

C. $BCl_3 < GaCl_3 < AlCl_3$

D. $AlCl_3 < BCl_3 < GaCl_3$

Answer:

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33. At $25°C$, pH of a 10^{-8} M aqueous KOH solution will be

A. 6.0

B. 7.02

C. 8.02

D. 9.02

Answer:

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34. The reaction of nitroprusside anion with sulphide ion gives purple colouration due to the formation of

A. the tetranionic complex of iron(II) coordinating to one NOS^- ion

B. the dianionic complex of iron(II) coordinating to one NCS^- ion

C. the trianionic complex of iron(III) coordinating to one NOS^- ion

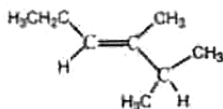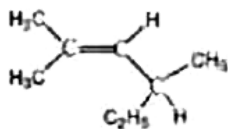D. the tetranionic complex of iron(III) coordinating to one NCS^- ion

Answer:

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35. An optically active compound having molecular formula C_8H_{16} on ozonolysis gives acetone as one of the products. The structure of the compound is

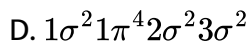A.

B.

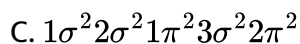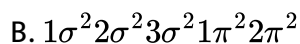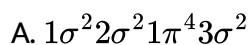

C.

D.
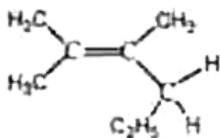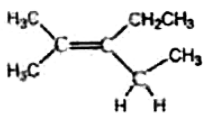
Answer: D

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36. Mixing of two different ideal gases under isothermal reversible condition will lead to

A. increase of Gibbs free energy of the system

B. no change of entropy of the system

C. increase of entropy of the system

D. increase of enthlapy of the system

Answer:

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37. The ground state electronic configuration of CO molecule is

A. $1\sigma^2 2\sigma^2 1\pi^4 3\sigma^2$

B. $1\sigma^2 2\sigma^2 3\sigma^2 1\pi^2 2\pi^2$

C. $1\sigma^2 2\sigma^2 1\pi^2 3\sigma^2 2\pi^2$

D. $1\sigma^2 1\pi^4 2\sigma^2 3\sigma^2$

Answer:

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38. When aniline is nitrated with nitrating mixture in ice cold condition, the major product obtained is

A. p-nitroaniline

B. 2,4-dinitroaniline

C. o-nitroaniline

D. m-nitroaniline

Answer:

39. The measured freezing point depression for a 0.1m aqueous CH_3COOH solution is $0.19°C$. The acid dissociation constant K_e at this concentration will be (Given K_f, the molal cryoscopic constant = 1.86 K kg mol^{-1})

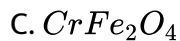A. 4.76×10^{-5}

B. 4×10^{-5}

C. 8×10^{-5}

D. 2×10^{-5}

Answer:

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40. The ore chromite is

A. $FeCr_2O_4$

B. $CoCr_2O_3$

C. $CrFe_2O_4$

D. $FeCr_2O_3$

Answer:

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41. Sulphan' is

A. a mixture of SO_3 and H_2SO_5

B. 100% conc. H_2SO_4

C. a mixture of gypsum and conc. H_2SO_4

D. 100% oleum (a mixture of 100% SO_3 in 100% H_2SO_4)

Answer:

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42. Pressure-volume (PV) work done by an ideal gaseous system at constant volume is (where E is internal energy of the system)

A. $\Delta P/P$
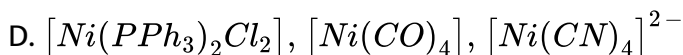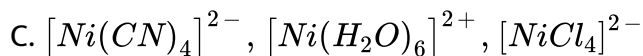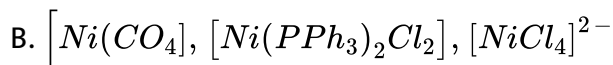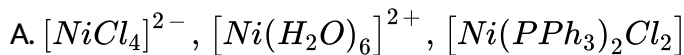
B. zero

C. $-V\Delta P$

D. $-\Delta E$

Answer:

43. Amongst

$[NiCl_4]^{2-}$, $[Ni(H_2O)_6]^{2+}$, $[Ni(PPh_3)_2Cl_2]$, $[Ni(CO)_4]$ and $[Ni(CN)_4]$

, the paramagnetic species are

A. $[NiCl_4]^{2-}$, $[Ni(H_2O)_6]^{2+}$, $[Ni(PPh_3)_2Cl_2]$

B. $[Ni(CO_4)]$, $[Ni(PPh_3)_2Cl_2]$, $[NiCl_4]^{2-}$

C. $[Ni(CN)_4]^{2-}$, $[Ni(H_2O)_6]^{2+}$, $[NiCl_4]^{2-}$

D. $[Ni(PPh_3)_2Cl_2]$, $[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$

Answer:

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44. Number of hydrogen ions present in 10 millionth part of $1.33cm^3$ of pure water at $25°C$ is

A. 6.023 million

B. 60 million

C. 8.01 million

D. 80.23 million

Answer:

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45. Ribose and 2-deoxyribose can be differentiated by

A. Fehling's reagent

B. Tollens' reagent

C. Barfoed's reagent

D. Osazone formation

Answer:

1. The standard Gibbs free energy change $\left(\Delta G^0\right)$ at $25°C$ for the dissociation of $N_2O_4(g)$ to $NO_2(g)$ is (given, equilibrium constant = 0.15, R = 8.314 JK/mol)
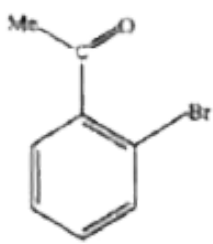
    A. 1.1 kJ

    B. 4.7 kJ

    C. 8.1 kJ

    D. 38.2 kJ
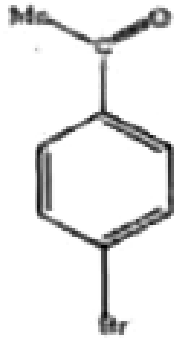
Answer:

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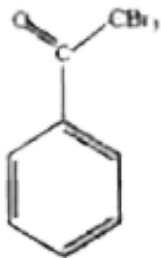
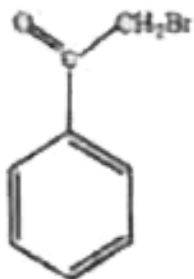**2.** Bromination of PhCOMe in acetic acid medium produces mainly

A.

B.

C.

D.

Answer:

3. Silicone oil is obtained from the hydrolysis and polymerisation of

A. trimethylchlorosilane and dimethyldichlorosilane

B. trimethylchlorosilane and methyltrichlorosilane

C. methyltrichlorosilane and dimethyldichlorosilane

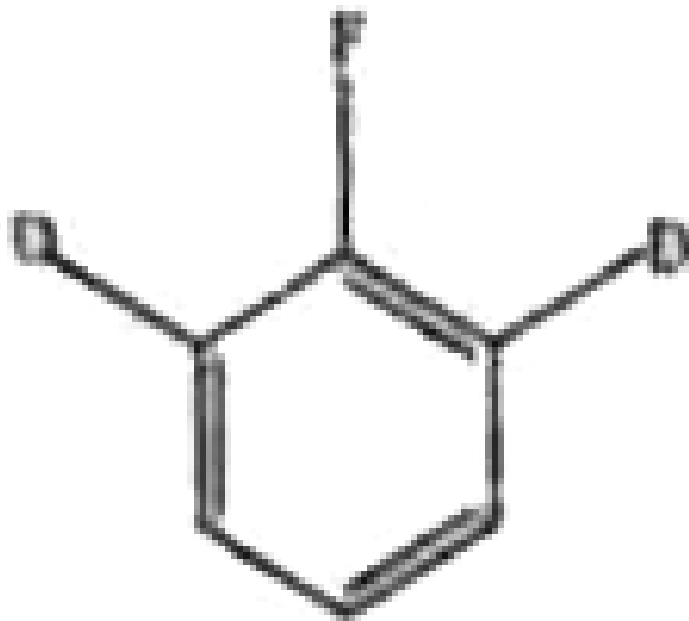D. triethylchlorosilane and diethyldichlorosilane

Answer:

4. Treatment of

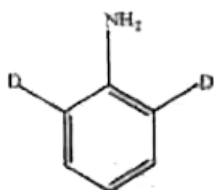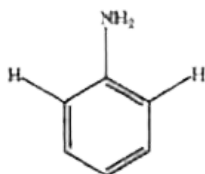with $NaNH_2/liq.\ NH_3$ gives

A.

B.

C.

D.
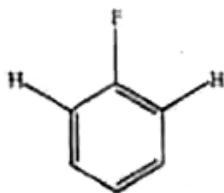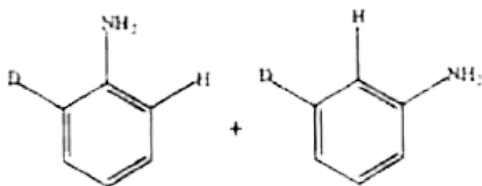
Answer:

5. Identify of CORRECT statement

A. Quantum numbers (n, l, m, s) are obtained arbitrarily

B. All the Quantum numbers (n, l, m, s) for any pair of electrons in an

atom can be identical under special circumstance

C. All the quantum numbers (n, l, m, s) may not be required to

describe an electron of an atom completely

D. All the quantum numbers (n, l, m, s) are required to describe an

electron of an atom completely

Answer:

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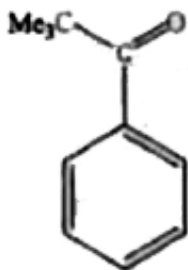**6.** In borax the number of B-O-B links and B-OH bonds present are, respectively,

A. five and four
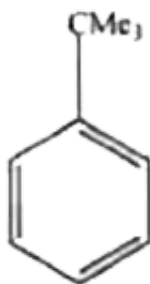
B. four and five

C. three and four

D. five and five

Answer:

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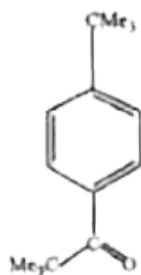**7.** Reaction of benzene with Me_3COCl in the presence of anhydrous $AlCl_3$ gives
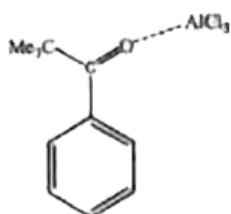

A.

B.

C.

D.

Answer:

8. 1×10^{-3} mole of HCl is added to a buffer solution made up of 0.01M acetic acid and 0.01M sodium acetate. The final pH of the buffer will be (given, pKa of acetic acid is 4.75 at $25°C$)

A. 4.60

B. 4.66

C. 4.75

D. 4.8

Answer:

9. The best method for preparation of Me_3CCN is

A. to react Me_3COH with HCN

B. to react Me_3CBr with NaCN

C. to react Me_3CMgBr with ClCN

D. to react Me_3Cli with NH_2CN

Answer:

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10. On heating, chloric acid decomposes to

A. $HClO_4, Cl_2, O_2$ and H_2O

B. $HClO_2, Cl_2, O_2$ and H_2O

C. $HClO, Cl_2O$ and H_2O_2

D. $HCl, HClO, Cl_2O$ and H_2O

Answer:

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1. Consider the following reaction for $2NO_2(g) + F_2(g) \rightarrow 2NO_2F(g)$. The expression for the rate of reaction in terms of the rate of change of partial pressure of reactant and product is/are

    A. rate $= -1/2[dp(NO_2)/dt]$

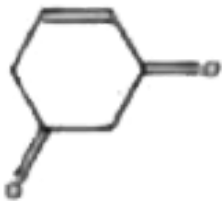   B. rate $= 1/2[dp(NO_2)/dt]$

    C. rate $= -1/2[dp(NO_2F)/dt]$

    D. rate $= 1/2[dp(NO_2F)/dt]$

Answer:

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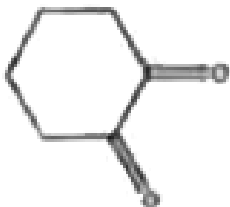**2.** Tautomerism is exhibited by

A. $(Me_3CCO)_3CH$

B.

C.

D.

Answer:

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3. The important advantage(s) of Lintz and Donawitz (L.D.) process for the manufacture of steel is (are)

A. the process is very quick

B. operating costs are low

C. better quality steel is obtained

D. scrap iron can be used

Answer:

4. In basic medium the amount of Ni^{2+} in a solution can be estimated with the dimethylglyoxime reagent. The correct statement(s) about the reaction and the produt is(are)

A. in ammoniacal solution Ni^{2+} salts gives cherry-red precipitate of nickel(II) dimethylglyoximate

B. two dimethylglyoximate units are bounde to one Ni^{2+}

C. in the complex two dimethylglyoximate units are hydrogen bounded to each other

D. each dimethylglyoximate unit forms a six =membered chelate ring

with Ni^{2+}

Answer:

5. Correct statement(s) in cases of n-butanol and t-butanol is (are)

A. both are having equal solubility in water

B. t-butanol is more soluble in water thn n-butanol

C. boiling point of t-butanol is lower than n-butanol

D. boiling point of n-butanol is lower t-butanol

Answer: