369 PU M Sc Chemical Sciences

1 of 100
219 PU_2016_369_E
Which of the following electrical interaction forces is called London force or Dispersion force?

- Dipole-induce dipole interaction
- Induced- dipole induced-dipole interaction
- Ion-Dipole interaction
- Hydrogen bonding interaction

2 of 100
121 PU_2016_369_E
Bond order in O_2^{2-} is:-

- 3
- 4
- 1
- 2

3 of 100
133 PU_2016_369_E
Calculate crystal field stabilization energy of a low spin d^6 octahedral complex.

- 2.4 Δ_o
- 0.4 Δ_o
- 0.6 Δ_o
- 3.6 Δ_o

4 of 100
174 PU_2016_369_E
An organic compound showed two bands of almost equal intensity between 3300-3500 cm^{-1} in its IR spectrum. The compound is:-

- Hexanoic acid
- N-methylaniline
- 1-butanamine
- N,N-dimethylformamide

5 of 100
216 PU_2016_369_E
Which of the following inorganic compound will exhibit magnetic moment?

- $BaTiO_3$
- CuO
- $MgAl_2O_3$

- $ZnSiO_4$

6 of 100

112 PU_2016_369_E

Out of XeF_2, CO_2, SO_2 and NO_2^- the linear species are:-

- XeF_2 and CO_2
- SO_2 and NO_2^-
- CO_2 and SO_2
- XeF_2 and NO_2^-

7 of 100

109 PU_2016_369_E

The oxidation number and valency of P in phosphorus acid is:-

- +3, +3
- +5, +3
- +3, +5
- +5, +5

8 of 100

132 PU_2016_369_E

What is the oxidation state of Cr in $[CrF_6]^{3-}$?

- +6
- +2
- -3
- +3

9 of 100

170 PU_2016_369_E

The major product formed in the reaction of 1-octene with NBS and dibenzoyl peroxide (cat.) is:-

- 1,2-dibromooctane
- E-1-bromo-2-octene
- Z-1-bromo-2-octene
- 3-bromo-1-octene

10 of 100

120 PU_2016_369_E

Oxide ion forms close packed cubic structure in $MgAl_2O_4$. How many octahedral holes and tetrahedral holes are present in per unit formula?

- 4 each
- 1 and 2

- 2 each
- 4 and 8

11 of 100

200 PU_2016_369_E

Which of the thermodynamic parameter remains constant during phase transition from solid to liquid?

- Enthalpy
- Volume
- Temperature
- Entropy

12 of 100

205 PU_2016_369_E

In the case of real gas which of the following thermodynamic parameter is used instead of pressure?

- Partial pressure
- Equilibrium pressure
- Fugacity
- None of the above

13 of 100

166 PU_2016_369_E

Which among following compounds can be resolved into optically active isomers at room temperature?

A. cis-1,2-dimethylcyclohexane
B. *trans*-cyclooctene
C. *t*-Butylsulfinamide.

- A and C
- A and B
- A, B and C
- B and C

14 of 100

113 PU_2016_369_E

Which is true for complexes $[Fe(CN)_6]^{4-}$ and $[Co(NH_3)_6]^{3+}$:-

- former is high spin and latter is low spin
- both are low spin complexes
- former is low spin and latter is high spin
- both are high spin complexes

15 of 100

108 PU_2016_369_E

The secondary valency number of copper in $[Cu(NH_3)_4]Cl_2$ complex is:-

- 2
- 6
- 4
- 0

16 of 100

142 PU_2016_369_E

Which one of the following alkyl bromides soluble in water?

- Bromocycloheptane
- 5-Bromocyclohepta-1,3-diene
- 3-Bromocyclohept-1-ene
- 7-Bromocyclohepta-1,3,5-triene

17 of 100

150 PU_2016_369_E

What would be the specific rotation of 400 mg of testosterone in 10 mL of ethanol placed in a sample tube of 100 mm long? The observed rotation of this sample at 25°C using sodium D line is +4.36°.

- +10.9°
- +1.09°
- +109°
- +54.5°

18 of 100

189 PU_2016_369_E

The rotational symmetry number in CH_4 molecule is:-

- 4
- 8
- 6
- 12

19 of 100

116 PU_2016_369_E

The number of states belongs to atomic term symbol 'D is:-

- 5
- 7
- 3
- 1

20 of 100

145 PU_2016_369_E

Identify the molecule which exhibits IR stretching vibration at 3100 cm^{-1}.

- Oct-1-ene
- (*E*)-Oct-4-ene
- Oct-4-yne
- Oct-1-yne

21 of 100

192 PU_2016_369_E

The *inequality of Clausius* discusses about:-

- entropy
- enthalpy
- heat capacity
- Gibbs energy

22 of 100

105 PU_2016_369_E

In an acid-base titration, the end point is noticed at pH=8.6; The best indicator for this titration is:-

- methyl orange
- Phenolphthalein
- methyl red
- bromothymol blue

23 of 100

182 PU_2016_369_E

Which one of the following pairs is *isostructural*?

- NF_3 and BF_3]
- [NH_3 and NO_2^-]
- [BCl_3 and $BrCl_3$]
- [BF_4^- and NH_4^+]

24 of 100

125 PU_2016_369_E

Trisilylamine is planar, whereas trimethylamine is pyramidal due to the presence of the following bonding in trisilylamine:-

- pπ-pπ bonding
- four-centered two-electron bonding
- dπ-dπ bonding
- pπ-dπ bonding

25 of 100

101 PU_2016_369_E
The amount of NaOH needed to prepare 1.5 M sodium hydroxide solution in 100 mL is:-

- 15 g
- 6 g
- 10 g
- 60 g

26 of 100

117 PU_2016_369_E
The number of EPR lines you get for a hydrogen radical is:-

- 3
- 2
- 4
- 1

27 of 100

196 PU_2016_369_E
The slope obtained from the Arrhenius plot:-

- - Ea/R
- Ea/R
- Ea/RT
- constant A

28 of 100

204 PU_2016_369_E
The SI unit of ionic mobility for ions in solution is given by:-

- metre/sec
- Coulomb/Volt
- Coulomb-metre/sec
- Coulomb-sec/Kg

29 of 100

186 PU_2016_369_E
The absorption band corresponding to the transition of an electron from n=2 to n=3 level having the length of the box 578 pm:-

- $6.54*10^{4}\ cm^{-1}$
- $3.54*10^{4}\ cm^{-1}$
- $4.54*10^{4}\ cm^{-1}$
- $5.54*10^{4}\ cm^{-1}$

30 of 100

154 PU_2016_369_E

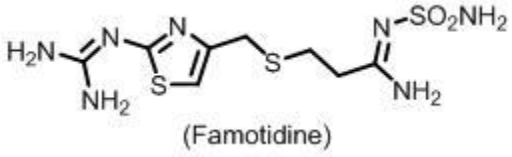
Which one of the following compound shows stretching vibration at 1850 cm^{-1} in FT-IR?

- Cyclopropanone
- Ethyl acetate
- Cyclopentanone
- Acetone

31 of 100

162 PU_2016_369_E

Structural elements present in the following drug molecule are:-



(Famotidine)

A. Urea
B. Guanidine
C. Thiazole
D. Thiophene

- A and C
- A and B
- B and D
- B and C

32 of 100

157 PU_2016_369_E

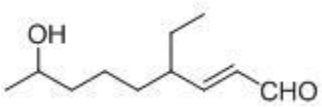
Which one among the following is strong base?

- Imidazole
- Aniline
- Pyridine
- Piperidine

33 of 100

149 PU_2016_369_E

Find out the correct IUPAC name for the molecule:-



- (Z)-Ethyl-8-hydroxynon-2-enal
- (E)-Ethyl-8-hydroxynon-2-enal

- (Z)-9-Oxo-6-ethylnon-2-en-7-ol
- (E)-9-Oxo-6-ethylnon-2-en-7-ol

34 of 100

218 PU_2016_369_E

Which of the following range of energies is the normal range for Hydrogen-bonding in molecules?

- 39 kcals/mole to 51 kcals/mole
- 3 kcals/mole to 15 kcals/mole
- 15 kcals/mole to 27 kcals/mole
- 27 kcals/mole to 39 kcals/mole

35 of 100

146 PU_2016_369_E

Reaction of p-cresol with 2-methylpropene in presence of phosphoric acid gives:-

- 2,6-Diisobutyl-4-methylphenol
- 2-Isobutyl-4-methylphenol
- 2-tert-butyl-4-methylphenol
- 2,6-Di-tert-butyl-4-methylphenol

36 of 100

124 PU_2016_369_E

The β-activity of 1 g of carbon from the wood of a recently felled tree is 0.26Bq. If the activity of 1 g of carbon isolated from the wood of an Egyptian mummy case is 0.16 Bq under the same conditions, estimate the age of the mummy case. (^{14}C: $t_{1/2}$ = 5730 yr.)

- 3526 yr
- 5730 yr
- 2005 yr
- 4010 yr

37 of 100

158 PU_2016_369_E

Why genetic information is not stored in RNA?

- Because RNA is bigger than DNA
- Because RNA has base pair
- Because RNA is highly stable
- Because RNA is less stable

38 of 100

128 PU_2016_369_E

In P_4O_{10} phosphorous atoms are arranged in:-

- rectangular planar geometry

- square planar geometry
- rhombic planar geometry
- tetrahedral geometry

39 of 100

181 PU_2016_369_E

In allene (C_3H_4), the type(s) of hybridization of the carbon atoms is (are):-

- only sp^2
- sp and sp^3
- sp^2 and sp^3
- sp and sp^2

40 of 100

100 PU_2016_369_E

A crystal system has a = 13.2 Å, b = 13.2 Å, c = 15.2 Å and ∞ = β = γ = 90 belongs to:-

- triclinic
- monoclinic
- tetragonal
- orthorhombic

41 of 100

169 PU_2016_369_E

A hydrocarbon of molecular formula C_7H_{12} on oxidation with OsO_4 followed by reaction with $NaIO_4$ provided a keto aldehyde. The compound is:-

- 4-methylcyclohex-1-ene
- 3-methylcyclohex-1-ene
- 1-methylcyclohex-1-ene
- 1,2-dimethylcyclopent-1-ene

42 of 100

104 PU_2016_369_E

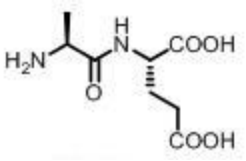
A solution with pH= 4 is more acidic than a solution of pH = 7 by a factor of:-

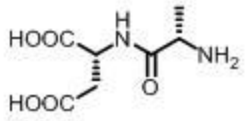
- 1000
- +3
- +4
- -3

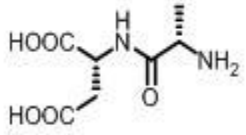
43 of 100

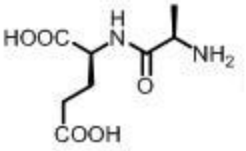
178 PU_2016_369_E

Structure of naturally occurring dipeptide ala-glu is:-









44 of 100

161 PU_2016_369_E

Which among of the following statements for $F_2C=CF_2$ is true:-

. $F_2C=CF_2$ is used for manufacture of Teflon
B. Dipole moment for $F_2C=CF_2$ is zero
C. F2C=CF2 is solid at room temperature (30°C)
D. carbon in $F_2C=CF_2$ is sp2 hybridized

- B and C
- A and D
- A, C and D
- A, B and D

45 of 100

193 PU_2016_369_E

The entropy change for an isothermal expansion of ideal gas is given as:-

- $nR \ln(P_2/P_1)$
- 0
- $nR \ln(V_2/V_1)$
- $nR \ln(T_2/T_1)$

46 of 100

212 PU_2016_369_E

In the case of viscosity of a liquid, which of the following statement is true?

- Viscosity decreases with increasing temperatures,
- First increases and then decreases

- Viscosity remains constant with increasing temperatures,
- Viscosity increases with increasing temperatures,

47 of 100

165 PU_2016_369_E

Correct statement(s) for imidazole are:-

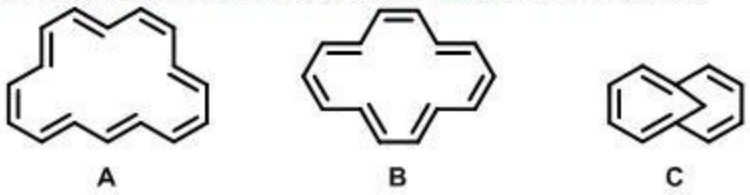
A. It is a weak acid
B. It is a weak base
C. It is a heterocycle with one nitrogen
D. It is a heterocycle with two nitrogen atoms

- B and C
- A and D
- A and C
- B and D

48 of 100

177 PU_2016_369_E

Aromatic / antiaromatic among the following hydrcarbons are:-



- A and B are antiaromatic, C is aromatic
- A is aromatic, B and C are antiaromatic
- A and C are antiaromatic, B is aromatic
- A is antiaromatic, B and C are aromatic

49 of 100

129 PU_2016_369_E

Zeolites are:-

- silicones
- 3D silicates
- double chain silicate
- allotropes of silicon

50 of 100

141 PU_2016_369_E

Base pairing in DNA is between Guanine and:-

- Thymine
- Uracil

- Cytosine
- Adenine

51 of 100

208 PU_2016_369_E

Which of the following property is exhibited by electromagnetic radiation (light) in Compton effect?

- Both wave and particle nature of light
- Wave nature of light
- Particle nature of light
- All of the above

52 of 100

185 PU_2016_369_E

The de Broglie wavelength of an electron traveling at 1% of the speed of light:-

- 243 pm
- 300 pm
- 343 pm
- 200 pm

53 of 100

136 PU_2016_369_E

Which one of the following complexes exhibit optical isomerism?

- *trans*-$[Co(NH_3)_4Cl_2]Cl$
- *cis*-$[Co(NH_3)_4Cl_2]Cl$
- *trans*-$[Co(en)_2Cl_2]Cl$
- *cis*-$[Co(en)_2Cl_2]Cl$

54 of 100

137 PU_2016_369_E

Magnitude of Δ in coordination complexes depends on:-

- oxidation state of the metal
- charge on the ligand
- size of the ligand
- number of electrons on the metal

55 of 100

213 PU_2016_369_E

Which of the following is an insulator?

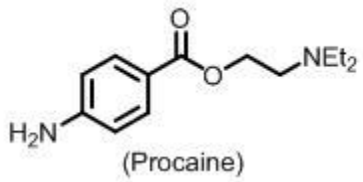
- Si
- C (Diamond)

- Ge
- None of the above

56 of 100

173 PU_2016_369_E

The correct reagents / reactants and their sequence of use in the synthesis of local anaesthetic procaine is:-



(Procaine)

- (i) ethyleneoxide (ii) diethylaniline (iii) 4-aminobenzoic acid
- (i) diethylamine (ii) epichlorohydrin (iii) 4-aminobenzoic acid
- (i) 4-aminobenzoic acid (ii) ethylene oxide (iii) diethylamine
- (i) diethylamine (ii) ethylene oxide (iii) 4-aminobenzoic acid

57 of 100

197 PU_2016_369_E

The linear Gibbs energy relationship (to study the substituent and correlation effects) for Aliphatic compounds was well shown by:-

- Hammett
- Debye-Onsager
- Taft
- Gibbs-Helmholtz

58 of 100

201 PU_2016_369_E

Carnot cycle in Temperature and Entropy axes is represented as:-

- Squire
- Rectangle
- Equilateral triangle
- Trapezium

59 of 100

209 PU_2016_369_E

An electron in which of the following orbital has the highest probability of approaching nearest to the atomic nucleus?

- d-orbital
- p-orbital

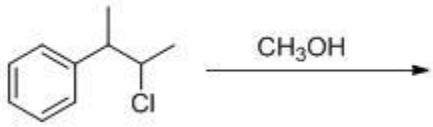
f- orbital

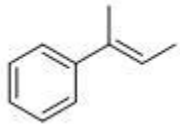
s-orbital

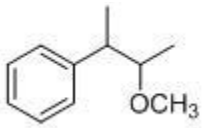
60 of 100

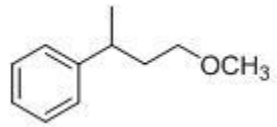
153 PU_2016_369_E

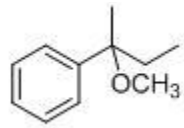
Identify the product formed in the following transformation.







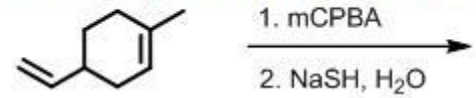


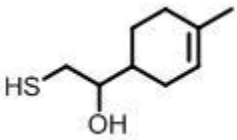


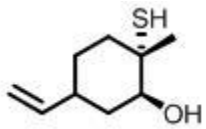
61 of 100

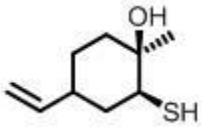
236 PU_2016_369_M

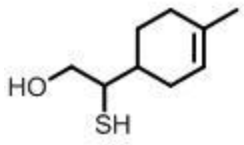
The major product formed in the following reaction is:-











62 of 100

229 PU_2016_369_M
Pt is used in:-

- metallic paintings for cars
- fuel for cars
- Car body frame
- Catalytic converters in cars

63 of 100

251 PU_2016_369_M
An acceptable wave function Ψ need not be always:-

- single valued
- normalized
- finite
- continuous

64 of 100

258 PU_2016_369_M
Zero point energy is zero in:-

- harmonic oscillator
- particle in a sphere
- particle in a ring
- particle in a box

65 of 100

221 PU_2016_369_M
Which among the following is more acidic:-

- NH_3
- N_2H_4
- H_2S
- PH_3

66 of 100

256 PU_2016_369_M
In the differential equation $3(d^2y/dx^2) + (dy/dx)^3 = x$, the degree and order is:-

- 1, 2

- 3, 3
- 3, 2
- 2, 1

67 of 100

241 PU_2016_369_M

The standard emf of the cell, $Pt|Fe^{3+}(aq),Fe^{2+}(aq) \parallel Sn^{4+}(aq),Sn^{2+}(aq)|Pt$, here, $E^{\circ}_{(Sn^{4+}/Sn^{2+})} = +0.15V; E^{\circ}_{(Fe^{3+}/Fe^{2+})} = +0.77V$

- -1.39V
- +0.62V
- -0.62V
- +1.39V

68 of 100

240 PU_2016_369_M

The average speed of a gas molecule at a given temperature is given by:-

- $\sqrt{(5RT/3M)}$
- $(5RT/3M)^2$
- $\sqrt{(3RT/M)}$
- $(3RT/M)^2$

69 of 100

233 PU_2016_369_M

Reaction of phenyl acetylene with 9-BBN followed by oxidation with H_2O_2/NaOH gives:-

- Ethylbenzene
- 2-Phenylacetaldeyde
- Acetophenone
- 2-Phenylacetic acid

70 of 100

228 PU_2016_369_M

Which one of the following statements is **incorrect**?

- Ferrocene undergoes Friedel-Crafts alkylation reactions faster than benzene
- Oxidation state of Fe in ferrocene is +II
- Ferrocene can be used as Grignard reagent
- Ferrocene is an organometallic compoun

71 of 100

225 PU_2016_369_M

The ground state free ion term of Pr^{3+} is:-

- $^{7}F_{0}$
- $^{3}H_{4}$
- $^{5}I_{4}$
- $^{1}S_{0}$

72 of 100

232 PU_2016_369_M

The reaction of bromine with (E)-but-2-ene in CCl_4gives:-

- *meso*-2,3-dibromobutane
- *dl*-2,3-dibromobutane
- ()-2,3-dibromobutane
- (+)-2,3-dibromobutane

73 of 100

252 PU_2016_369_M

The spacing between levels remains constant in:-

- harmonic oscillator
- particle in a box
- particle in a ring
- particle in a sphere

74 of 100

237 PU_2016_369_M

An organic compound displayed intense signals at m/z 43 and 58 in its mass spectrum. The compound is:-

- 2-ocatanone
- 4-octanone
- 3-octanone
- Octanal

75 of 100

259 PU_2016_369_M

What is the coordination number of body centered cube?

- 6
- 4
- 12
- 8

76 of 100

220 PU_2016_369_M

Which one of the following organometallic compound is strong base:-

- CH_3Li
- CH_3MgBr
- $(CH_3)_2CuLi$
- CH_3ZnBr

77 of 100

255 PU_2016_369_M

Orthogonal matrices are necessarily:-

- hermitian
- periodic
- scalar
- unitary

78 of 100

248 PU_2016_369_M

Which of the following spectroscopic techniques can be used to calculate the bond length of a diatomic molecule?

- Infrared spectroscopy
- Rotational spectroscopy
- Ultraviolet-Visible spectroscopy
- None of the above

79 of 100

244 PU_2016_369_M

When an endothermic thermal event above 400°C on an inorganic compound is accompanied by loss of weight of the compound, then which of the following statement is true?

- The weight loss could be due to the loss of absorbed moisture from the compoun
- The weight loss could be due to the decomposition of the compound with the formation of a gaseous component
- The weight loss could be due to the decomposition with formation of water as well as a gaseous component
- All of the above cases

80 of 100

224 PU_2016_369_M

The metal present in Wilkinson's catalyst is:-

- Titanium
- Rhodium
- Platinum

- Iridium

81 of 100

264 PU_2016_369_D

Which among the following does not obey 18 electron rule:-

- $Mo(CO)_6$
- $Fe(CN)_6]^{4-}$
- $[Co(NH_3)6]^{3+}$
- $[Cu(OH_2)_6]^{2+}$

82 of 100

272 PU_2016_369_D

Reaction of an alkene with diiodomethane in presence of zinc-copper couple gives cyclopropane ring. This reaction is called:-

- Simmons-Smith reaction
- Horner-Wadsworth-Emmons reaction
- Corey-Fuchs reaction
- Corey-Chaykovsky reaction

83 of 100

260 PU_2016_369_D

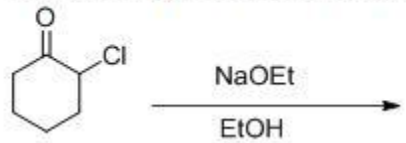
X and Y are two elements which form X_2Y_3 and X_3Y_4. If 0.20 mol of X_2Y_3 weighs 32.0 g and 0.4 mol of X_3Y_4 weighs 92.8 g, the atomic weights of X and Y are respectively:?

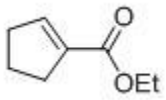
- 28.0 and 8.0
- 16.0 and 56.0
- 56.0 and 16.0
- 8.0 and 28.0

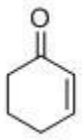
84 of 100

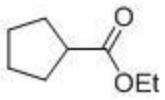
273 PU_2016_369_D

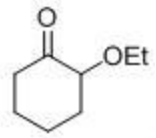
Identify the product formed in the following reaction.



- 

- 





85 of 100

265 PU_2016_369_D

Which one of the following ions is the most labile?

- Zn^{2+}
- Hg^{2+}
- Cd^{2+}
- Pt^{2+}

86 of 100

268 PU_2016_369_D

NO is paramagnetic in gaseous state and diamagnetic in liquid state because:-

- It loses the odd electron in liquid state
- It gains additional electron in liquid state
- To liquefy NO, it has to be cooled and in cold condition it is diamagnetic
- It dimerizes in liquid state and hence the electrons are paired up

87 of 100

297 PU_2016_369_D

What is the value of following expressions? $\frac{1}{2+\frac{1}{3+\frac{1}{4+\frac{1}{5}}}} + \frac{1}{1+\frac{1}{1+\frac{1}{3+\frac{1}{4+\frac{1}{5}}}}}$

- 1.5
- 1
- 0
- 1.25

88 of 100

289 PU_2016_369_D

The energy of the particle in a box is independent of:-

- mass of the particle
- length of the box
- charge of the particle

None of the above

89 of 100

288 PU_2016_369_D

The energy gap between the n and n+1 level in the particle in a sphere:-

decrease with increasing in n

independent of the value of n

remains constant

increase with increasing in n

90 of 100

281 PU_2016_369_D

Which of the following order is correct in the case of Maxwell velocity distribution of dilute gasses?

$v_{nmost\ probable} > v_{average} > v_{rms}$

$v_{rms} < v_{nmost\ probable} < v_{average}$

$v_{nmost\ probable} < v_{average} < v_{rms}$

$v_{average} < v_{nmost\ probable} < v_{rms}$

91 of 100

280 PU_2016_369_D

In H_2 molecule which of the electronic configurations cannot be the possible in excited state?

σ_{2s}^2 (spin up:spin up)

σ_{1s}^1(spin down) σ_{2s}^1(spin down)

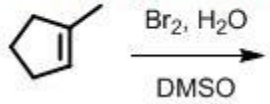
σ_{1s}^1(spin up) σ_{2s}^1(spin up)

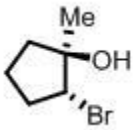
σ_{1s}^1(spin up) σ_{2s}^1(spin down)

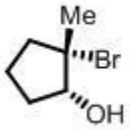
92 of 100

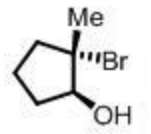
277 PU_2016_369_D

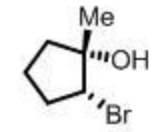
The major product formed in the following reaction is:-











93 of 100

261 PU_2016_369_D

The solubility product Ksp of $CaSO_4$= 1X 10^{-6} ; $BaSO_4$ = 1x10^{-11} ; Ag_2SO_4 = 1x10^{-5}; $SrSO_4$ = 1x10^{-7} in water. Which salt will precipitate first in water?

- Ag_2SO_4
- $BaSO_4$
- $CaSO_4$
- $SrSO_4$

94 of 100

285 PU_2016_369_D

When one operates with d2/dx2 on the function 8sin (2x), one finds that:-

- The function is not an eigen function
- the function is an eigen function with the eigen value 4
- the function is an eigen function with the eigen value -4
- the function is an eigen function with the eigen value -32

95 of 100

292 PU_2016_369_D

If three Persons A, B and C toss a coin in the same order repeatedly till somebody gets a head, what is the probability of A getting the head?

- 1/7
- 4/7
- 3/7
- 2/7

96 of 100

269 PU_2016_369_D

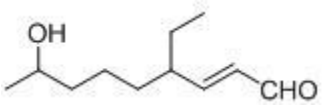
Dilute solutions of Mn^{2+} are almost colorless though there are 5 unpaired electrons in *d* orbitals. This is due to:-

- the electronic transitions in Mn^{2+} are Laporte forbidden
- the electronic transitions in Mn^{2+} are spin forbidden
- very high gap between HOMO and LUMO

- the absence of LUMO

97 of 100

299 PU_2016_369_D



- 1-D, 2-C, 3-B, 4-A
- 1-C, 2-D, 3-B, 4-A
- 1-D, 2-C, 3-A, 4-B
- 1-B, 2-A, 3-D, 4-C

98 of 100

284 PU_2016_369_D

Which of the following is an odd function?

- $f(x) = a \exp(-bx^2)$, where a and b are constants
- $f(x) = |x|$
- $f(x) = 3x^4-2x^2+1$
- $f(x) = Sin(x)\ Cos(x)$

99 of 100

276 PU_2016_369_D

A hydrocarbon of molecular formula C_7H_{10} on reaction with 1. $(sia)_2BH$, 2. H_2O_2, aq. NaOH provided 2-cyclopentylacetaldehyde. The hydrocarbon is:-

- 1-ethylcyclopentadiene
- ethynylcyclopentane
- 1-ethenyl-1-cyclopentane
- 1,2-dimethylcyclopentadiene

100 of 100

296 PU_2016_369_D

Which of the following electrolyte is the most effective coagulating agent for Sb_2S_3 sol:-

- $CaCl_2$
- NH_4Cl
- $Al_2(SO_4)_3$
- Na_2SO4