



Tanta University
Faculty of Pharmacy
Dept. of Pharm. Chem.
First Semester

December 30, 2013
Prerpharmacy
Organic Chemistry Final Exam
Time: 120 min

This Exam Booklet contains 16 pages

150 Total Point Exam

PART ONE:

(60 Points, 40 min)

Answer Sheet for PART ONE

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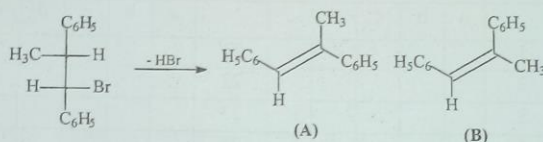
Select the **one best answer** by encircling the appropriate letter (a-e) and then fill the Answer Sheet for Part One (Page 1).

- 1) Resorcinol and hydroquinone are
 a) Chain isomers
 b) Positional isomers
 c) Functional isomers
 d) None

- 2) How many isomers of C_6H_{12} ?
 a) Two
 b) Four
 c) Five
 d) Six
 e) Seven

- 3) How many positional isomers of C_6H_{12} ?
 a) One
 b) Two
 c) Three
 d) Four
 e) Five

- 4) Chlorination of n-butane using Cl_2 /heat is
 a) Stereoselective reaction
 b) Stereospecific reaction
 c) Both
 d) none



- 5) The above reaction gives
 a) Only A
 b) Only B
 c) Both A and B
- 6) An object that has no plane of symmetry is called
 a) Tetrahedral
 b) Achiral
 c) Symmetric
 d) Asymmetric
- 7) *Cis*- and *trans*-2-butene are
 a) Geometric isomers
 b) Optical isomers
 c) Diastereomers
 d) Both (a) and (b)
 e) Both (a) and (c)
- 8) Flying wedge is considered as
 a) Top view
 b) Side view
- 9) *Meso* compounds are
 a) Chiral
 b) Achiral
- 10) Erythrose is
 a) (2*R*,3*R*)2,3,4-trihydroxybutanal
 b) (2*S*,3*S*)2,3,4-trihydroxybutanal
 c) Both (a) and (b)
 d) None

11) The
 a) 4-Eto
 b) 4-Me
 c) Eithe
 d) None

12) The
 a) No C
 c) Two

13) Co
 a) Opt

14) B
 a) Tru

15) C
 a) Er
 c) Ne

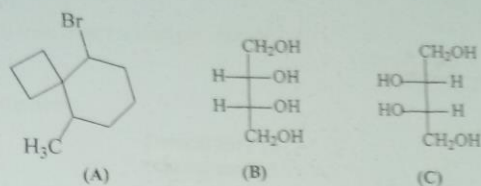
16) T
 a) (a

H₃C

17)
 a) C
 c) I

18
 a)
 c)

19
 a)



11) The nomenclature of the above **A** is

- a) 4-Bromo-8-methyl spiro[5.3]nonane
- b) 4-Methyl-8-bromo spiro[5.3]nonane
- c) Either (a) or (b)
- d) None

12) The above Compound **B** has

- a) No Chiral center
- b) One chiral center
- c) Two chiral centers

13) Compound **B** is

- a) Optically active
- b) Optically inactive

14) **B** and **C** are nonsuperimposable mirror images

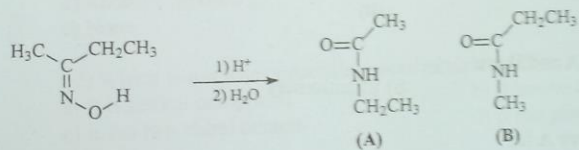
- a) True
- b) False

15) Compound **C** is

- a) *Erythro* compounds
- b) *Threo* compounds
- c) None

16) *Trans* 1,4-dimethylcyclohexane should be

- a) (a,e) or (e,a)
- b) (a,a) or (e,e)



17) The above reaction gives

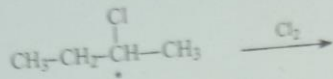
- a) Only **A**
- b) Only **B**
- c) Both **A** and **B**

18) The bond angle in cyclohexane is

- a) 109°
- b) 120°
- c) Both (a) and (b)
- d) None

19) S_N2 reaction leads to inversion of configuration

- a) True
- b) False

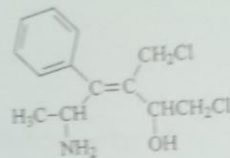


- 20) The above reaction gives
 a) One isomer
 c) Three isomers

- b) Two isomers
 d) Four isomers

- 21) Hydroxylation of alkene is always *anti* addition
 a) True

- b) False



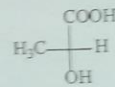
- 22) The above compound is
 a) *E*-alkene

- b) *Z*-alkene

- 23) Which is **not** true concerning Fischer projection?
 a) The intersection is in plane
 b) The horizontal line is above the plane
 c) Carbon 1 is the highest priority nomenclature
 d) It is mainly used in carbohydrates
 e) None



(A)



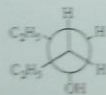
(B)

- 24) The above Two compounds A and B are
 a) The same compounds

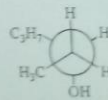
- b) Enantiomers

- 25) The configuration of the above A is
 a) (*R*)

- b) (*S*)



(A)



(B)

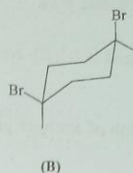
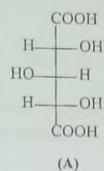
- 26) For the above structures, which is 3-hexanol?

- a) A
 c) Both A and B

- b) B

27) Which term denotes racemic mixture?

- a) \pm
- b) (R,S)
- c) d,l
- d) Both (a) and (b)
- e) All of the above



28) The above A contains

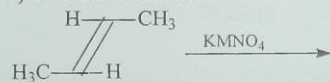
- a) One chiral centers
- b) Two chiral centers
- c) Three chiral centers
- d) No chiral center

29) The above A is optically active compound

- a) True
- b) False

30) The above B contains

- a) No chiral center
- b) One chiral center
- c) Two Chiral Centers



31) The above equation gives

- a) Racemic mixture
- b) *Meso* compound
- c) None

32) Which is **not** true concerning *meso* tartaric acid?

- a) It is achiral compound
- b) It has no chiral center
- c) It has two chiral centers
- d) It has plane of symmetry
- e) None

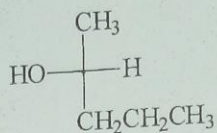
33) Which is **not** correct concerning SN_1 reaction?

- a) It leads to racemization
- b) Rearrangement is possible
- c) It is one-stage process
- d) One molecule is undergoing covalency change
- e) None

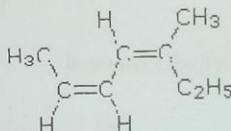
34) Which of the following changes **does not** change the configuration of a molecule in a Fischer projection?

- a) Exchanging the two horizontal substituents
- b) Exchanging the two vertical substituents
- c) Rotation by 180° out of the plane

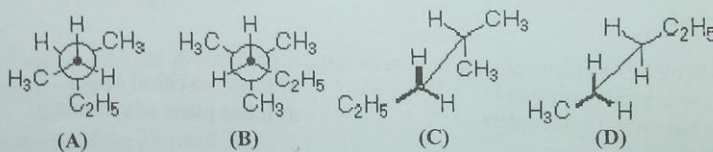
- d) Single switch
e) None



- 35) The above compound is (-)(R)-2-pentanol
a) True
b) False
- 36) Enzymatic reduction of acetone gives (R)(-) secondary alcohol
a) True
b) False
- 37) (2R, 3R)-2,3,4-trihydroxybutanal and (2R, 3S)-2,3,4-trihydroxybutanal are
a) Enantiomers
b) Diastereomers
c) The same compound
d) None



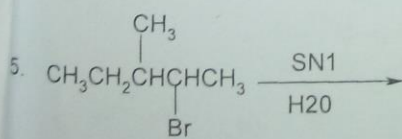
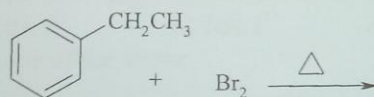
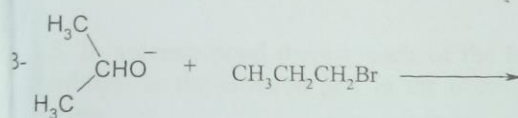
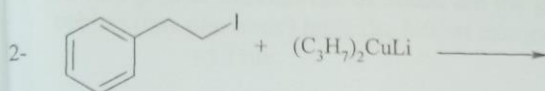
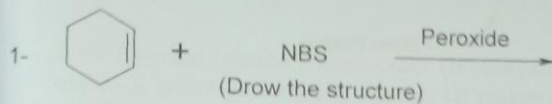
- 38) The above compound is
a) 2E, 4E
b) 2Z, 4Z
c) 2Z, 4E
d) 2E, 4Z
e) None
- 39) Butane and isobutene are
a) Chain isomers
b) Positional isomers
c) Functional isomers
d) None

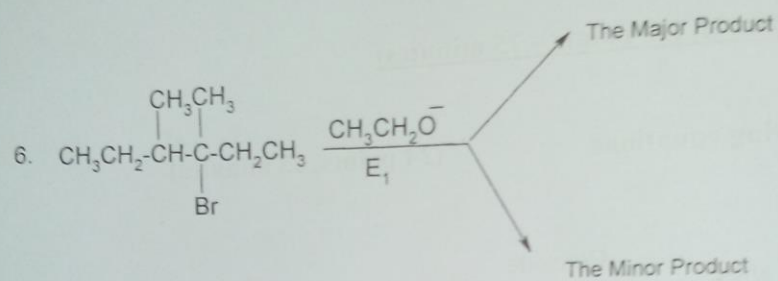


- 40) Which of the following conformational structures is 2-methylpentane?
a) A
b) B
c) C
d) D
e) None

Part II, (90 points – 75 minutes)

A) Complete the following equations (24 points, 25 minutes)



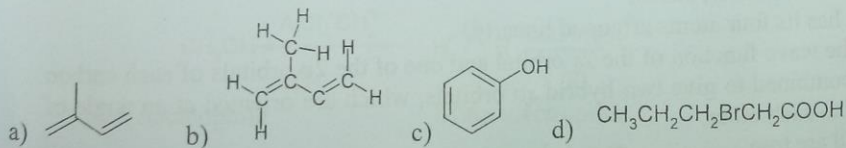


B) Draw the different conformers of 1-methyl-3-isopropylcyclohexane and arrange them according to their energy. (6 points, 10 minutes)

C) Choose the best answer and fill in sheet (I) (60 points 40 minutes)

1. The wavefunction (ψ) is plus (+) in regions where wave is above the average level (in crest) and it is minus (-) in regions where wave is below the average level (in troughs).
a) True b) False
2. Waves can reinforce each other (if waves of the same phase sign meet each other) or interfere with one another (if waves of opposite sign meet each other).
a) True b) False
3. The greater the number of nodes are the greater the energy of the orbital. 1s orbital (has one node) have the lowest energy.
a) True b) False
4. The energy level of 3d is lower than that of 4s
a) True b) False
5. In valence bond theory, each of the bonded atoms retains its own atomic orbitals as the electron pair in the overlapping orbitals is shared by only one atom.
a) True b) False
6. The bond angle between H-C=C- in $\text{CH}_2=\text{CH}_2$ is.....
a) 107.3° b) 104.5° c) 180° d) 120°
e) none of the above

7. Which of the following represent a Kekule structure:



8. The formal charge of the carbon atom (in carbon monoxide is: $:\text{C}\equiv\text{O}:$)

a) zero
e) -2

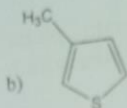
b) +1

c) -1

d) +2

9. Which of the following compounds contain an amino functional group

a) $\text{CH}_3\text{CH}_2\text{—SH}$



c) 

d) $\text{CH}_3\text{CH}_2\text{—S—CH}_2\text{CH}_3$

10. The orbital is a region of space within an atom where an electron is most likely to be found.

a) True

b) False

11. Four of the five d orbitals are cloverleaf-shaped and the fifth d orbital is shaped like an elongated dumbbell with a doughnut around its middle.

a) True

b) False

12. All are true about ammonia except

a) It has a pyramidal geometry.

b) The wave function of the 2s orbital and the three 2p orbitals of nitrogen are combined to give four hybrid sp^3 orbitals, one containing a lone pair of electrons (nonbonding electrons), and three containing single electrons, which are available for bonding.

c) a + b are true

13. In Acetylene,

a) A carbon-carbon triple bond results from the interaction of two sp -hybridized carbon atoms.

b) It has its four atoms arranged linearly.

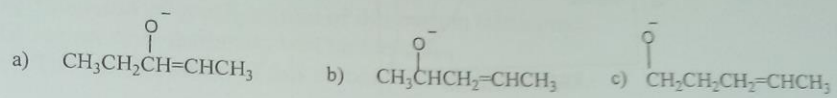
c) The wave function of the 2s orbital and one of the 2p orbitals of each carbon are combined to give two hybrid sp orbitals, which are oriented at an angle of 180° to each other.

d) All are true

e) a + b

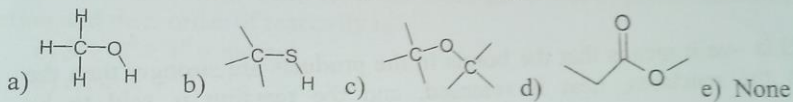
14. Which of the following species is likely to be an electrophile:
 a) NO_2^+ b) CN^- c) HO^- d) :NH_2 e) none
 of the above

15. Which species is more stable?

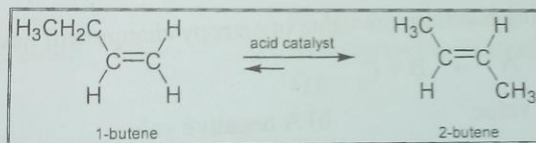


16. C-Cl is polar covalent bonds as their electronegativities differ by
 a) 0.2 b) 0.5 c) 2.2 d) None

17. Which of the following compounds belongs to ether:

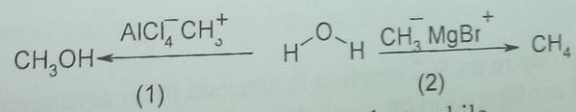


18. The following equation is an example ofreaction



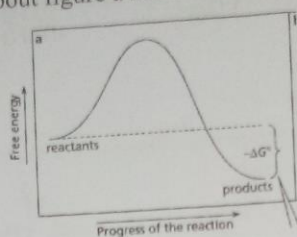
a) addition b) elimination c) substitution d) rearrangement
 e) none of the above

19. Water works in reaction (1) as



a) A nucleophile b) An electrophile

20. All are true about figure a hereunder



- a) ΔG° will be negative
- b) The products will have a lower free energy and more stable than the reactants.
- c) The reaction will release more energy than it will consume.
- d) It will be an exergonic reaction.
- e) All are true
- f) All are true except d

21. If ΔH is $-ve$ it means that the bonds in the products are stronger than the bonds in the reactants, heat is released, and the reaction is said to be exothermic.

- a) True
- b) False

22. For the following reaction, the value of entropy change will have



- a) A positive value
- b) A negative value

23. Which of the following reaction is faster

- a) One ΔG^\ddagger with $= +45$ KJ/mol
- b) One ΔG^\ddagger with $= +370$ KJ/mol
- c) One ΔG^\ddagger with $= -70$ KJ/mol
- d) One ΔG^\ddagger with $= -46$ KJ/mol

24. If the leaving group in an S_N2 reaction is attached to an asymmetric carbon

- a) Inversion of configuration of this carbon takes place.
- b) A pair of enantiomers will be formed.
- c) The configuration of this carbon will be maintained.

25. In S_N1 reacti

- a) C
- c) V

26. If the leavi

- a) Inversio
- b) A pair c
- c) The cor

27. The follo

28. When

reaction and

- a) 3°
- b) m
- c) T

29. If cycl

- a) Less
- c) Less
- e) a +

30. The b

- a) Fre
- c) Fre
- e) a +

31. Iodi

han ch

25. In S_N1 reactions the best solvent is:

- a) Chloroform
- b) Ethanol
- c) Water
- d) Ethanol + water mixture

26. If the leaving group in an S_N1 reaction is attached to an asymmetric carbon

- a) Inversion of configuration of this carbon takes place.
- b) A pair of enantiomers will be formed.
- c) The configuration of this carbon will be maintained.

27. The following factors affect the S_N1 reaction except:

- a) The leaving group
- b) The nucleophile
- c) The solvent
- d) None of them

28. When treated with HX, alcohols undergo a nucleophilic substitution reaction and their order of reactivity is

- a) $3^\circ > 2^\circ > 1^\circ > \text{methyl}$
- b) $\text{methyl} > 1^\circ > 2^\circ > 3^\circ$
- c) The type of the alcohol does not affect the substitution reaction.

29. If cyclobutane is planar, it would have

- a) Less angle strain
- b) More angle strain
- c) Less torsional strain
- d) More torsional strain
- e) a + d
- f) b + c

30. The boat conformation of cyclohexane is

- a) Free of angle strain
- b) Free of torsion strain
- c) Free of steric strain
- d) Stabilized by flagpole hydrogens
- e) a + d

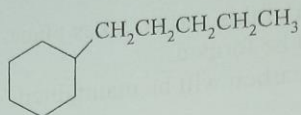
31. Iodide ion is better nucleophile than chloride ion although it is less basic than chloride ion

- a) True
- b) False

32. Allyl lithium reacts with cuprous iodide to give a lithium diallylcopper reagent, which is referred to as

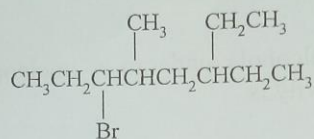
- a) Grignard reagent
b) Gilman reagent

33. The nomenclature of



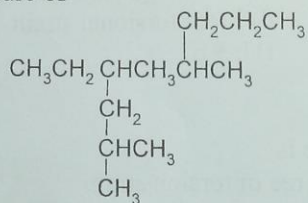
- a) 1-cyclopentylhexane
b) 1-cyclohexylpentane
c) 1-cyclobutylhexane
d) 1-pentylcyclohexane

34. The nomenclature of



- a) 3-ethyl-5-methyl-6-bromoheptane
b) 3-bromo-4-methyl-6-ethylheptane
c) 3-bromo-6-ethyl-4-methylheptane
d) None is true

35. The nomenclature of

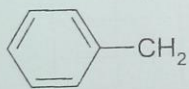


- a) 2,6-dimethyl-4-ethyldecane
b) 4-ethyl-2,6-dimethyldecane
c) 2,6-dimethyl-4-ethylnonane
d) 4-ethyl-2,6-dimethylnonane
e) None

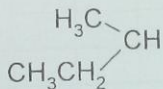
36. In substituted cyclohexanes, 1,3-diaxial interactions takes place when the substituent is in

- a) The equatorial position
b) The axial position
c) Does not exist in monosubstituted cyclohexanes

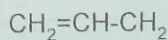
37. If the leaving group in an S_N1 reaction is attached to an asymmetric carbon
- Inversion of configuration of this carbon takes place.
 - A pair of enantiomers will be formed.
 - The configuration of this carbon will be maintained.
38. Reaction of CH_3CH_2Br with reducing metals is a type of nucleophilic substitution reaction
- True
 - False
39. The relative rates of alkyl radical formation by a chlorine radical is
- Tertiary > Secondary > Primary > Methyl
 - Methyl > Primary > Secondary > Tertiary
40. The stability of the following free radicals are arranged as follows



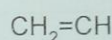
(1)



(2)



(3)



(4)

- $1 > 2 > 3 > 4$
- $2 > 3 > 1 > 4$
- $2 > 4 > 1 > 3$
- $1 > 3 > 2 > 4$
- None is right.

امتحان الجبر

Answer Sheet I

No	a	b	c	d	e	f	No	a	b	c	d	e	f
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