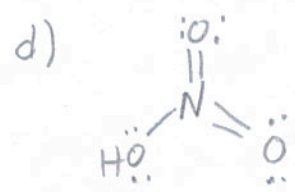
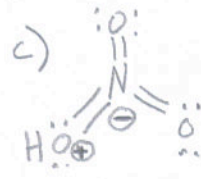
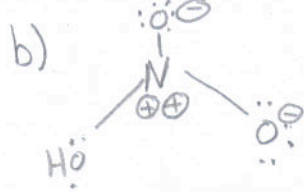
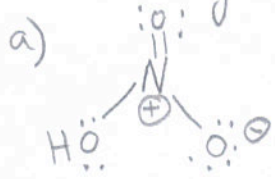


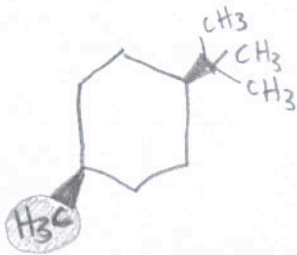
B. Colonna

Test #1

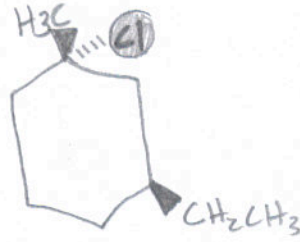
① I identify the best Lewis dot structure for nitric acid HNO_3 .



② Predict whether the highlighted substituent is axial or equatorial (assume the most stable configuration).



A



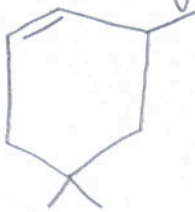
B



C

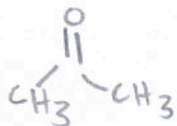
- 1) A=e, B=e, C=e
- 2) A=a, B=a, C=e
- 3) A=a, B=e, C=a
- 4) A=e, B=e, C=a
- 5) A=a, B=a, C=a

③ Name the following compound



④ What is the formal charge on the BH_4^- molecule?

⑤ acetone looks like the following:



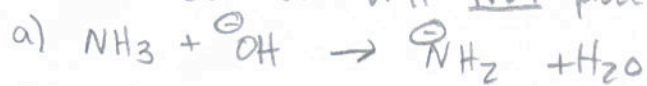
and has a structure:



Identify this orbital.

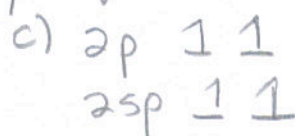
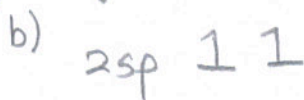
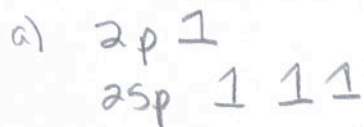
- a) sigma (σ)
- b) sigma antibonding (σ^*)
- c) pi (π)
- d) pi antibonding (π^*)

⑥ Which reaction will NOT proceed in the indicated direction?

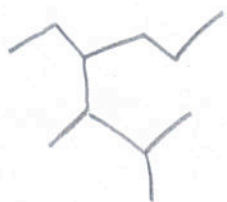


⑦ What is the correct molecular orbital diagram for H_2^+ ?

⑧ What is the correct energy diagram for an sp hybridized carbon?



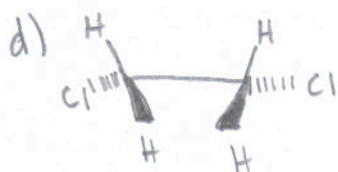
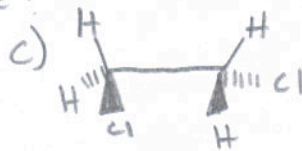
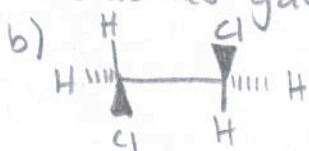
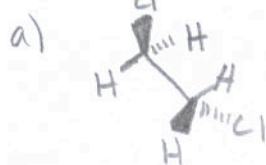
9) Name the following compound:



10) Which of the following conformation of 1,2-dichloroethane has the largest dipole moment?

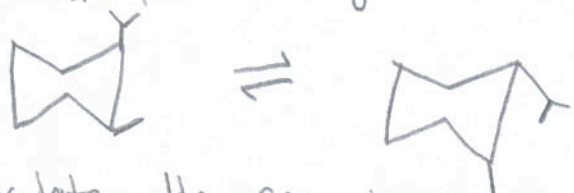
- a) Cl-Cl anti
- b) Cl-Cl gauche
- c) Cl-Cl eclipsed
- d) Cl-H anti

11) Which conformation has the chlorines gauche?



12) Skipped due to error in test.

13) Consider the following:



calculate the approximate ratio of the z conformers at 25°C.

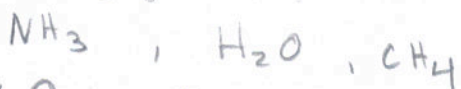
- a) 1:99
- b) 10:90
- c) 20:80
- d) 35:65

14) Predict the favorable direction of the two acid/base equilibria shown.



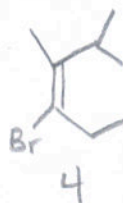
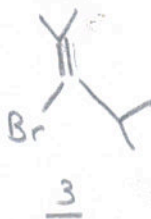
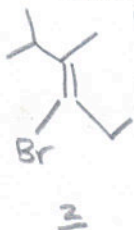
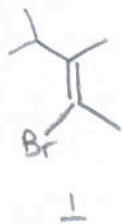
- a) $A \rightarrow, B \rightarrow$
 b) $A \leftarrow, B \leftarrow$
 c) $A \rightarrow, B \leftarrow$
 d) $A \leftarrow, B \rightarrow$

15) Rank the conj. bases of the following in order of increasing basicity:



- a) $CH_3^{\ominus} < OH^{\ominus} < NH_2^{\ominus}$
 b) $CH_3^{\ominus} < NH_2^{\ominus} < OH^{\ominus}$
 c) $NH_2^{\ominus} < OH^{\ominus} < CH_3^{\ominus}$
 d) $OH^{\ominus} < CH_3^{\ominus} < NH_2^{\ominus}$
 e) $OH^{\ominus} < NH_2^{\ominus} < CH_3^{\ominus}$

16) Which of the following alkenes are stereoisomers?



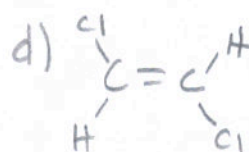
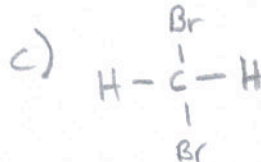
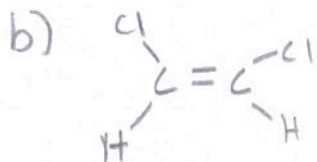
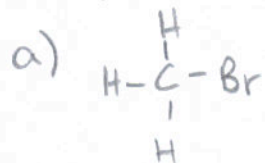
- a) 1 & 3
 b) 4 & 1
 c) 2 & 4
 d) 3 & 2

17) What orbitals are used to form the σ bond in the $C=N$ bond in the following:



- a) $C sp^2 - N sp$
 b) $C sp - N sp$
 c) $C sp^2 - N sp^2$
 d) $C p - N p$
 e) $C sp - N sp^3$

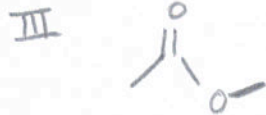
18) Which of the following molecules is not polar (has no dipole moment)?



19) Predict for each of the following which has the higher boiling point:



or



or



or



a) I, III, IV

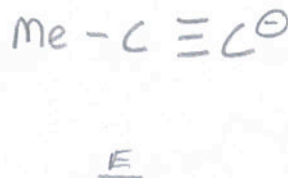
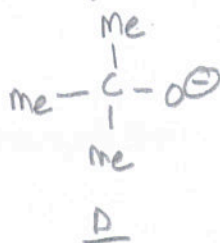
b) II, IV, VI

c) I, IV, VI

d) I, III, V

e) II, III, VI

20) Predict the strength of the following bases from weakest to strongest:



a) C D E A B

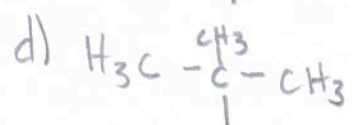
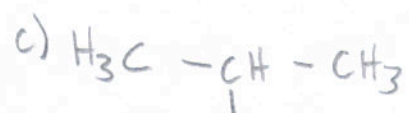
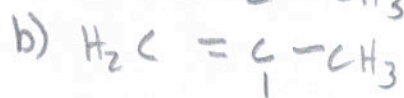
b) C B E D A

c) A D E B C

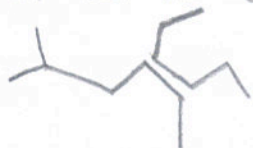
d) C E B A D

e) A D B E C

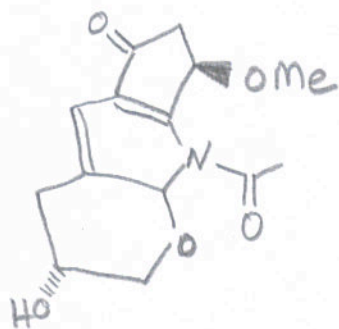
21) Which of the following groups would have the highest priority under the (E, Z) system?



22) What is the correct name for the following molecule?



23) What is the degree of unsaturation for the following molecule?



a) 2

b) 6

c) 7

d) 9

Answer Key
Colonna Test # 1

1) a

2) 2

3) 3,5,5-trimethylcyclohexene

4) B: -1

H₁: 0

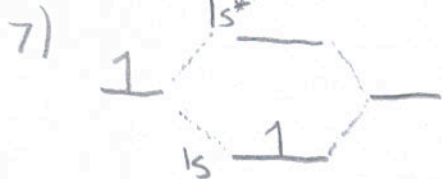
H₂: 0

H₃: 0

H₄: 0

5) d

6) a



8) c

9) 4-ethyl-2,3-dimethylheptane

10) c

11) b

12) skipped

13) d

14) b

15) e

16) c

17) c

18) d

19) c

20) c

21) a

22) (E)-4-ethyl-3,6-dimethyl-3-heptene

23) c