

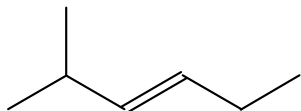
CHEM 231
SUMMER 2005
TEST # 1

Name: _____

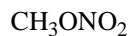
Circle the letter corresponding to the best answer or provide the answer when indicated:

Chemical Bonding

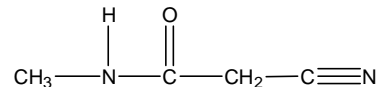
- Which of the following is the most electronegative?
a) B b) Li c) O d) I e) H
- What is the valence of oxygen
a) 2 b) 3 c) 4 d) 5 e) 6
- What number of valence electrons does N have?
a) 2 b) 3 c) 4 d) 5 e) 6
- What element has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^4$?
a) Al b) Si c) P d) S e) Cl
- How many hydrogens are present in the molecule below?



- Draw a complete Lewis structure for the compound with the condensed formula below:



Consider the compound below in answering questions 7 – 14.



7. How many lone pairs of electrons are present?

- a) 1 b) 2 c) 3 d) 4 e) 5

8. How many pi bonds are present?

- a) 1 b) 2 c) 3 d) 4 e) 5

9. How many sigma bonds are present?

- a) 5 b) 7 c) 10 d) 12 e) 15

10. What is the hybridization of the nitrogen on the right?

- a) sp b) sp² c) sp³ d) sp⁴

11. What is the hybridization of the nitrogen on the left?

- a) sp b) sp² c) sp³ d) sp⁴

12. What is the hybridization of the carbon in the CH₃ group?

- a) sp b) sp² c) sp³ d) sp⁴

13. What is the hybridization of the carbon in the CH₂ group?

- a) sp b) sp² c) sp³ d) sp⁴

14. What is the hybridization of the oxygen?

- a) sp b) sp² c) sp³ d) sp⁴

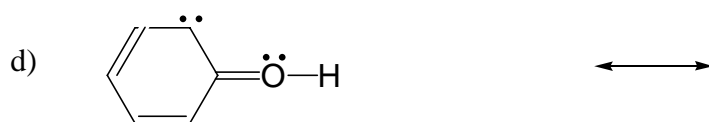
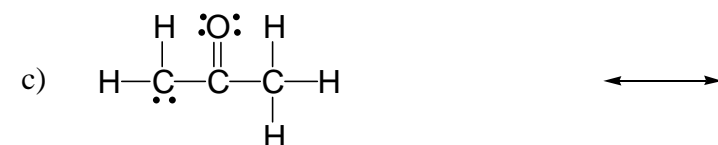
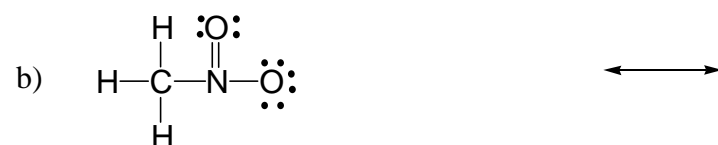
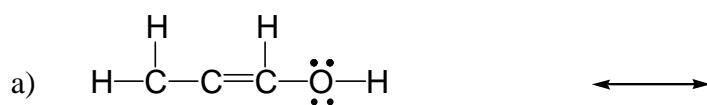
15. Using stereochemical drawing, provide the structures of two stereoisomers with the formula $C_4H_6F_2$:

16. Provide the structure of a constitutional isomer of the stereoisomer in problem 15 above:

17. What is the geometry and approximate bond angle associated with each of the following:

	<u>geometry</u>	<u>bond angle (°)</u>
a) CH_3^- (H-C-H)	_____	_____
b) BF_3 (F-B-F)	_____	_____
c) H_2S (H-S-H)	_____	_____
d) NF_3 (F-N-F)	_____	_____
e) CF_4 (F-C-F)	_____	_____
f) CHCH (C-C-H)	_____	_____

18. Draw a reasonable resonance structure for each of the following Lewis structures. Circle the most stable structure (do not circle either if they are equally stable). Indicate the presence of any formal change in all of the structures.



19. Indicate (using the letters below) the relationship between the following pairs of structures:

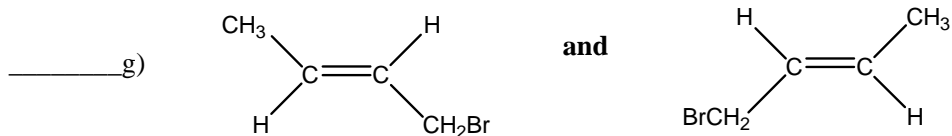
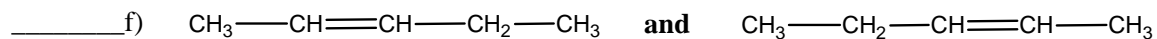
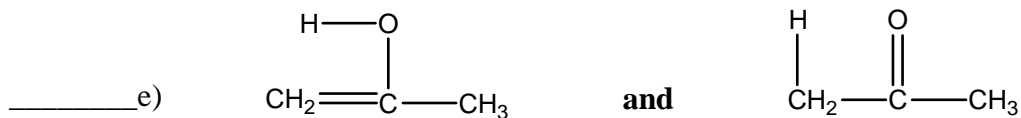
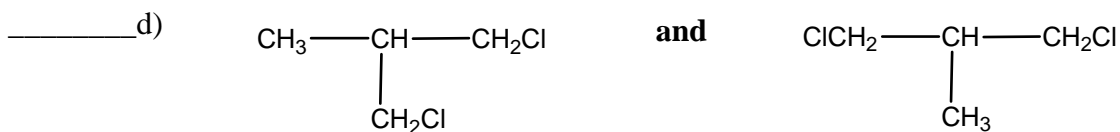
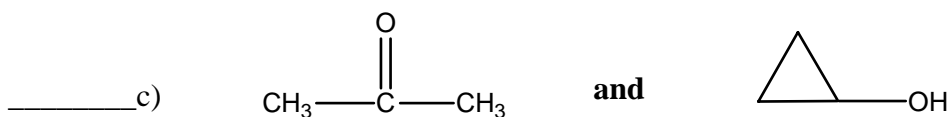
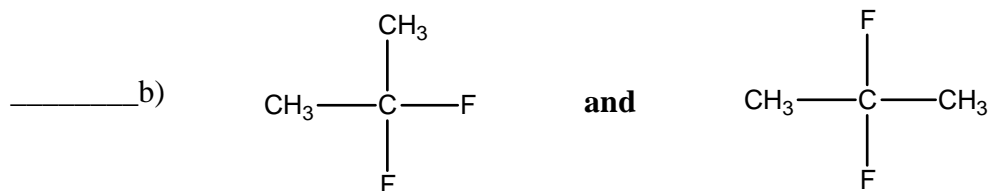
I – Identical

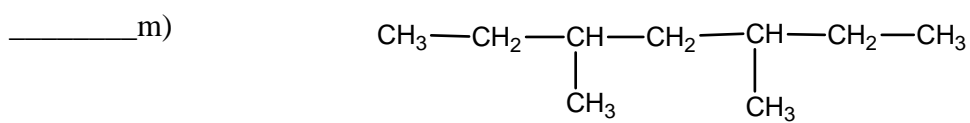
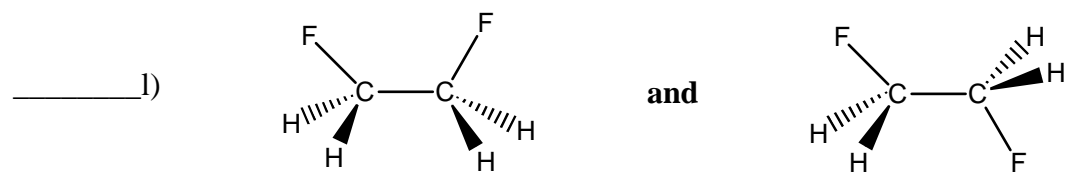
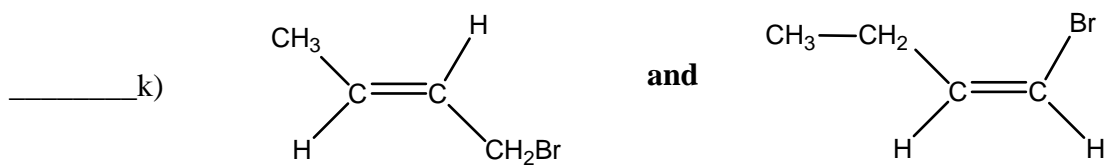
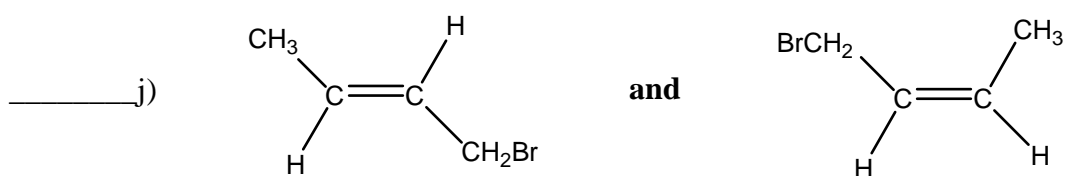
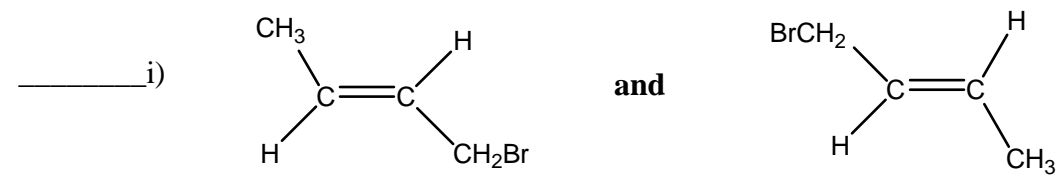
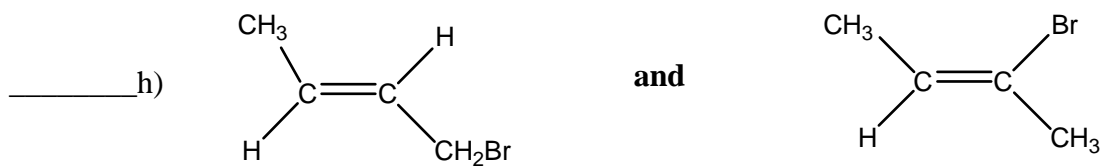
C – Constitutional Isomers

S – Stereoisomers

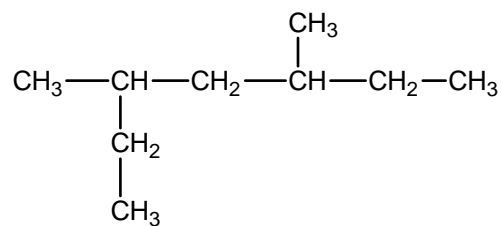
R – Resonance Structures

U – Unrelated Compounds





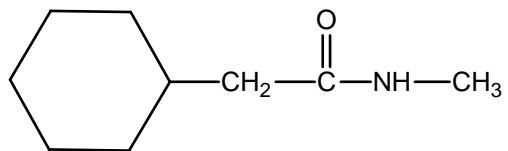
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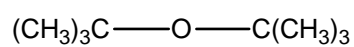
Functional Groups

1. Identify the functional group (omit alkane) in each of the following molecules:

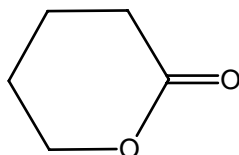
_____ a)



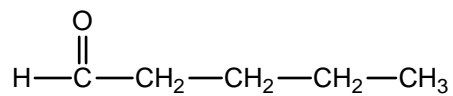
_____ b)



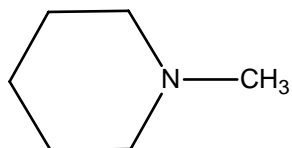
_____ c)



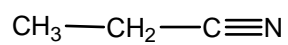
_____ d)



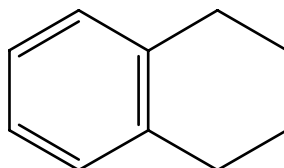
_____ e)



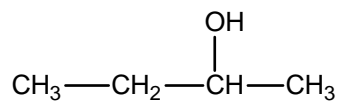
_____ f)



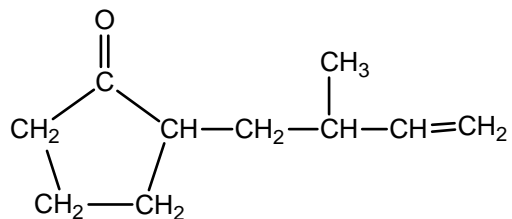
_____ g)



_____ h)



Consider the following molecule in answering questions 2 – 4.

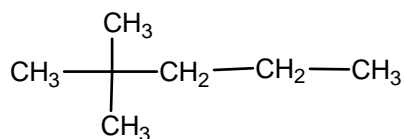


2. Draw a bond – line structure for the molecule above.

3. What functional groups are present in the molecule above?

4. Draw a constitutional isomer of the compound above which has none of the same functional groups.

5. How many primary carbons does the compound below have?



- a) 1 b) 2 c) 3 d) 4 e) 5

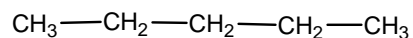
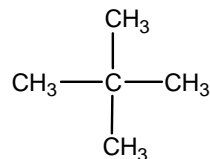
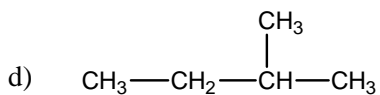
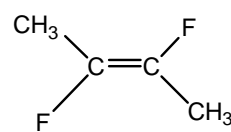
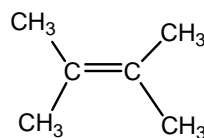
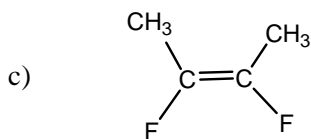
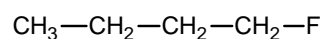
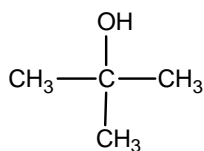
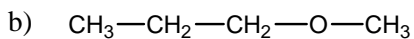
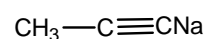
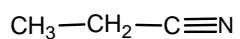
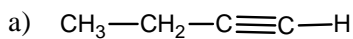
6. How many tertiary hydrogens does the compound in problem 5 have?

- a) 0 b) 2 c) 4 d) 6 e) 12

7. Which of the following would have the greatest solubility in water?

- a) CH_3I d) CH_3OH
 b) CF_4 e) CH_3OCH_3
 c) CO_2

8. In each of the following groups of compounds, circle the compound with the highest boiling point:



9. In each of the following groups, circle the compound with the largest dipole moment:

