

CHEM 231
SUMMER 2005
TEST # 2

Name: _____

Organic Reaction

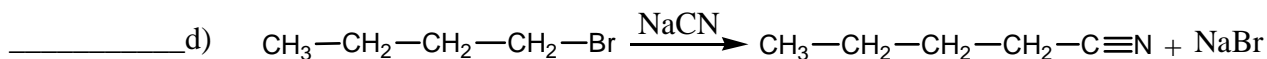
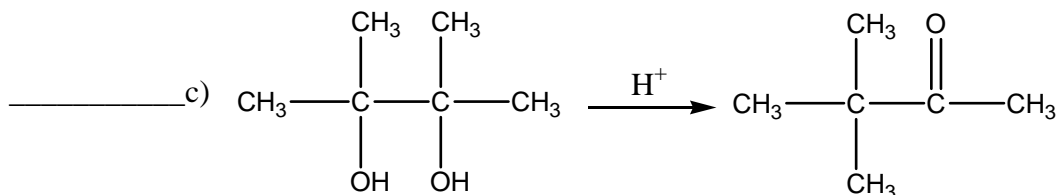
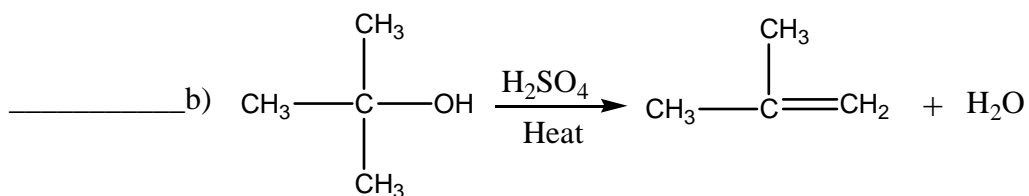
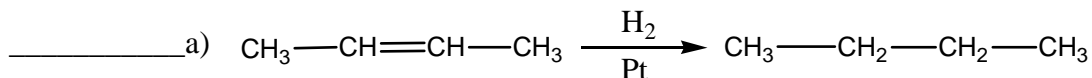
1. Match each of the reactions below with the types of reactions listed below:

A. Substitution

C. Addition

B. Elimination

D. Rearrangement



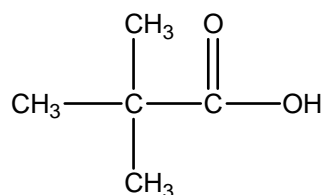
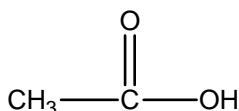
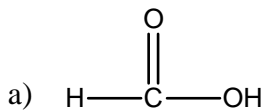
2. Fill in the blanks in the following statements:

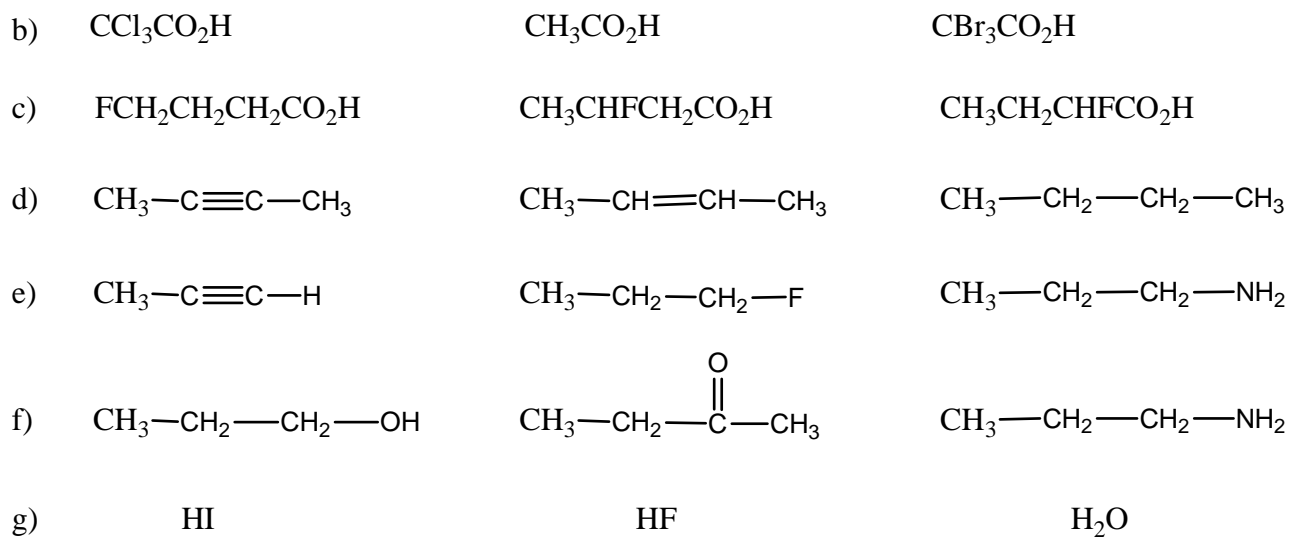
a) Heterolytic bond cleavage leads to the formation of _____.

b) Homolytic bond cleavage leads to the formation of _____.

Acid – Base Reactions

1. Circle the most acidic compound in each of the following groups of compounds:

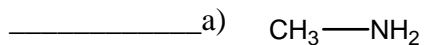
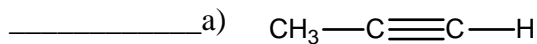
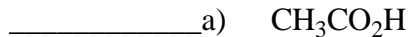




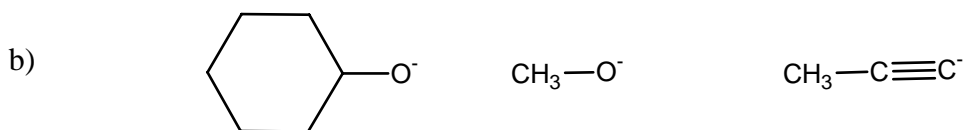
2. Define a Lewis base:

3. Define a Bronsted – Lowry Acid:

4. Identify the approximate pka for each of the following:



5. Circle the strongest base in each of the following groups of ions:



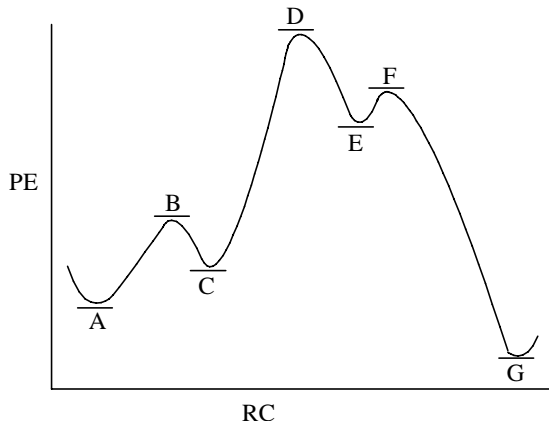
6. Reactions in which the bond dissociation energies of the bonds broken in the reactants are greater than those of the bonds formed in the reaction are said to be

_____.

7. Provide an equation showing the relationship between the free energy of a reaction and its equilibrium constant:

8. Provide an equation showing the relationship between the free energy of a reaction and its entropy and enthalpy.

Consider the reaction profile below in answering questions 9 – 12.



9. How many intermediates are formed during this reaction?

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

10. How many transition states are formed during the reaction?

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

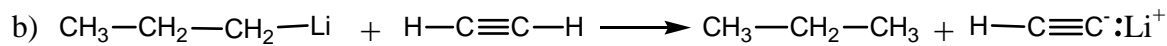
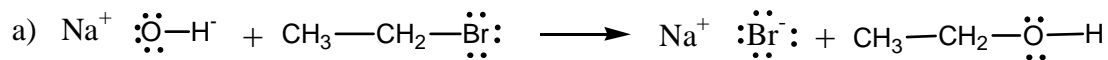
11. Which step is the rate – determining – step for the reaction?

- a) $A \longrightarrow C$ b) $C \longrightarrow E$ c) $E \longrightarrow G$ d) $B \longrightarrow D$ e) $C \longrightarrow F$

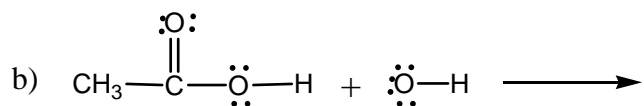
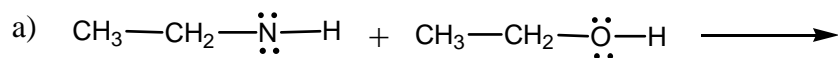
12. The overall reaction is?

- a) isothermic d) endothermic
 b) exothermic c) ectothermic
 c) epithermic

13. Use the curved – arrow formalism to show electron movement in the following reaction:

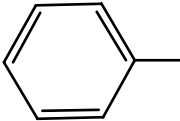
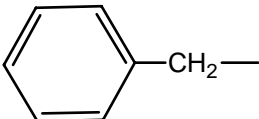


14. Complete the following acid – base reactions using the curved – arrow formalism to show electron movement. Label the acid, base, conjugate acid and conjugate base in each case:



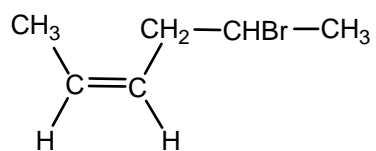
Alkane Nomenclature

1. Match each of the following groups and group names:

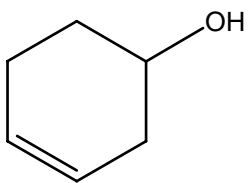
- | | | |
|----------|--|-----------------|
| _____ a) | $\text{CH}_3\text{—CH}_2\text{—}\overset{\text{CH}_3}{\text{CH}}\text{—}$ | A) Benzyl |
| _____ b) | $\text{CH}_3\text{—}\overset{\text{CH}_3}{\text{CH}}\text{—CH}_2\text{—}$ | B) Isopropyl |
| _____ c) | $\text{CH}_3\text{—}\overset{\text{CH}_3}{\text{CH}}\text{—}$ | C) Tert - butyl |
| _____ d) | $\text{CH}_2\text{=CH—}$ | D) Vinyl |
| _____ e) | $\text{CH}_3\text{—}\overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}}\text{—}$ | E) Sec - butyl |
| _____ f) |  | F) Neopentyl |
| _____ g) | $\text{CH}_3\text{—}\overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}}\text{—CH}_2\text{—}$ | G) Isobutyl |
| _____ h) |  | H) Phenyl |

2. Provide IUPAC names for each of the following:

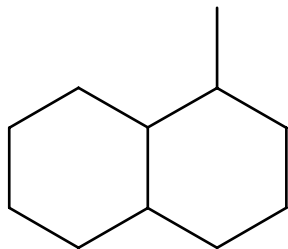
a) _____



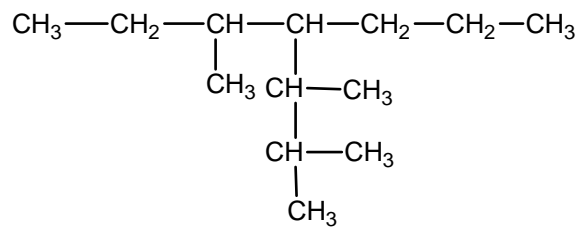
b) _____



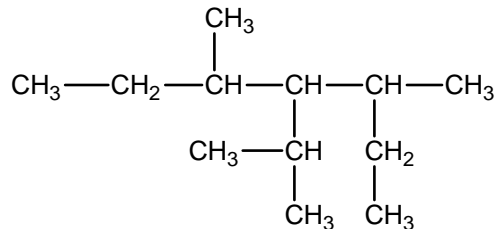
c) _____



c) _____



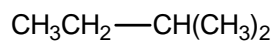
3. Consider the following compound in answering the questions below:



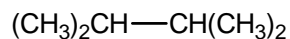
- _____ a) How many primary carbons does the compound have?
- _____ b) How many different kinds of primary carbon does the compound have?
- _____ c) How many tertiary hydrogens does the compound have?
- _____ d) How many different kinds of tertiary hydrogens does the compound have?

Conformations

1. Draw, using a Newman projection, the most stable conformation about the bond shown in the compound below:



2. Draw, using a Newman projection, the least stable conformation about the bond shown in the compound below:



3. List the conformations of cyclohexane from most stable to least stable:

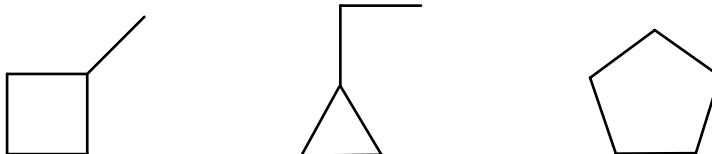
_____ I _____ II _____ III _____ IV
(most stable) (least stable)

4. Draw an example of each of the following:

a) a fused ring compound

b) a spiro compound

5. Circle the compound below with largest heat of combustion:



6. Draw the two chair conformations of each of the following compounds and circle the most stable conformer if one is more stable than the other.

a) cis - 1, 3 - dimethylcyclohexane

b) cis - 1 - tert-butyl - 4 - methylcyclohexane

Reactions

Complete the following reactions by providing either the major product or missing reagents:

