

9A

Exam III Physical Science (PSC 102) Form A 10/28/18 M 9 am MWF Dr. Hahn Exam # \_\_\_\_\_

Name Key (print) Name \_\_\_\_\_ (sign)

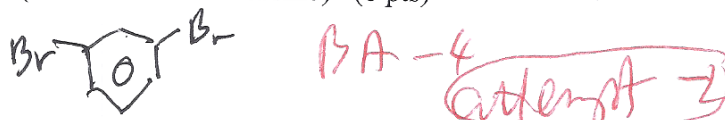
Please show work for partial credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (2 pts print AND sign exam)

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (No Partial Credit for MC) (3 pts per question, 21 pts total)**

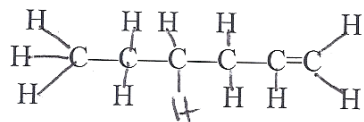
- 1) Hydrocarbons containing all single bonds and a ring in their structural formulas are  
 A) alkane       B) cycloalkane      C) alkene      D) alkyne      1) B
- 2) A hydrocarbon that contains one or more benzene rings must be classified as  
 A) aromatic      B) alkene      C) alkane      D) alkyne      2) A
- 3) In organic molecules, a carbon atom will normally form how many bonds?  
 A) 3      B) 2      C) 1       D) 4      3) D
- 4) Hydrocarbons containing only single bonds are  
 A) alkene      B) alkyne      C) aromatic       D) alkane      4) D
- 5) What organic compound is represented by a hexagon with a circle inside?  
 A) cyclooctane       B) benzene      C) ethane      D) cyclohexane      5) B
- 6) Compounds that have the same molecular formula but different structural formulas are called structural, or constitutional  
 A) isomer      B) congeners      C) isotope      D) derivative      6) A
- 7) Hydrocarbons containing carbon-carbon triple bonds are  
 A) alkane      B) alkene       C) alkyne      D) aromatic      7) C

**Part II: Short Answers** (44 pts) Show work on all questions for **partial and full credit** even on questions which do not specify.

1. Draw the structure of 1,3-dibromobenzene (Br substituent is bromo) (8 pts)



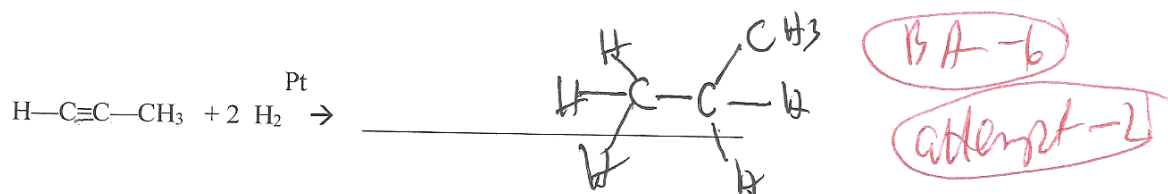
2. Name the following alkene (6 C alkane is hexane) (don't forget to number your molecule) (8 pts)



1-hexene

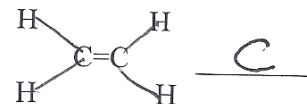
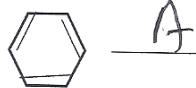
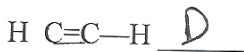
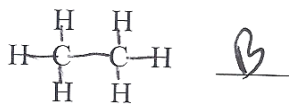
BA-4 attempt-2

3. Show the product of the following reaction. (12 pts)



4. **Functional Groups:**

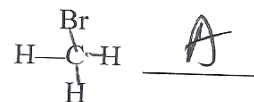
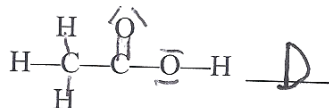
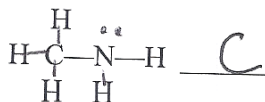
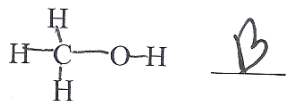
- A. Fill in the blank to match the structure & name. (A) benzene (B) Alkane (C) alkene (D) alkyne (8 pts, 2 pts each blank)



- B. Fill in the blank with the letter of the functional group. (8 pts, 2 pts each)

- (A) Alkyl halide  $\text{R}-\text{X}$  (B) Alcohol  $\text{R}-\text{O}-\text{H}$  (C) Amine  $\text{R}-\text{NH}_2$

- (D) carboxylic acid  $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{H}$  (E) Amide  $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{NHR}'$  (F) ester  $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{R}'$



**Part III: Long Answers** (33 pts) Show work on all questions for partial and full credit even on questions which do not specify. Remember "attempt" points.

1.a. 1 mole of Li = 6.94 grams (6 pts)

*attempt -1 BA-3*

b. 1 mole of  $K_3N$  = 131.31 grams show work (6 pts)

$$3(39.10) + 14.01 = 131.31$$

*NW -3*

c. What is the molarity of a solution made by dissolving 7.2 moles of NaOH in water to make up 0.20 Liters of the sodium hydroxide solution? (Molarity = moles solute / liters of solution) (6 pts)

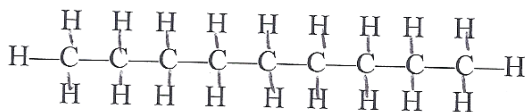
$$\frac{7.2 \text{ mol NaOH}}{0.20 \text{ L}} = 36 \text{ M}$$

*BA-3*

*attempt -1*

5. Constitutional Isomer - (15 pts, 5 pts each)

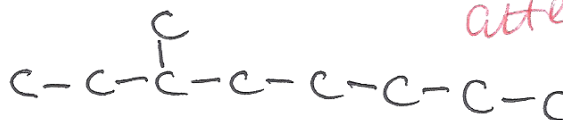
a. Show one constitutional isomer of the following molecule (5 pts)



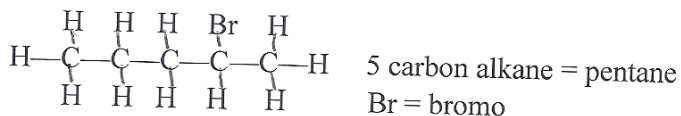
9 carbon molecule

*BA -2 1/2*

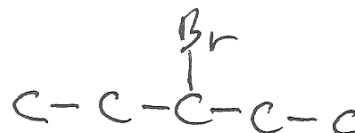
*attempt -1*



b. Show one constitutional isomer of the following molecule (5 pts)



5 carbon alkane = pentane  
Br = bromo



*BA-2 1/2*

*attempt -1*

c. name the original molecule above (in b) (not the constitutional isomer that you drew above, don't forget to number your molecule). (5 pts)

*2-bromopentane*

*BA -2 1/2*

*attempt -1*

93

Name Key (print) Name \_\_\_\_\_ (sign)

Please show work for partial credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (2 pts print AND sign exam)

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (No Partial Credit for MC) (3 pts per question, 21 pts total)**

- 1) Hydrocarbons containing carbon-carbon triple bonds are  
A) alkene      B) alkyne      C) aromatic      D) alkane      1) B
- 2) Hydrocarbons containing all single bonds and a ring in their structural formulas are  
A) alkene      B) alkyne      C) alkane      D) cycloalkane      2) D
- 3) In organic molecules, a carbon atom will normally form how many bonds?  
A) 1      B) 2      C) 3      D) 4      3) D
- 4) What organic compound is represented by a hexagon with a circle inside?  
A) ethane      B) benzene      C) cyclooctane      D) cyclohexane      4) B
- 5) Compounds that have the same molecular formula but different structural formulas are called structural, or constitutional  
A) isotope      B) congeners      C) derivative      D) isomer      5) D
- 6) Hydrocarbons containing only single bonds are  
A) alkene      B) aromatic      C) alkane      D) alkyne      6) C
- 7) A hydrocarbon that contains one or more benzene rings must be classified as  
A) alkyne      B) alkene      C) alkane      D) aromatic      7) D

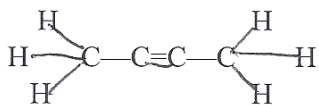
**Part II: Short Answers** (44 pts) Show work on all questions for partial and full credit even on questions which do not specify.

1. Draw the structure of 1,4-dimethylbenzene (methyl substituent is CH<sub>3</sub>—) (8 pts)

attempt - 2  
BA - 4



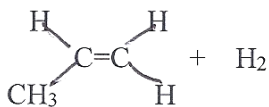
2. Name the following alkyne (4 C alkane is butane) (don't forget to number your molecule) (8 pts)



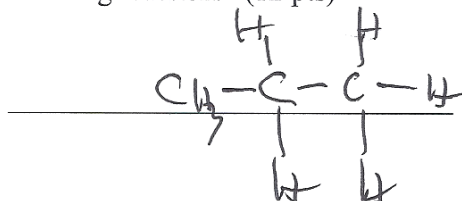
attempt - 2  
BA - 4

2-butyne

3. Show the product of the following reaction. (12 pts)



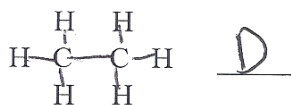
Pt →



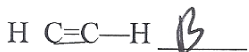
attempt - 2  
BA - 6

**4. Functional Groups:**

A. Fill in the blank to match the structure & name. (A) alkene (B) alkyne (C) benzene (D) Alkane (8 pts, 2 pts each blank)



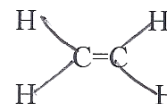
D



B



C

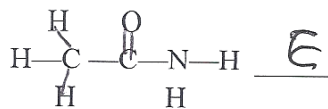


A

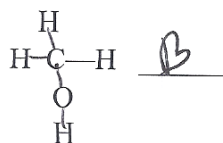
B. Fill in the blank with the letter of the functional group. (8 pts, 2 pts each)

(A) Alkyl halide R—X (B) Alcohol R—O—H (C) Amine R—NH<sub>2</sub>

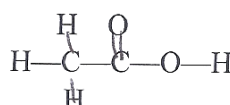
(D) carboxylic acid R—C(=O)—O—H (E) Amide R—C(=O)—NHR' (F) ester R—C(=O)—O—R'



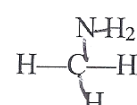
E



B



D



C



11 A

Name Key (print) Name \_\_\_\_\_ (sign)

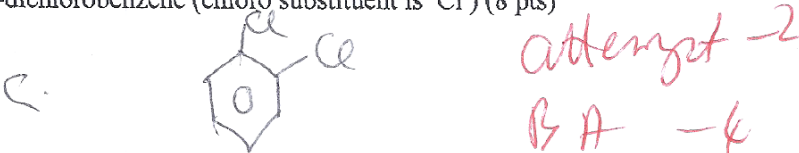
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Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (No Partial Credit for MC) (3 pts per question, 21 pts total)

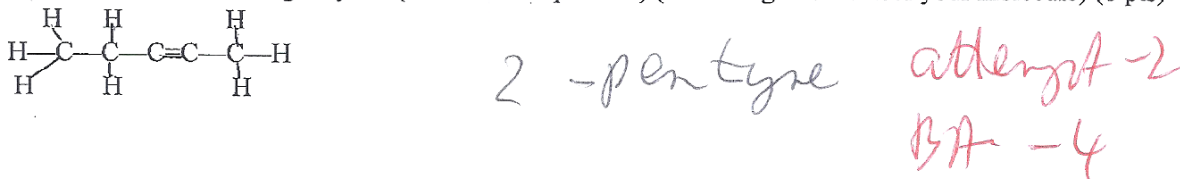
- 1) What organic compound is represented by a hexagon with a circle inside? 1) C  
A) ethane                      B) cyclohexane                      C) benzene                      D) cyclooctane
- 2) Compounds that have the same molecular formula but different structural formulas are called structural, or constitutional 2) D  
A) isotope                      B) derivative                      C) congeners                      D) isomer
- 3) Hydrocarbons containing all single bonds and a ring in their structural formulas are 3) D  
A) alkene                      B) alkane                      C) alkyne                      D) cycloalkane
- 4) Hydrocarbons containing carbon-carbon triple bonds are 4) B  
A) aromatic                      B) alkyne                      C) alkene                      D) alkane
- 5) In organic molecules, a carbon atom will normally form how many bonds? 5) B  
A) 1                      B) 4                      C) 2                      D) 3
- 6) Hydrocarbons containing only single bonds are 6) A  
A) alkane                      B) alkyne                      C) aromatic                      D) alkene
- 7) A hydrocarbon that contains one or more benzene rings must be classified as 7) B  
A) alkyne                      B) aromatic                      C) alkane                      D) alkene

**Part II: Short Answers** (44 pts) Show work on all questions for **partial and full credit** even on questions which do not specify.

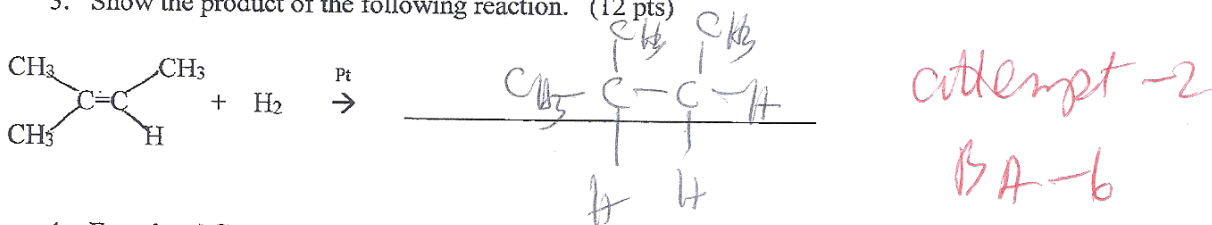
1. Draw the structure of 1,2-dichlorobenzene (chloro substituent is Cl) (8 pts)



2. Name the following alkyne (5 C alkane is pentane) (don't forget to number your molecule) (8 pts)

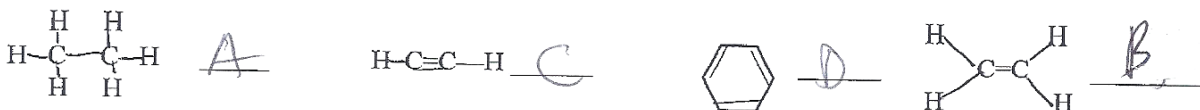


3. Show the product of the following reaction. (12 pts)



4. **Functional Groups:**

A. Fill in the blank to match the structure & name. (A) Alkane (B) alkene (C) alkyne (D) benzene (8 pts, 2 pts each)



B. Fill in the blank with the letter of the functional group. (8 pts, 2 pts each)

(A) Alkyl halide R-X      (B) Alcohol R-O-H      (C) Amine R-NH<sub>2</sub>

(D) carboxylic acid R-C(=O)-O-H      (E) Amide R-C(=O)-NHR'      (F) ester R-C(=O)-O-R'





**Part III: Long Answers** (33 pts) Show work on all questions for partial and full credit even on questions which do not specify. Remember "attempt" points.

1 a. 1 mole of Sr = 87.82 grams (6 pts)

b. 1 mole of CaBr<sub>2</sub> = 199.88 grams show work (6 pts)

$$40.08 + 2(79.9) =$$

attempt -1  
NW -3  
BA -3

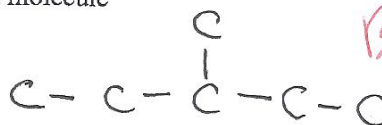
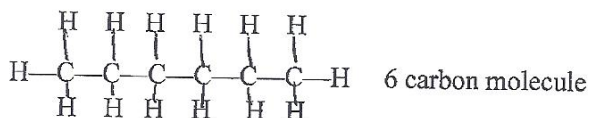
c. What is the molarity of a solution made by dissolving 4.2 moles of NaOH in water to make up 7.2 Liters of the sodium hydroxide solution? (Molarity = moles solute / liters of solution) (6 pts)

$$\frac{4.2 \text{ mol}}{7.2 \text{ L}} = 0.58 \text{ M}$$

attempt -1  
BA -3

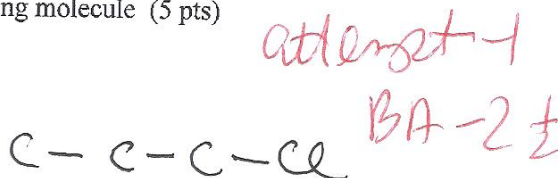
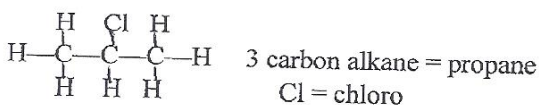
2. Constitutional Isomer - (15 pts, 5 pts each)

a. Show one constitutional isomer of the following molecule (5 pts)



attempt -1  
BA -2½

b. Show one constitutional isomer of the following molecule (5 pts)



attempt -1  
BA -2½

c. name the original molecule above (in b) (not the constitutional isomer that you drew above, don't forget to number your molecule). (5 pts)

2-chloropropane

attempt -1  
BA -2½

11 B

Name Key (print) Name \_\_\_\_\_ (sign)

Please show work for partial credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If I cannot read your work, I obviously cannot grade it. (2 pts print AND sign exam)

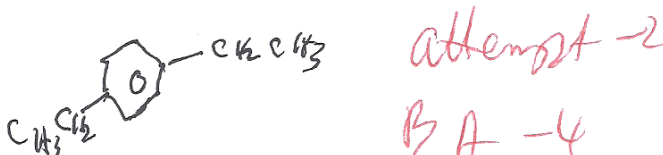
green

**Part I MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (No Partial Credit for MC) (3 pts per question, 21 pts total)**

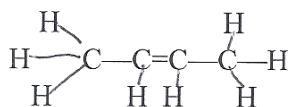
- 1) A hydrocarbon that contains one or more benzene rings must be classified as 1) C  
 A) alkene                      B) alkyne                      C) aromatic                      D) alkane
- 2) Hydrocarbons containing all single bonds and a ring in their structural formulas are 2) C  
 A) alkene                      B) alkane                      C) cycloalkane                      D) alkyne
- 3) Compounds that have the same molecular formula but different structural formulas are called structural, or constitutional 3) A  
 A) isomer                      B) derivative                      C) congeners                      D) isotope
- 4) Hydrocarbons containing carbon-carbon triple bonds are 4) C  
 A) alkene                      B) aromatic                      C) alkyne                      D) alkane
- 5) What organic compound is represented by a hexagon with a circle inside? 5) D  
 A) cyclooctane                      B) ethane                      C) cyclohexane                      D) benzene
- 6) In organic molecules, a carbon atom will normally form how many bonds? 6) B  
 A) 2                      B) 4                      C) 1                      D) 3
- 7) Hydrocarbons containing only single bonds are 7) D  
 A) alkene                      B) aromatic                      C) alkyne                      D) alkane

**Part II: Short Answers** (44 pts) Show work on all questions for partial and full credit even on questions which do not specify.

1. Draw the structure of 1,4-diethylbenzene (ethyl substituent is  $\text{CH}_3\text{CH}_2-$ ) (8 pts)

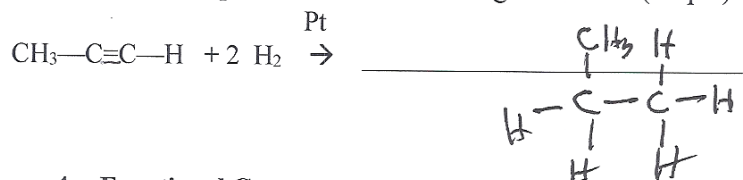


2. Name the following alkene (4 C alkane is butane) (don't forget to number your molecule) (8 pts)



2-butene  
attempt -2  
BA -4

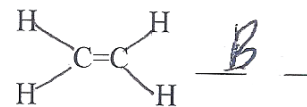
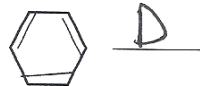
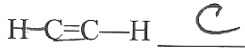
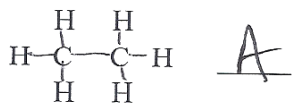
3. Show the product of the following reaction. (12 pts)



attempt -2  
BA -6

4. Functional Groups:

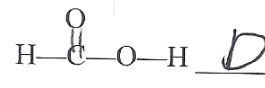
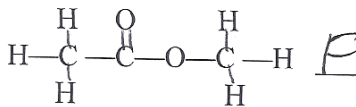
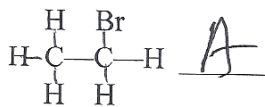
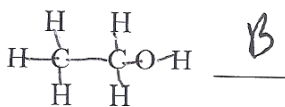
A. Fill in the blank to match the structure & name. (A) Alkane (B) alkene (C) alkyne (D) benzene (8 pts, 2 pts each blank)



B. Fill in the blank with the letter of the functional group. (8 pts, 2 pts each)

(A) Alkyl halide  $\text{R}-\text{X}$  (B) Alcohol  $\text{R}-\text{O}-\text{H}$  (C) Amine  $\text{R}-\text{NH}_2$

(D) carboxylic acid  $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{H}$  (E) Amide  $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{NHR}'$  (F) ester  $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{R}'$



**Part III: Long Answers** (33 pts) Show work on all questions for partial and full credit even on questions which do not specify. Remember "attempt" points.

1. a. 1 mole of Ba = 137.33 grams (6 pts)

b. 1 mole of AlCl<sub>3</sub> = 133.5 grams show work (6 pts)

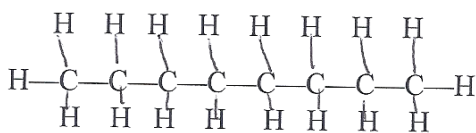
$27.0 + 3(35.5) = 133.5$

c. What is the molarity of a solution made by dissolving 1.9 moles of Na OH in water to make up 4.2 Liters of the sodium hydroxide solution? (Molarity = moles solute / liters of solution) (6 pts)

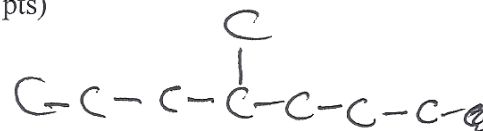
$\frac{1.9 \text{ mol}}{4.2 \text{ L}} = 0.45 \text{ M}$

2. Constitutional Isomer - (15 pts, 5 pts each)

a. Show one constitutional isomer of the following molecule (5 pts)



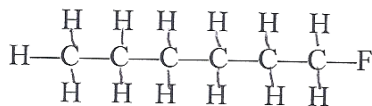
8 carbon molecule



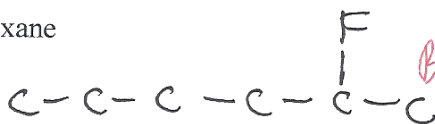
attempt -1

BA - 2 1/2

b. Show one constitutional isomer of the following molecule (5 pts)



6 carbon alkane = hexane  
F = fluoro



attempt -1

BA - 2 1/2

c. name the original molecule above (in b) (not the constitutional isomer that you drew above, don't forget to number your molecule). (5 pts)

1-fluorohexane

attempt -1

BA - 2 1/2