



UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA
FIRST SEMESTER EXAMINATIONS, NOV/DEC 2018

COURSE NO: ORGANIC CHEMISTRY

COURSE NAME: PE 271

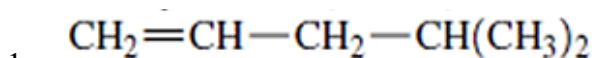
CLASS: PE 2017

TIME: 3 HOURS

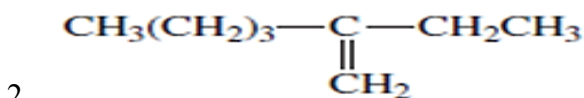
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SECTION A (50 MARKS) - ANSWER ALL QUESTIONS

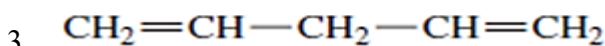
Provide the appropriate IUPAC name for the following compounds (Question 1 to 10)



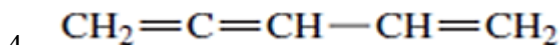
- | | |
|-----------------------|-----------------------|
| a. 4-methylpent-1-ene | c. 2-methylpent-1-ene |
| b. 3-methylpent-1-ene | d. 1-methylpent-1-ene |



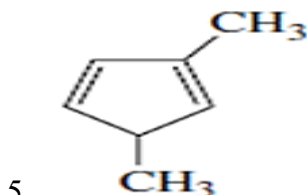
- | | |
|---------------------|---------------------|
| a. 5-ethylhex-2-ene | c. 1-ethylhex-2-ene |
| b. 2-ethylhex-5-ene | d. 2-ethylhex-1-ene |



- | | |
|--------------------|--------------------|
| a. penta-2,5-ene | c. penta-1,4-ene |
| b. penta-2,5-diene | d. penta-1,4-diene |



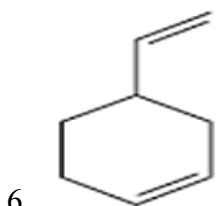
- | | |
|-----------------------|-----------------------|
| a. penta-1,2,4-triene | c. penta-2,4,5-triene |
| b. penta-1,3,4-triene | d. penta-2,3,5-triene |



- | | |
|-------------------------------------|-------------------------------------|
| a. 1,3-dimethylcyclopenta-2,5-diene | b. 1,3-dimethylcyclopenta-1,4-diene |
|-------------------------------------|-------------------------------------|

c. 2,5-dimethylcyclopenta-1,3-diene

d. 1,4-dimethylcyclopenta-1,3-diene

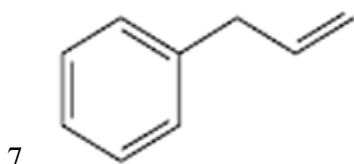


a. 3-vinylcyclohexene

c. vinylcyclohex-4-ene

b. 4-vinylcyclohexene

d. vinylcyclohex-3-ene

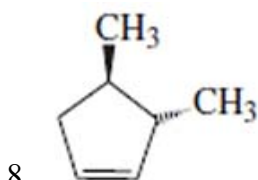


a. 4-phenylpropene

c. 2-phenylpropene

b. 3-phenylpropene

d. phenylpropene

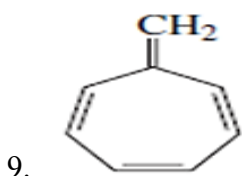


a. cis-3,4-dimethylcyclopentene

c. cis-2,3-dimethylcyclopentene

b. trans-2,3-dimethylcyclopentene

d. trans-3,4-dimethylcyclopentene

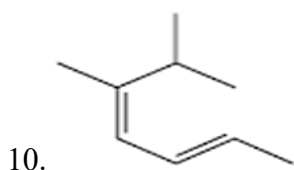


a. 7-methylenecyclohepta-1,3,5-triene

c. methylenecyclohepta-1,3,5,7-tetraene

b. 7-methylenecyclohepta-1,3,5-tetraene

d. 1-methylenecyclohepta-1,3,5-triene



- | | |
|--|--|
| a. (4E,2Z)-5,6-dimethylhepta-2,4-diene | c. (2E,4Z)-5,6-dimethylhepta-2,4-diene |
| b. (2E,4Z)-2,3-dimethylhepta-2,4-diene | d. (4E,2Z)-2,3-dimethylhepta-2,4-diene |

Determine the number of elements of unsaturation (Question 11 to 15)

11. $C_4H_4Cl_2$

- | | |
|--------|------|
| a. 1/2 | c. 1 |
| b. 2 | d. 4 |

12. C_4H_8O

- | | |
|--------|------|
| a. 1/2 | c. 2 |
| b. 1 | d. 3 |

13. $C_6H_8O_2$

- | | |
|----------|------|
| a. 3 | c. 6 |
| b. 1 1/2 | d. 4 |

14. $C_5H_5NO_2$

- | | |
|------|------|
| a. 2 | c. 6 |
| b. 8 | d. 4 |

15. C_6H_3NClBr

- | |
|--------|
| a. 10 |
| b. 7.5 |
| c. 5 |
| d. 2.5 |

Predict the hybridization for the carbon atom in the compounds (Question 16 to 20)

16. CH_3CHO

- | | |
|-----------|-------|
| a. sp^3 | c. sp |
| b. sp^2 | d. ss |

17. C_2H_2

c. 120°

d. 180°

25. C_2H_4

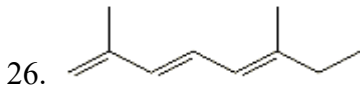
a. 90°

c. 120°

b. 109.5°

d. 180°

Select appropriate name for the compound using E-Z nomenclature (Question 26 to 30)

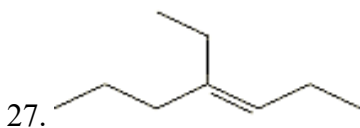


a. (3E,5E)-2,6-dimethylocta-1,3,5-triene

c. (3E,5Z)-2,6-dimethylocta-1,3,5-triene

b. (3Z,5Z)-2,6-dimethylocta-1,3,5-triene

d. (3Z,5E)-2,6-dimethylocta-1,3,5-triene

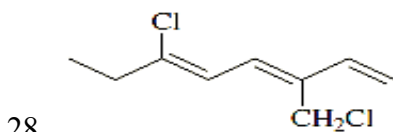


a. (Z)-4-ethylhept-3-ene

c. (E)-3-ethylhept-4-ene

b. (Z)-3-ethylhept-4-ene

d. (E)-4-ethylhept-3-ene

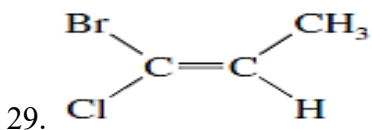


a. (3E,5E)-6-chloro-3-(chloromethyl)octa-1,3,5-triene

c. (3E,5Z)-6-chloro-3-(chloromethyl)octa-1,3,5-triene

b. (3Z,5E)-6-chloro-3-(chloromethyl)octa-1,3,5-triene

d. (3Z,5Z)-6-chloro-3-(chloromethyl)octa-1,3,5-triene

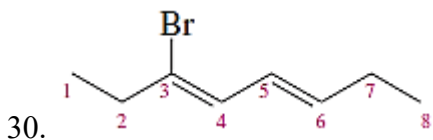


a. (Z)-2-bromo-2-chloropropene

b. (E)-2-bromo-2-chloropropene

c. (Z)-1-bromo-1-chloropropene

d. (E)-1-bromo-1-chloropropene



a. (5Z,3E)-3-bromoocta-3,5-diene

b. (3Z,5E)-3-bromoocta-3,5-diene

c. (3E,5E)-3-bromoocta-3,5-diene

d. (4Z,6E)-3-bromoocta-3,5-diene

Classify the compound into their appropriate functional groups (Question 31 to 40)



a. alkene

b. cycloalkene

c. alkyne

d. cycloalkyne



a. aldehyde

b. alcohol

c. ether

d. ester

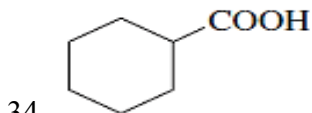


a. ketone

b. alcohol

c. ether

d. alkene

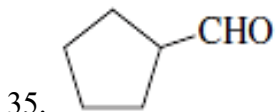


a. ether

b. alcohol

c. aldehyde

d. carboxylic acid



a. alcohol

b. ketone

c. aldehyde

d. ether

36. $\text{CH}_3\text{CH}_2\text{CONHCH}_3$

- a. amine
- b. ketone

- c. amide
- d. ether

37. $(\text{CH}_3\text{CH}_2)_2\text{NH}$

- a. amine
- b. ketone

- c. amide
- d. nitrile

38. $(\text{CH}_3)_2\text{CHCOOCH}_3$

- a. ether
- b. aldehyde

- c. ketone
- d. ester

39. $(\text{CH}_3\text{CH}_2)_2\text{O}$

- a. ester
- b. ether

- c. aldehyde
- d. ketone

40. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CN}$

- a. ketone
- b. nitrile

- c. amine
- d. amide

State if the following statement is TRUE or FALSE (Question 41 to 50)

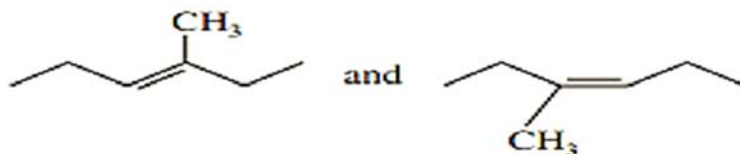
SECTION B (35 MARKS) - ANSWER QUESTIONS 1 AND 2

Q1.A. In 1934, a Chemist extracted 1360 kg of hog ovaries to isolate a few milligrams of pure estradiol, a potent female hormone. She burned 5.00 mg of this precious sample in oxygen and found that 14.54 mg of CO₂ and 3.97 mg of H₂O were generated.

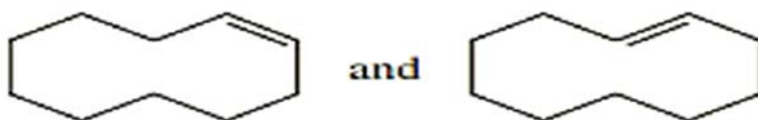
- (i) Determine the empirical formula of estradiol.
(ii) The molecular weight of estradiol was later determined to be 272. Determine the molecular formula of estradiol. [10 marks]

B. Illustrate how the following pair of compounds show cis trans isomerism. [5 marks]

(i)



(ii)



Q2.A. Briefly explain the commercial importance of the following organic chemicals:

- (i) Propylene [4 marks]
(ii) Ethylene [4 marks]

B. Using appropriate chemical equations show how alkenes are synthesized by the following methods:

- (i) Dehydrogenation of Alkanes [4 marks]
(ii) Catalytic Cracking of Alkanes [4 marks]
(iii) Dehydration of Alcohols [4 marks]

SECTION C (15 MARKS) - ANSWER ONLY ONE QUESTION

Q 3. For each pair of compounds:

- (a) cis-1,2-dichloroethene or cis-1,2-dibromoethene
(b) cis-2,3-dichlorobut-2-ene or trans-2,3-dichlorobut-2-ene
(c) cyclohexene or 1,2-dichlorocyclohexene

