CHUKA **UNIVERSITY**

UNIVERSITY EXAMINATION

RESIT/SUPPLEMENTARY / SPECIAL EXAMINATIONS EXAMINATION FOR THE AWARD OF DEGREE IN BACHELOR OF SCIENCE (CHEMISTRY)

CHEM 130: ORGANIC CHEMISTRY I

STREAMS: **TIME: 2 HOURS**

DAY/DATE: MONDAY 3/5/2021 **2.30 P.M - 4.30 P.M.**

INSTRUCTIONS

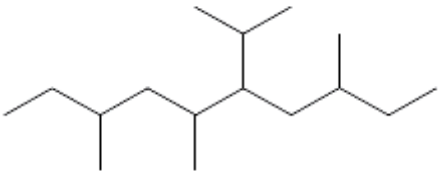
Answer all questions

QUESTION ONE (30 MARKS)

a) Give systematic IUPAC names of the following organic compounds (6 marks)

i)

ii)



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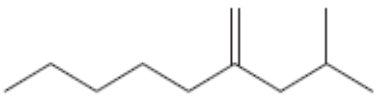

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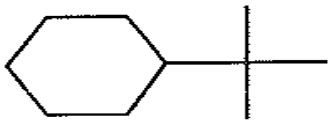

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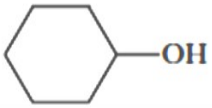

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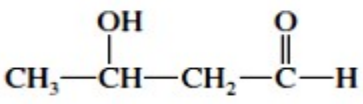
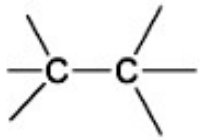


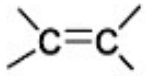
b) Explain three physical properties of alkanes (6 marks)

c) When 2-chlorobutane is treated with potassium hydroxide two products are produced. Write the equation for the reaction and identify the major and minor products. Give account for the major product. (3 marks)

d) Given the following compounds, indicate the type of hybridization in each (3 marks)

(i) $HC\equiv CH$

(ii) 

(iii) 

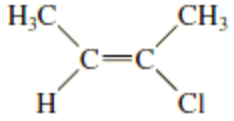
e) For each of the following pair of compounds, predict the one with a higher boiling point. Justify your answers. (6 marks)

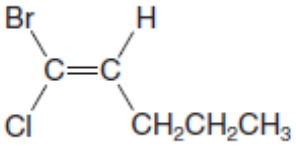
(i) Cis-1,2-dichloroethene or cis-1,2-dibromoethene

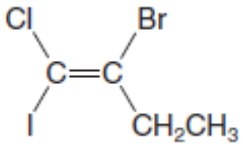
(ii) Cis or trans-2,3-dichlorobut-2-ene

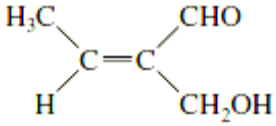
(iii) Cyclohexene or 1,2-dichlorocyclohexene

f) Give the IUPAC names for each of the following using E/Z designation (4 marks)

(a) 

(b) 

(c) 

(d) 

g) State 2 commercial uses of alkanes (2 marks)

QUESTION TWO (20 MARKS)

a) Draw the structures of the following compounds (6 marks)

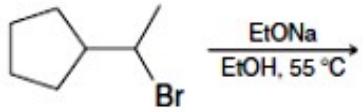
i. 3,4-dibromobut-1-ene
ii. 6,6-Dimethylhept-3-yne
iii. 2-methoxypentane
iv. 4-Bromo-2-methylheptanal
v. Pent-4-en-2-ol
vi. 2-Bromobutanoic acid

b) Explain why alkenes are more reactive than alkanes (2 marks)

c) Write a balanced equation to show the products formed when the molecule below completely burns in oxygen. (2 marks)

d) Draw the structure of the major products for each of the following reactions. (10 marks)

i)



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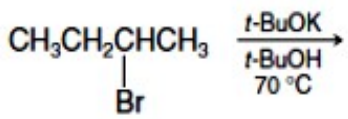

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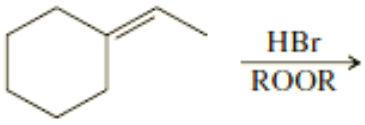

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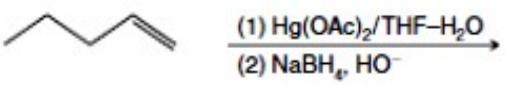

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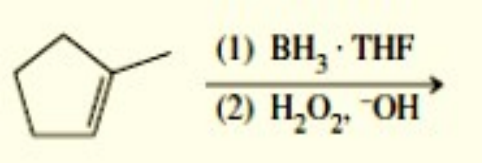
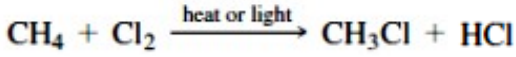


QUESTION THREE (20 MARKS)

a) Write the structural formula for all the constitutional isomers with the molecular formula C_6H_{14} and name them by IUPAC system (5 marks)

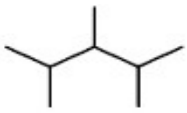
b) Halogenation reactions of alkanes take place by a radical mechanism. Write the step-wise mechanism for the following reaction: (6 marks)



c) Describe with the aid of suitable examples, the synthesis of alkanes from alkenes, stating the required conditions. (6 marks)

d) Give the molecule that is expected to have a higher-octane number between compound P and Q below. Explain your answer (3 marks)

P



Q

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