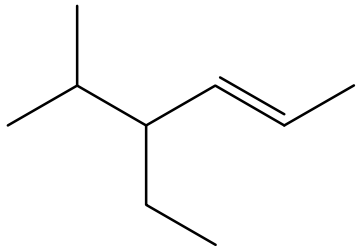
Q9 The chemistry of carbon **[3 + 1 + 6 + 4 + 6 = 20 marks]**

a) Write a condensed structural formula showing every atom but no bonds, and a molecular formula for the following alkene.
Hint: You do not need to name it!

[2 + 1 = 3 marks]



Condensed formula

$(CH_3)_2CHCH(CH_2CH_3)CH=CHCH_3$
Or similar
2 marks
½ marks for minor error

Molecular formula

C_9H_{18}

1 mark, all or nothing

b) Arrange the following alkanes in order of **increasing** boiling point.
2-methylbutane, 2,2-dimethylpropane and pentane

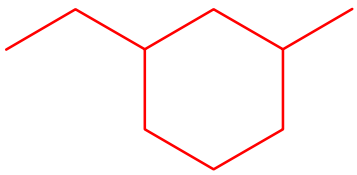
All or nothing [1 mark]

2,2-dimethylpropane < 2-methylbutane < pentane **1 mark**

c) i) Write structures for the following compounds:

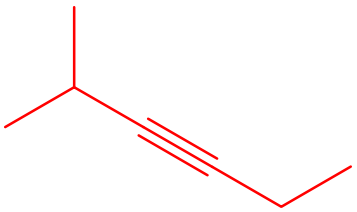
½ mark family, ½ mark chain length, ½ mark locant; ½ mark substituents [2 + 2 = 4 marks]

1-ethyl-3-methylcyclohexane



lowest numbering must be used, ethyl substituent is at C1

2-methylhex-3-yne



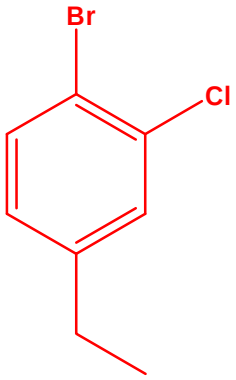
must be linear in the region of the triple bond

Q9 (continued) The chemistry of carbon **[3 + 1 + 6 + 4 + 6 = 20 marks]**

c) ii) Write the structure for the following compound.

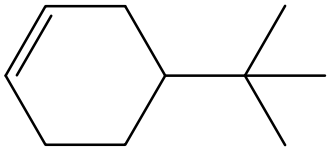
1 mark substituents , 1 mark positions [2 marks]

1-bromo-2-chloro-4-ethylbenzene



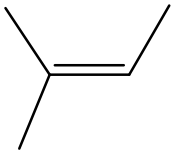
d) Write the names for each of the following compounds.

[2 + 2= 4 marks]



4-*tert*-butylcyclohexene

1 mark cyclohexene, ½ mark substituent, ½ mark position



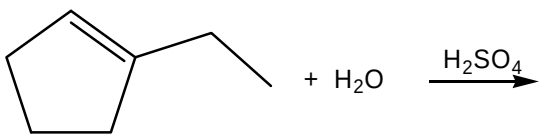
2-methylbut-2-ene
1 mark butene, ½ mark position of double bond
½ mark substituent

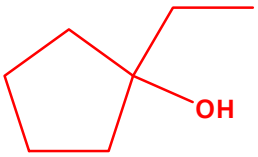
Lowest numbers must be used

Q9 (continued) The chemistry of carbon **[3 + 1 + 6 + 4 + 6 = 20 marks]**

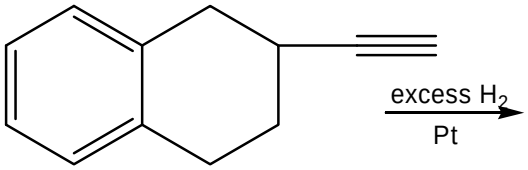
e) i) Complete the equations by predicting the major organic products formed in the following reactions.
Hint: You do not need to name the products.

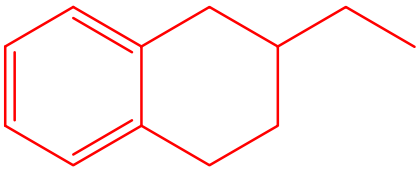
[2 + 2 = 4 marks]





2 marks if completely correct
1 mark for minor product

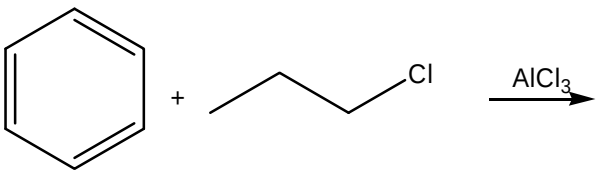


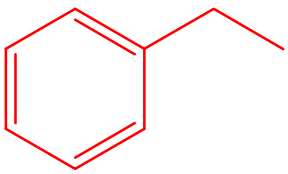


2 marks if completely correct
Only 1 mark if aromatic ring is hydrogenated

e) ii) Complete the equations below by predicting and naming the major organic product formed in the following reactions. Hint: you have to draw and name the major organic product.

1 mark structure, 1 mark name [2 marks]





+ HCl

ethylbenzene