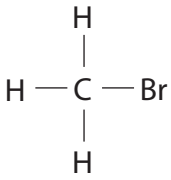
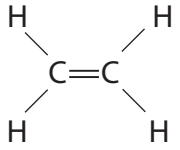
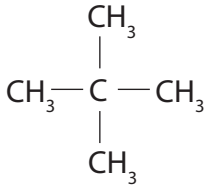
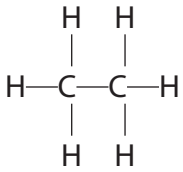
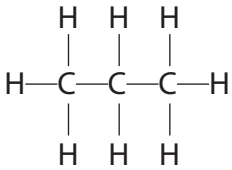
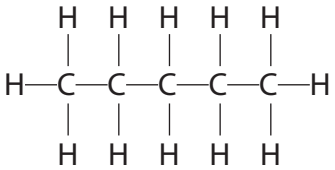
1 The table shows the structures of six organic compounds, A to F.

A 	**B** 	**C** 
D 	**E** 	**F** 

(a) The letter of the compound in the table that is **not** shown as a displayed formula is .....

(1)

(b) (i) State what is meant by the term hydrocarbon, and give the letter of one compound in the table that is **not** a hydrocarbon.

(3)

Hydrocarbon .....

.....

Letter .....

(ii) State what is meant by the term unsaturated, and give the letter of one compound in the table that is unsaturated.

(2)

Unsaturated .....

.....

Letter .....

(iii) State what is meant by the term isomers, and give the letters of two compounds in the table that are isomers of each other.

(3)

Isomers .....

.....

Letters ..... and .....

(c) Some of the compounds in the table are members of the same homologous series.

(i) One feature of a homologous series is that adjacent members have formulae that differ by CH_2

State two other features of members of the same homologous series.

(2)

1 .....

.....

2 .....

.....

(ii) Give the letters of two adjacent members of the same homologous series shown in the table.

(1)

Letters ..... and .....

(d) (i) Compound G has the molecular formula $C_2H_4Br_2$

It can be made from a compound in the table by a reaction that does **not** need UV light.

Draw the displayed formula of compound G.

(1)

(ii) Compound H reacts with bromine to form one of the compounds in the table. The reaction needs UV light.

Draw the displayed formula of compound H.

(1)

(Total for Question 1 = 14 marks)

2 This question is about hydrochloric acid.

(a) Dilute hydrochloric acid, HCl(aq), reacts with many metals.

A student observes the reaction of dilute hydrochloric acid with four metals, P, Q, R and S. She uses the same amount of metal in each case.

The table shows her observations.

Metal	Observations
P	very few bubbles produced very slowly
Q	many bubbles produced very quickly
R	many bubbles produced quickly
S	few bubbles produced slowly

(i) Use the information in the table to place the four metals in order of reactivity.

Place the most reactive first.

(2)

most reactive ☐ ☐ ☐ ☐ least reactive

(ii) Give the names of the two products formed when magnesium reacts with dilute hydrochloric acid.

(2)

Product 1 .....

Product 2 .....

(b) Describe a test to show that dilute hydrochloric acid contains chloride ions.

(2)

.....

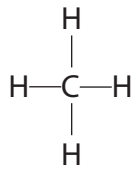
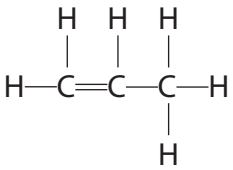
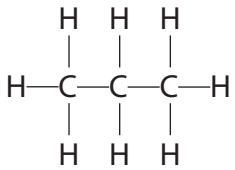
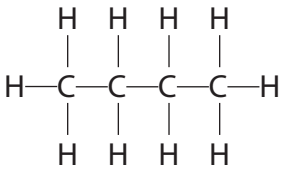
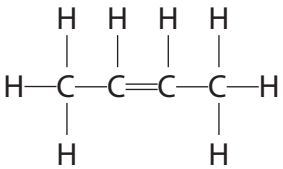
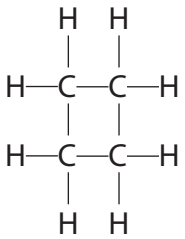
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(Total for Question 2 = 6 marks)

3 The table shows the displayed formulae of some organic compounds.

A 	B 	C 
D 	E 	F 

(a) Explain why all of these compounds are described as hydrocarbons.

(2)

.....

.....

.....

.....

(b) Why are B and E described as unsaturated?

(1)

.....

.....

(c) Which letter represents the first member of the homologous series of alkanes?

(1)

.....

(d) Which letters represent compounds that have the empirical formula CH_2?

(2)

.....

(e) Compound F has the same general formula as an alkene.

Why does F **not** decolourise bromine water?

(1)

.....

.....

(f) One of the compounds in the table reacts with bromine to form G, a compound with the composition by mass C = 22.2%, H = 3.7%, Br = 74.1%.

(i) Show, by calculation, that the empirical formula of G is C_2H_4Br

(3)

(ii) The relative formula mass of G is 216

Deduce the molecular formula of G.

(2)

molecular formula .....

(Total for Question 3 = 12 marks)

4 The production of polymers from crude oil involves several processes, including

- fractional distillation
- cracking
- purification
- polymerisation

(a) Three of the fractions obtained from fractional distillation are fuel oil, gasoline and kerosene.

(i) Identify which of these fractions has the darkest colour.

(1)

.....

(ii) Identify which of these fractions has the highest boiling point.

(1)

.....

(iii) Identify which of these fractions contains molecules with the fewest carbon atoms.

(1)

.....

(b) Cracking involves heating some of the fractions to about 650 °C.

(i) Name a catalyst used in industry for cracking.

(1)

.....

(ii) One reaction that occurs in cracking involves the conversion of one molecule of hexadecane into one molecule of octane and two molecules of an alkene.

Complete the equation for this reaction.

(2)

$C_{16}H_{34} \rightarrow C_8H_{18} +$ .....

(iii) Give three reasons why cracking is carried out.

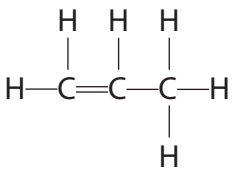
(3)

(c) One of the compounds sometimes present in crude oil has the formula $C_6H_{12}S$

Explain why it is important to remove this compound from a fuel.

(2)

(d) One compound obtained from crude oil is used as a monomer in polymerisation.
It has the displayed formula



Complete the following structure to show a part of the polymer formed from this monomer.

(2)

—C—C—C—C—

(Total for Question 4 = 13 marks)