

GCSE Chemistry (9 – 1)

Relative Formula Mass

Name:

Group:

Instructions

- Read each question carefully before you begin to answer it.
- Use black ink or black ball-point pen for your answers.
- Fill in the boxes at the top of this page with your name and group.
- Attempt to answer every question in the booklet.
- Answer the questions in the spaces provided – there may be more space than you need in some answer spaces.
- Calculators may be used for this booklet.
- For any calculations, you **must** show all your working.
- Any and all drawings or graphs should be completed in pencil.



For markers use	
Question	Mark
1	/5
2	/23
3	/10
4	/10
5	/13
Total	/60
%	
Grade	

Information

- The maximum mark for this paper is 60 marks.
- The marks for each question are shown in brackets.
- Please be aware that good English and clear presentation are required in your answers.



1. The relative formula mass (M_r) of a compound is the sum of the relative atomic masses (A_r) of all the atoms shown in its chemical formula, using values from the periodic table.

Circle the letter of the correct answer for each of the following questions.

- a) What is the relative formula mass (M_r) of methane, CH_4 ?

A	B	C	D
13	16	48	60

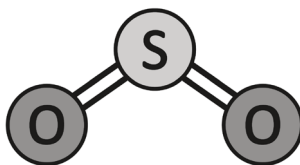
(1 mark)

- b) A molecule of water has the formula H_2O . What is its relative formula mass (M_r)?

A	B	C	D
10	17	18	34

(1 mark)

- c) What is the relative formula mass (M_r) of sulfur dioxide, SO_2 ?



A	B	C	D
64	68	62	64.5

(1 mark)

- d) What is the relative formula mass (M_r) of ammonia, NH_3 ?

A	B	C	D
15	17	20	45

(1 mark)

- e) Carbon dioxide has the formula CO_2 . What is its relative formula mass (M_r)?

A	B	C	D
28	32	44	56

(1 mark)

(Total for Question 1 is 5 marks)

2. Determine the relative formula mass (M_r) of the following molecules.

Show your working

a) Water (H_2O)

b) Nitric acid (HNO_3)

.....
c) Chlorine (Cl_2)

.....
d) NaCl

.....
e) Hydrogen Chloride (HCl)

.....
f) Methane (CH_4)

.....
g) Carbon Dioxide (CO_2)

.....
h) Ammonia (NH_3)

.....
i) Hydrogen Sulfide (H_2S)

.....
j) Sulfur Dioxide (SO_2)

.....
k) Ethanol (C_2H_5OH)

.....
l) Ethane (C_2H_6)

.....
m) Al_2O_3

.....
n) $(NH_4)_3PO_4$

.....
o) $Fe(OH)_3$

.....
p) K_2SO_4

.....
q) $NaHCO_3$

.....
r) C_2H_5Br

.....
s) $C_6H_{12}O_6$

.....
t) Iron(III) Chloride ($FeCl_3$)

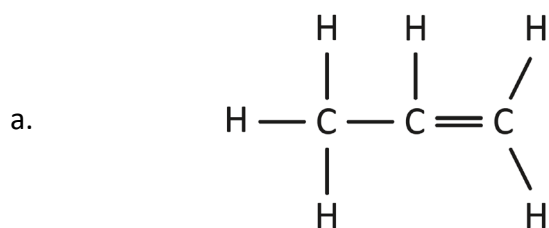
.....
u) Ti_2CO_3

.....
v) C_5H_{12}

.....
w) $Na_2CO_3 \cdot 7H_2O$

.....
.....
.....
(Total for Question 2 is 23 marks)

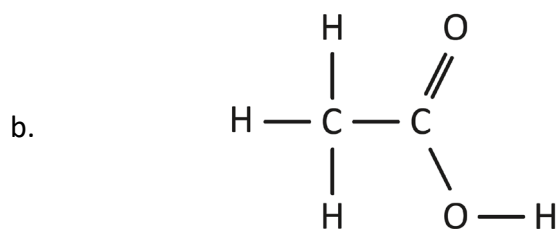
3. Determine the molecular formula and the relative formula mass (Mr) of the following substances. Show all of your working.



Molecular formula:

Mr:

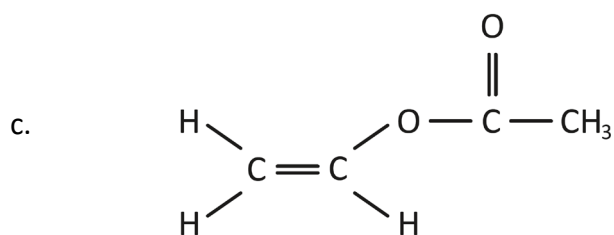
(2 marks)



Molecular formula:

Mr:

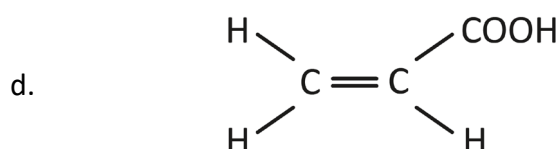
(2 marks)



Molecular formula:

Mr:

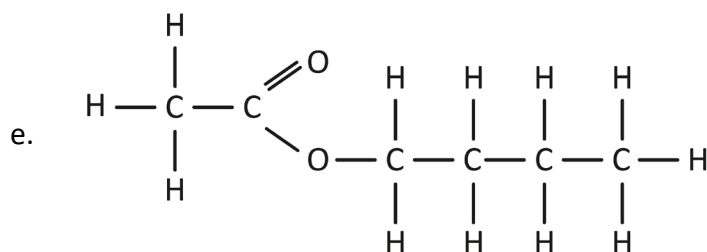
(2 marks)



Molecular formula:

Mr:

(2 marks)



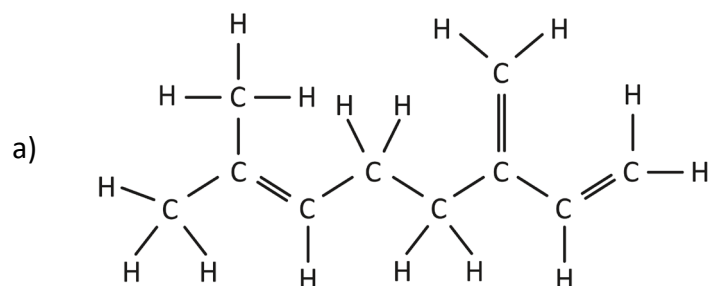
Molecular formula:

Mr:

(2 marks)

(Total for Question 3 is 10 marks)

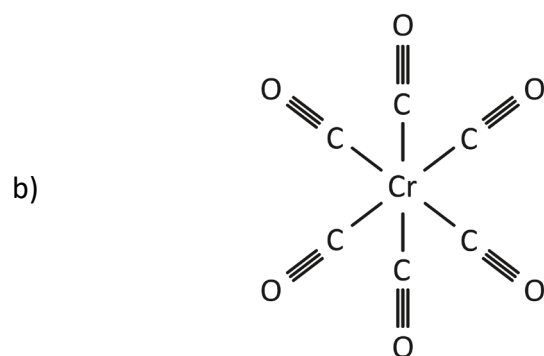
4. Determine the molecular formula and the relative formula mass (Mr) of the following substances.



Molecular formula:

Mr:

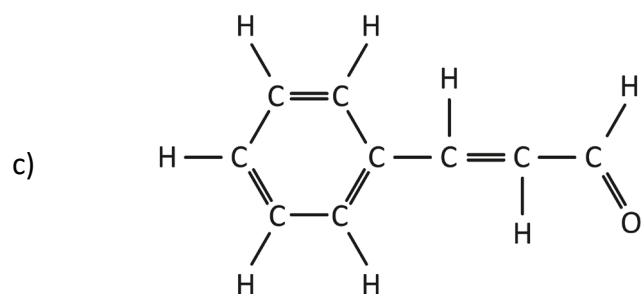
(2 marks)



Molecular formula:

Mr:

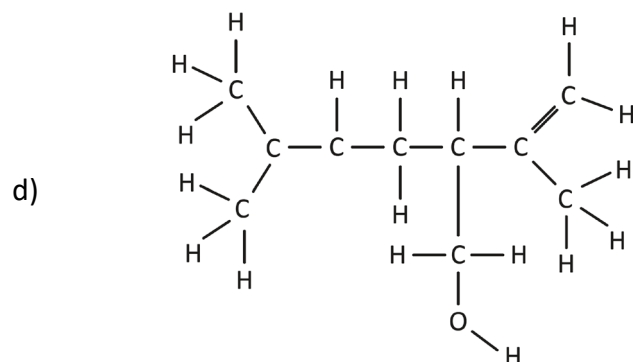
(2 marks)



Molecular formula:

Mr:

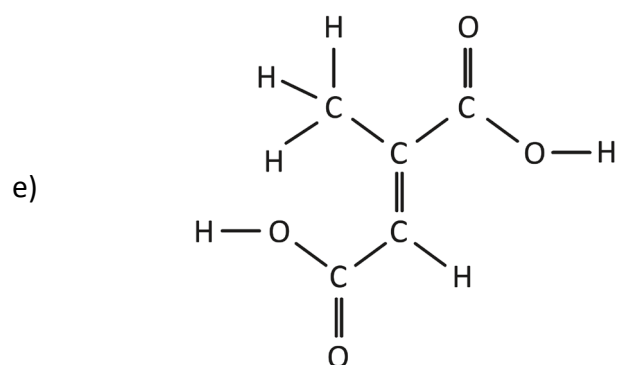
(2 marks)



Molecular formula:

Mr:

(2 marks)



Molecular formula:

Mr:

(2 marks)

(Total for Question 4 is 10 marks)

5. The relative formula mass (M_r) can be used to find the percentage by mass of an element in a compound. This is useful for comparing substances, for example, to see which fertiliser contains the most nitrogen.

$$\text{Percentage Mass} = (\text{Total Ar of the element in the formula} \div \text{Mr of the compound}) \times 100$$

- a) Calculate the percentage by mass of hydrogen (H) in methane (CH_4).
(Relative atomic masses: H = 1, C = 12)

Percentage by mass = ...
(3 marks)

- b) Calculate the percentage by mass of magnesium (Mg) in magnesium nitrate, $\text{Mg}(\text{NO}_3)_2$.
(Relative atomic masses: N = 14, O = 16, Mg = 24)

Percentage by mass = ...
(3 marks)

- c) A farmer needs to buy a fertiliser with the highest possible percentage by mass of nitrogen.
The two options are ammonium nitrate (NH_4NO_3) and urea ($\text{CO}(\text{NH}_2)_2$).

By calculating the percentage by mass of nitrogen in both compounds, determine which fertiliser the farmer should buy. Show all your working.

(Relative atomic masses: H = 1, C = 12, N = 14, O = 16)

.....
.....
.....

(6 marks)

(Total for Question 5 is 12 marks)