

WJEC Chemistry GCSE

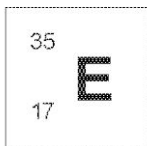
1.1: The Nature of Substances and Chemical Reactions

Practice Questions

Wales Specification

1.

An atom of element E is represented as follows.



State and explain what information this gives you about element E.

You may wish to refer to the key on the Periodic Table to help you answer this question. [6 QWC]

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2.

(a) Atoms consist of particles called electrons, neutrons and protons.

Complete the following table by giving the charge on an electron and the mass of a neutron.

[2]

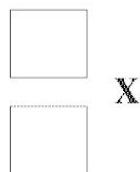
	Mass	Charge
electron	negligible	.....
neutron	.....	neutral (0)
proton	1	positive (+1)

(b) Potassium is represented as ${}_{19}^{39}\text{K}$.

Element X has 9 electrons, 10 neutrons and 9 protons.

Write the information for element X in the same form as above.

[1]



(c) Chlorine has two isotopes: chlorine-35 and chlorine-37.

Complete the table below.

[2]

	chlorine-35	chlorine-37
Atomic number	17	17
Mass number	35	37
Number of electrons	.....	17
Number of neutrons	18	.....
Number of protons	17	17

(d) The atomic number of sodium is 11.

Place a tick (✓) in the box next to the electronic structure of sodium.

[1]

- 11
- 2,9
- 4,7
- 2,4,5
- 2,8,1

(e) Element Z is found in Group 2 and in Period 4 of the Periodic Table.

Place a tick (✓) in the box next to the electronic structure of element Z.

[1]

- 2,4
- 4,2
- 2,8,2
- 2,8,8,2
- 2,8,8,4

7

3.

(a) The box below contains the names of seven different substances.

aluminium	iodine	nitrogen dioxide	crude oil
sodium	sulfur	water	

Use **only** the substances given above to answer parts (i)-(iii).

Each substance can be used once, more than once or not at all.

(i) Name **two** metals. [1]

..... and

(ii) Name **two** compounds. [1]

..... and

(iii) Name **one** mixture. [1]

.....

(b) The key below represents atoms of some elements.



carbon, C



oxygen, O



nitrogen, N

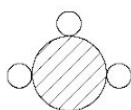


hydrogen, H

(i) Ammonia has the formula NH_3 .

Choose the letter of the diagram below that represents a molecule of ammonia.

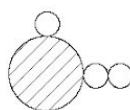
[1]



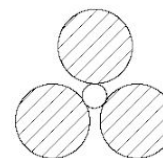
A



B



C



D

Letter

(ii) Use the key to draw a diagram representing a molecule of

I oxygen, O_2 , [1]

II carbon dioxide, CO_2 , [1]

(iii) The chemical formula of sodium carbonate is Na_2CO_3 .

I State how many carbon atoms are present in the formula Na_2CO_3 . [1]

.....

II Give the total number of atoms shown in the formula. [1]

.....

8

4.

(a) The table below shows information about four ionic compounds.
Complete the table.

[3]

Compound	Formula	Elements present
aluminium oxide	Al_2O_3	aluminium and oxygen
calcium chloride	CaCl_2	..... and
.....	CuO	copper and oxygen
magnesium bromide	.....	magnesium and bromine

(b) The following diagram represents carbon dioxide, CO_2 .



(i) Use the diagram to complete the key.

[1]

hydrogen

carbon

chlorine

oxygen

(ii) Using the key, draw a diagram that represents a molecule of

I. water, H_2O

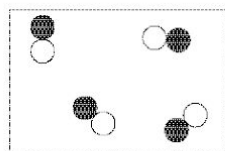
[1]

II. tetrachloromethane, CCl_4

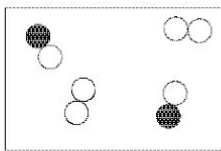
[1]

5.

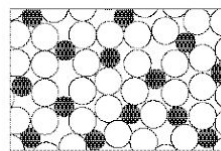
(a) The following five diagrams show the arrangement of atoms in different substances.



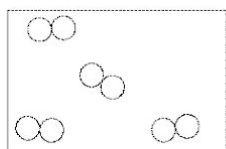
A



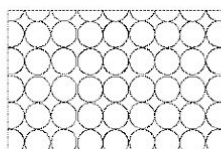
B



C



D



E

Give the letter of the diagram that best represents

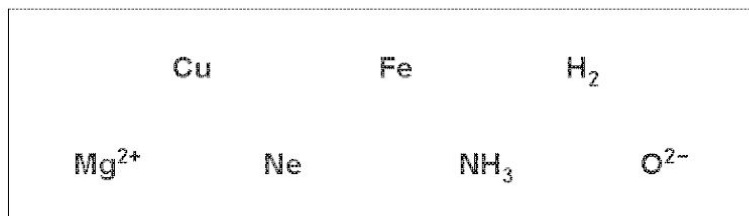
[3]

a compound,

a gaseous element,

an alloy.

(b) Choose the answers to this question from the following symbols and formulae.



Give the symbol or formula for

[2]





a compound,

a metal ion.

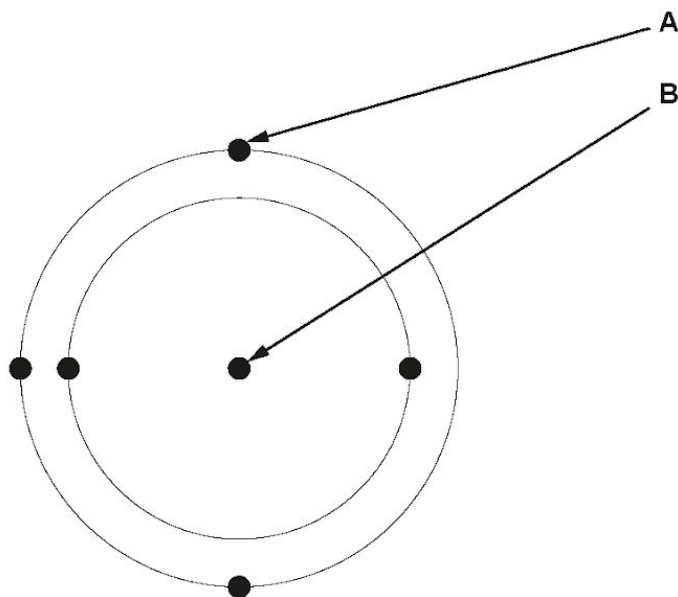
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6.

- (a) Draw lines to match each diagram below with the correct description. One has been done for you. [2]

Diagram	Description
	molecule of a compound
	molecule of an element
	mixture of two elements
	atom

(b) The following diagram shows an atom.



The box below contains some words that could be used in a description of the atom.

neutral	electron	positive
negative	nucleus	orbit

Use only words from the box to complete the table.

[2]

	Name	Charge
part A
part B

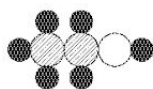
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7.

(a) Complete the following table that shows information about some compounds. [4]

Compound	Formula	Number of atoms present	Elements present
aluminium chloride	AlCl_3	4	aluminium and chlorine
.....	CaO	2	calcium and oxygen
copper(II) sulfide	CuS}	.....	..... and
sodium oxide	.....	3	sodium and oxygen

(b) The following diagram represents a molecule of ethanol, $\text{C}_2\text{H}_5\text{OH}$.



Give the names of the atoms represented by the following symbols. [2]

●

○

●

8.

(a) The formula for calcium chloride is CaCl_2 .

Give the names of the two elements present in this compound. [1]

..... and


(b) Name a metal which is in the same period of the Periodic Table as argon. [1]

.....

(c) (i) A formula for nitrogen oxide is N_2O .

A molecule of nitrogen oxide can be drawn as follows.



Give the name of the element which is represented by . [1]

.....

(ii) Draw your own key to represent hydrogen and carbon atoms. Use your key to draw a molecule of methane, CH_4 . [2]

Key

hydrogen	
carbon	

Methane

(d) Fizzy drinks such as lemonade contain carbonic acid. Each molecule of carbonic acid contains two atoms of hydrogen, one atom of carbon and three atoms of oxygen. [1]

Give the formula for carbonic acid.

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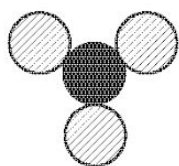
9.

(a) The key below represents atoms of some elements.



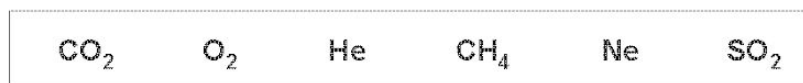
(i) Use the key to draw a diagram representing a molecule of nitrous oxide, N_2O . [1]

(ii) Use the key to give the chemical formula for the following molecule. [1]



Formula

(b) The box below shows the symbols and formulae for some gases.



Choose from the box

(i) two elements, and [1]

(ii) two compounds. and [1]

(c) The chemical formula of nitric acid is HNO_3 .

(i) State how many nitrogen atoms are present in the formula, HNO_3 [1]

(ii) Give the total number of atoms shown in the formula. [1]

(d) You may wish to refer to the table of common ions to help you answer parts (i) and (ii).

(i) Give the formulae of the ions present in the compound MgCl_2 . [1]

Positive ion Negative ion

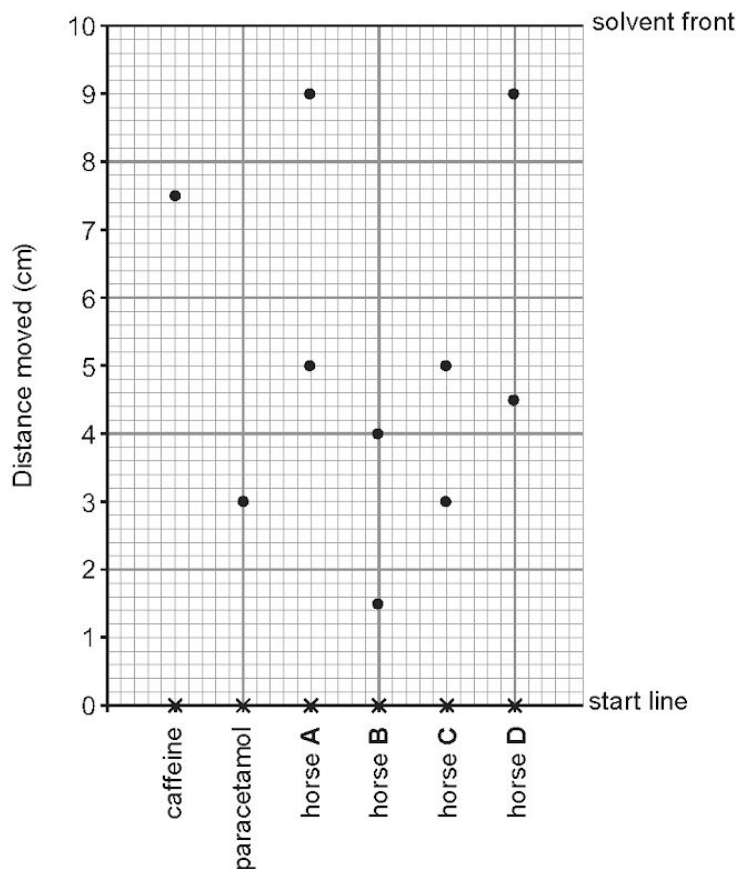
(ii) Give the chemical formula for sodium hydroxide. [1]

.....

8

10.

Chromatography can be used to test if racehorses have been given illegal drugs. Urine samples from four horses, **A–D**, were tested to find out whether they contained caffeine or paracetamol. The following diagram shows the results obtained.



(a) Give the letter of the horse, **A–D**, that had been given paracetamol. [1]

.....

(b) State, giving a reason, if any of the four horses had been given caffeine. [1]

.....

(c) The R_f value can be used to identify a substance. Use the following equation to calculate the R_f value of paracetamol. [2]

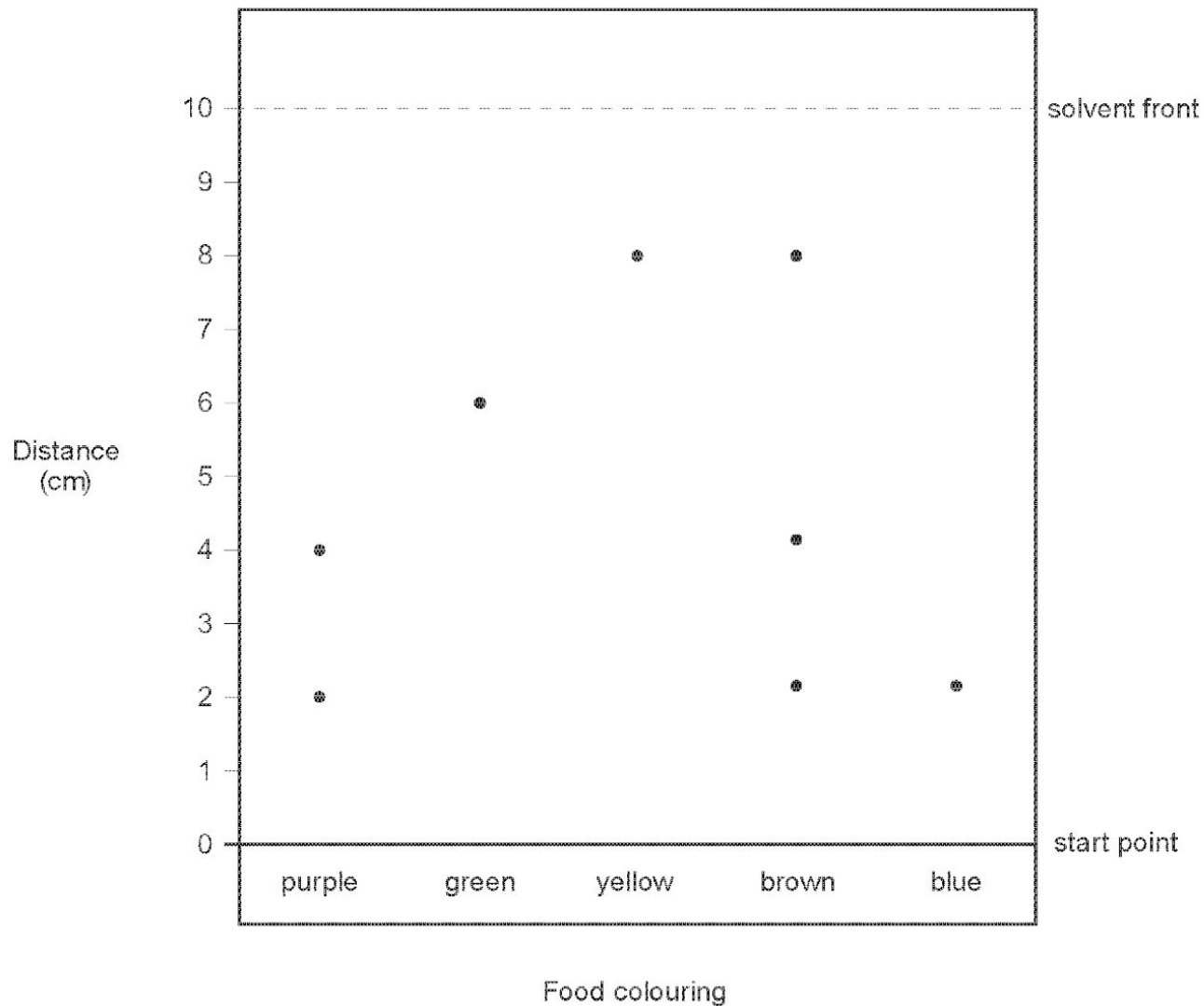
$$R_f \text{ value} = \frac{\text{distance moved by paracetamol}}{\text{distance moved by solvent}}$$

R_f value =

4

11.

The diagram below shows the chromatogram of several food colourings.



(a) Use the chromatogram to give the two food colourings that are mixed to make brown food colouring. [1]

..... and

- (b) The R_f value of a substance can be used to identify that substance.
The R_f value for a red food colouring is 0.4.

Use the equation below to calculate the distance this red food colouring would move on this chromatogram. [2]

$$\text{distance moved} = R_f \times \text{distance moved by the solvent}$$

Distance moved = cm

- (c) Give the reason why water is used as the solvent when obtaining this chromatogram of food colourings. [1]

.....

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