

## Final Examination Revision Worksheet 2018-19

### Year 9 Chemistry

1. This question is about the elements hydrogen and oxygen.

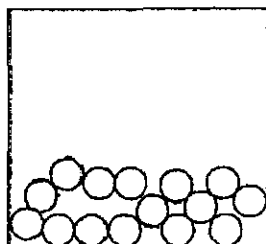
hydrogen and oxygen can react to form water.

The diagram shows the arrangement of the molecules in two of the three states of water.

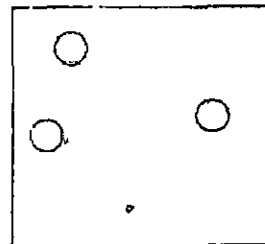
Each circle represents a molecule of water.



solid



liquid



gas

(a) Complete the diagram to show how the molecules of water are arranged in the solid state. [1]

(b) Which row of the table correctly describes the arrangement and movement of molecules of water in the solid state? [1]

	Arrangement	Movement
<input type="checkbox"/> A	regular	moving freely
<input type="checkbox"/> B	random	moving freely
<input type="checkbox"/> C	regular	vibrating
<input type="checkbox"/> D	random	vibrating

(c) Which word describes water changing from a liquid to a solid? [1]

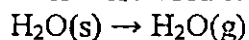
A boiling

B condensing

C freezing

D melting

(d) Give the word used to describe the change of state represented by this equation. [1]

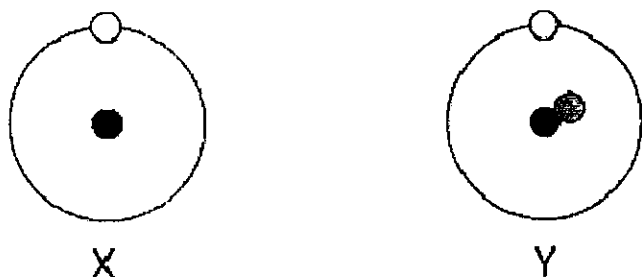


(e) Water is the name used for  $\text{H}_2\text{O}(l)$ . Give the two names used for  $\text{H}_2\text{O}(g)$ . [2]

1 .....

2 .....

(f) The diagram below shows two different atoms of hydrogen.



(i) The particle furthest from the centre of each atom is [1]

- A an electron                       B a neutron  
 C a nucleus                          D a proton

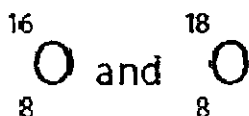
(ii) The particle present in atom Y but not in atom X is [1]

- A an electron                       B a neutron  
 C a nucleus                          D a proton

(iii) Both atoms are neutral because they have the same number of [1]

- A electrons and neutrons                       B electrons and protons  
 C electrons, neutrons and protons                       D neutrons and protons

(g) Different atoms of oxygen can be represented as



Select words or phrases from the box to complete the sentence about these atoms of oxygen. You may use each word or phrase once, more than once or not at all. [3]

atomic numbers                      isotopes                      mass numbers                      numbers of electrons

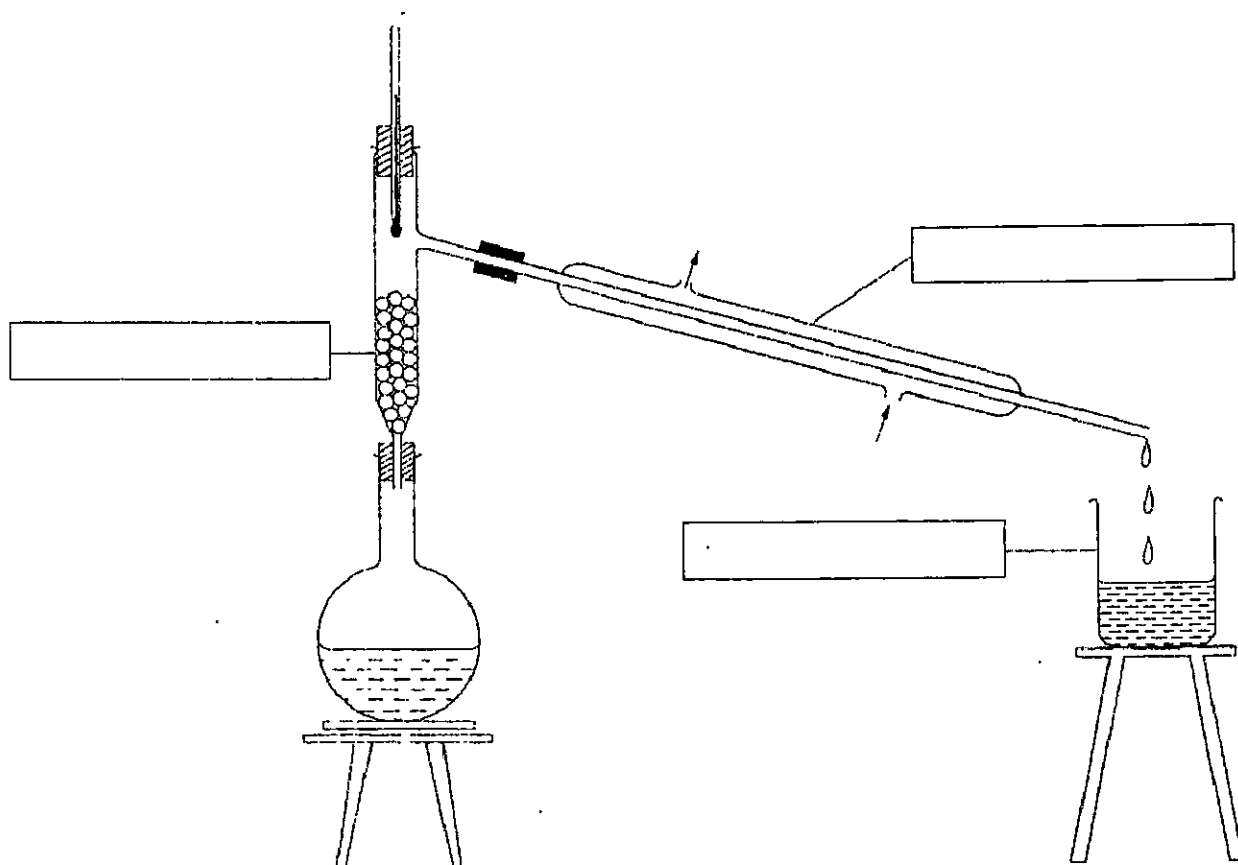
These atoms of oxygen are called.....because their .....  
 are the same but their ..... are different.

(h) Complete the table to show the relative mass and relative charge of a proton, a neutron and an electron. [2]

	Proton	Neutron	Electron
Relative mass			1/1840
Relative charge	+ 1		

(Total for Question 1 = 14 marks)

2 The apparatus below was used to separate ethanol from water.



(a) Complete the empty boxes to name the pieces of apparatus. [3]

(b) Indicate by an arrow where heat is applied. [1]

(c) Name this separation process.

..... [1]



(e) Suggest why this technique is not suggested to purify sea water. Which method would you suggest for the purification of sea water [2]

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(Total for Question 2 = 13 marks)

3. The melting points of three related compounds are

capric acid 32 °C

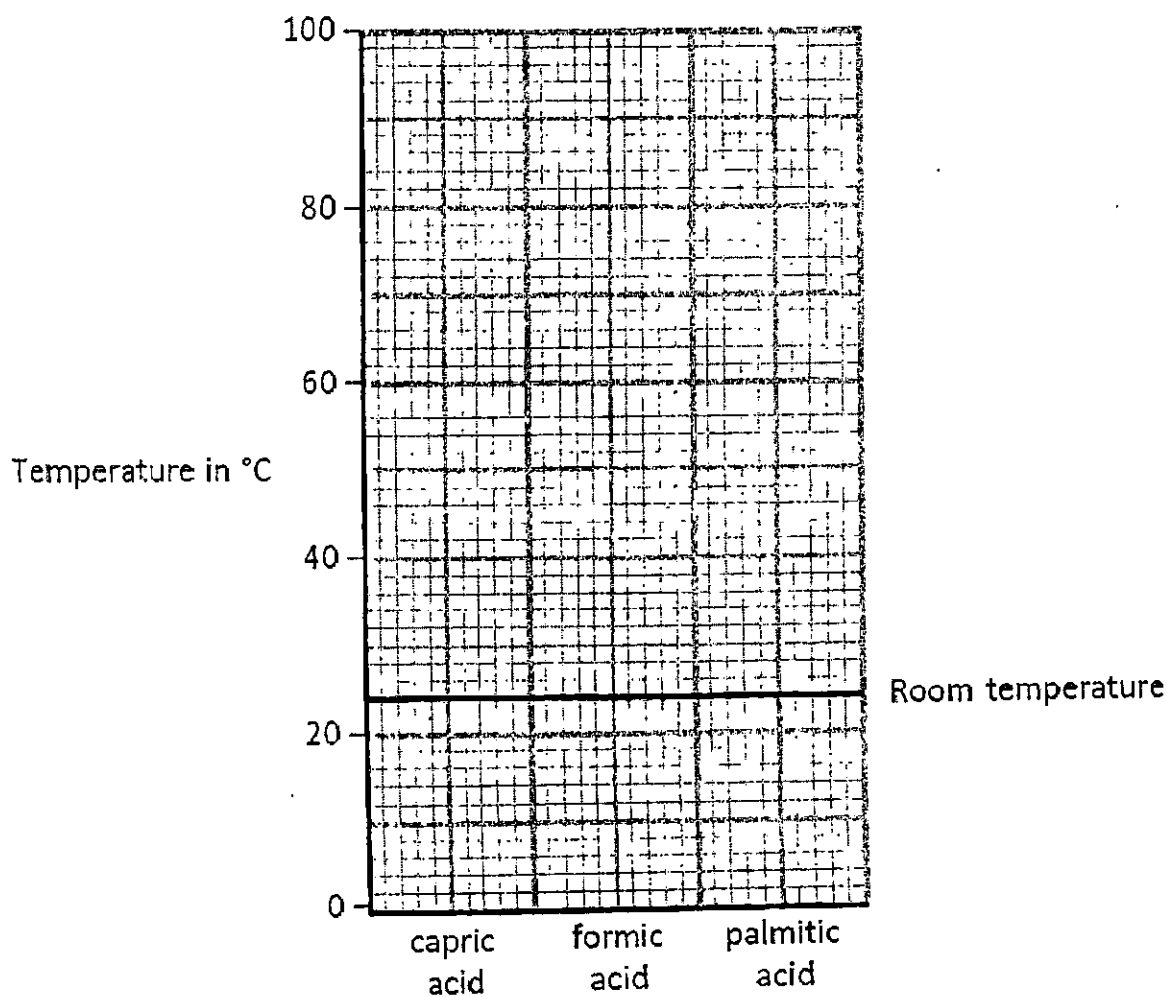
formic acid 8 °C

palmitic acid 63 °C

The boiling point of all these compounds is above 100 °C

[2]

(a) Use the grid to draw a bar chart of the melting points.



(b) Room temperature has been marked on the grid.

Use your bar chart to give the physical state of each acid at room temperature. [2]

capric acid .....

formic acid .....

palmitic acid .....

(Total for Question 3 = 4 marks)

4 (a) The term species is sometimes used to refer to neutral atoms and to positive and negative ions. The table shows the numbers of subatomic particles in eight different species.

Species	Number of protons	Number of neutrons	Number of electrons
A	5	5	5
B	5	6	5
C	6	7	5
D	6	7	7
E	7	7	7
F	7	7	10
G	8	8	10
H	8	10	10

(i) Explain which two letters represent neutral atoms of the same element. [3]

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(ii) Explain which two letters represent negative ions formed from the same element. [3]

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(iii) Explain which letter represents the atom with the lowest mass number. [2]

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(iv) What is the electronic configuration of species E? [1]

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(b) The table shows the percentage composition of a sample of magnesium. [3]

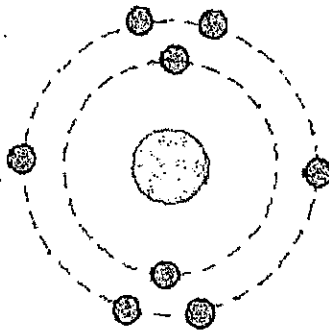
Isotope	$^{24}\text{Mg}$	$^{25}\text{Mg}$	$^{26}\text{Mg}$
Percentage (%)	78.6	10.1	11.3

Calculate the relative atomic mass of magnesium.

relative atomic mass = .....

(Total for Question 4 = 12 marks)

5. (a) The diagram shows how the electrons are arranged in an atom of oxygen.



Oxygen atoms form both covalent and ionic bonds.

Water is formed when two atoms of hydrogen combine with one atom of oxygen.

(i) Draw a dot and cross diagram of a molecule of water. You need only show the electrons in the outer shells. [2]

(ii) Explain how the covalent bonds in the water molecule hold the hydrogen and oxygen atoms together. [2]

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\*(b) The electronic configuration of a sodium atom is 2.8.1 [3]  
Sodium oxide, Na<sub>2</sub>O, is an ionic compound formed when sodium reacts with oxygen.

Describe, in terms of electrons, what happens when sodium oxide is formed in this reaction.

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(c) Explain why water has a much lower melting point than sodium oxide. [2]

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(d) Use the given formulae to answer following two questions.

name of ion	formula of ion
calcium	Ca <sup>2+</sup>
nitrate	NO <sub>3</sub> <sup>-</sup>
phosphate	PO <sub>4</sub> <sup>3-</sup>

(i) Which is the formula of calcium nitrate?

[1]

A  $\text{Ca}_2\text{NO}_3$

B  $\text{CaNO}_3$

C  $\text{Ca}_3\text{NO}_2$

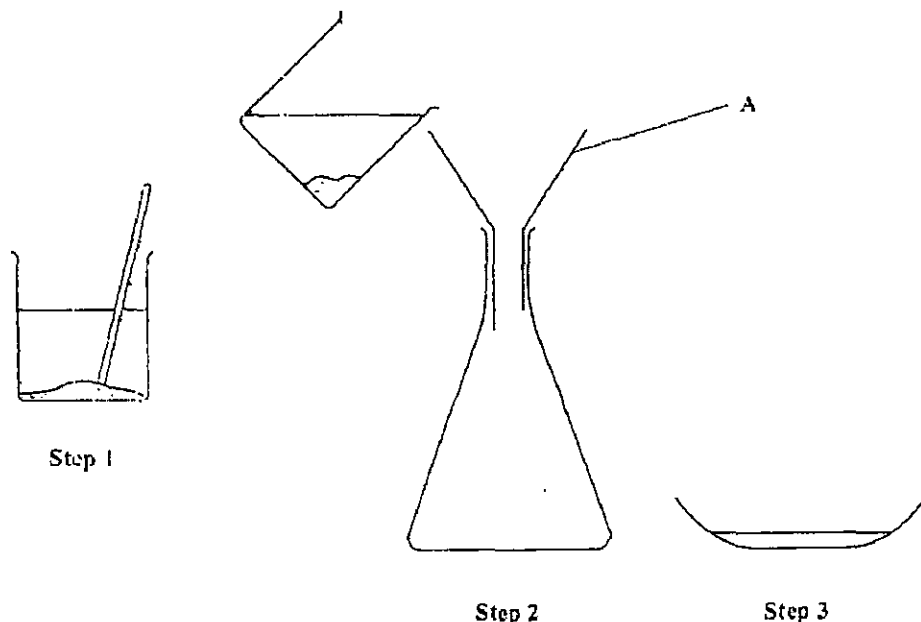
D  $\text{Ca}(\text{NO}_3)_2$

(ii) Write the formula of calcium phosphate.....

[1]

(Total for Question 5 = 11 marks)

6. Salt is soluble in water, but sand is insoluble in water. This difference allows a mixture of salt and sand to be separated using this apparatus.



(a) Use words from the box to complete the sentences. Each word may be used once, more than once or not at all.

Beaker, evaporation basin, water, glass rod, funnel, conical flask [6]

In Step 1, the mixture of salt and sand is placed in a .....containing

..... and stirred with a ..... In Step 2, the mixture

from Step 1 is poured through a .....into a .....

In Step 3, the liquid is transferred to a basin to allow the..... to be removed.

(b) (i) What should be placed in A before the mixture from Step 1 is poured through it? [1]

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(ii) What is the solid removed in Step 2? [1]

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(iii) Place crosses (X) in two boxes to show the names of two processes used in this separation. [2]

chromatography

condensation

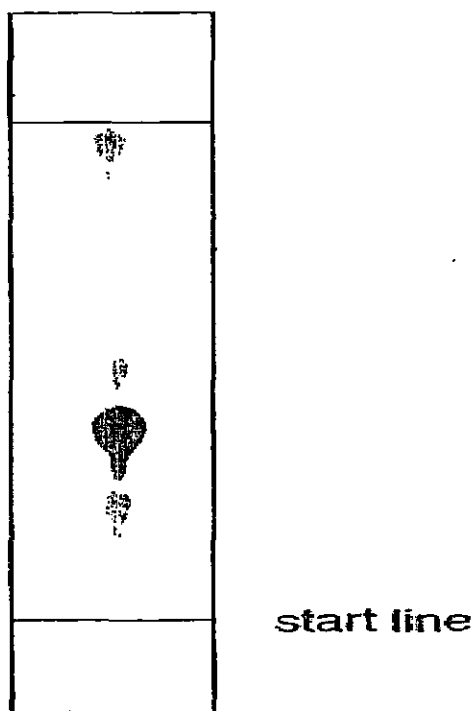
distillation

evaporation

filtration

sublimation

(c) A student extracted the coloured material from some green leaves. She ground up the leaves to break the cell walls so that the green substance could form a solution in ethanol. She then carried out paper chromatography using the solution and obtained the chromatogram shown in figure below.



(i) Suggest why the solution used in the experiment was made by using ethanol and not water. [1]

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\* (ii) Describe briefly what the student had to do to obtain the chromatogram shown in figure on page number 12. [4]

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(iii) From the chromatogram, what conclusion can the student draw about the coloured material she extracted from the leaves? [1]

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**(Total for Question 6 = 16 marks)**

7. Read the information about the periodic table.

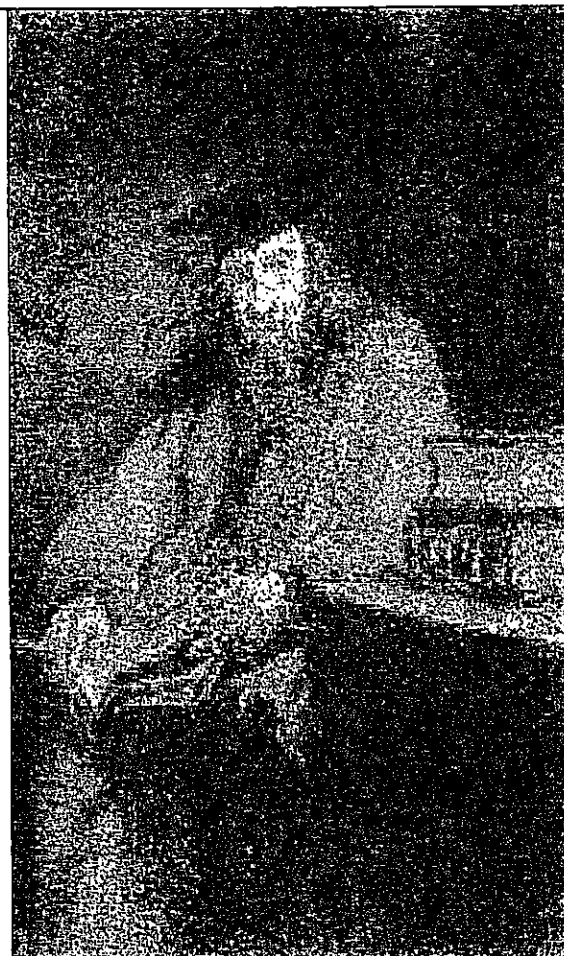
When the Russian chemist Dimitri Mendeleev put forward his periodic table in 1869, the atomic structure of elements was unknown.

Mendeleev tried to arrange the elements in a meaningful way based on their chemical reactions. First he put the elements in order of their increasing atomic weight. He then put elements with similar properties in the same column.

However, he left gaps, and sometimes did not follow the order of increasing atomic weight – for example, he placed iodine (atomic weight 127) after tellurium (atomic weight 128).

Within a few years there was sufficient evidence to prove that Mendeleev was correct.

Our modern periodic table has evolved from Mendeleev's table.



*Portrait of Dimitri Mendeleev by Ilya Repin*

(a) (i) State why Mendeleev left gaps.

[1]

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(ii) State why some elements were not placed in order of increasing atomic weight. [1]

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(b). Use the modern Periodic Table of Elements to help you to answer this question.  
Francium (Fr) is a very rare element. It is estimated that there is only 25 g of francium in the Earth's crust. Francium is radioactive and has a half-life of only a few minutes. Mendeleev predicted the existence of francium in the 1870s but the element was not discovered until 1939.

(i) Explain why Mendeleev was able to predict the existence of francium in the 1870s. [2]

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(ii) Suggest why there is not much experimental evidence for the properties of francium. [1]

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(Total for Question 7 = 5 marks)

Q8 Construct formulae for the following ionic compounds. Write the formulae / name in the spaces.

Compound	Formula
Zinc phosphate	
	MgSO <sub>3</sub>
Copper (I) carbonate	
Ammonium sulphate	
	Al(IO <sub>3</sub> ) <sub>3</sub>
Copper(II) phosphide	