Pearson Edexcel

# Additional Assessment Materials Summer 2021

# Pearson Edexcel GCSE in Chemistry (1CH0) Foundation

# Resource Set Topic A: Atomic Structure and the Periodic table

# Questions

# (Public release version)

**Pearson: helping people progress, everywhere**

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Additional Assessment Materials, Summer 2021

**General guidance to Additional Assessment Materials for use in 2021**

**Context**

- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment Materials presented in this booklet are an **optional** part of the range of evidence teachers may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

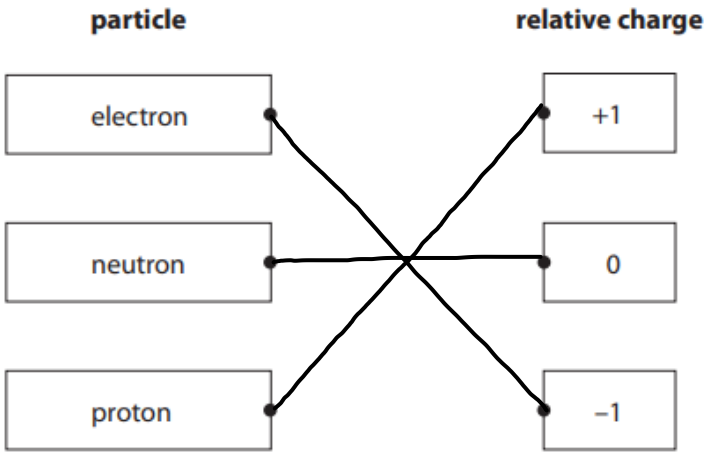
**Purpose**

- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions.
- These materials are only intended to support the summer 2021 series.

**3** (a) Atoms contain electrons, neutrons and protons.

(i) Draw one line to link each particle to its correct relative charge.

**(2)**




(ii) Which of the following is the relative mass of a proton?

**(1)**

☒ **A** 0

☒ **B** $\frac{1}{1837}$

☒ **C** 1

☒ **D** −1

(b) Argon is in group 0 of the periodic table.

Identify, using the periodic table on the back cover of this paper, which of these elements is in the same period as argon.

**(1)**

☒ **A** bromine

☒ **B** iron

☒ **C** magnesium

☒ **D** xenon

(c) Figure 4 shows the atomic number and mass number of two isotopes of argon.

| isotope | atomic number | mass number |
|---|---|---|
| argon-38 | 18 | 38 |
| argon-40 | 18 | 40 |

**Figure 4**

Describe the structure of an atom of argon-38 and of an atom of argon-40.

**(3)**

For both argon-38 and argon-40, there are 18 protons in the nucleus and 18 electrons. Argon-38 has 20 neutrons in the nucleus, whereas argon-40 has 22 neutrons.

**8** In Figure 8, the letters **A**, **E**, **G**, **J**, **X** and **Z** show the positions of six elements in the periodic table.

These letters are not the symbols of the atoms of these elements.

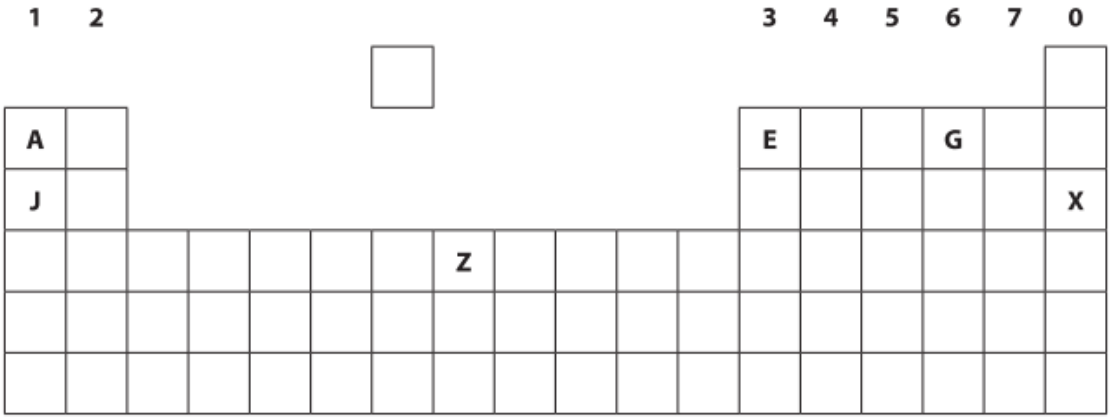



**Figure 8**

(a) Using the letters **A**, **E**, **G**, **J**, **X** and **Z**

(i) give the letters of the **two** elements that are non-metals

**(1)**

G & X

(ii) give the letters of **two** elements in period 2

**(1)**

A & E

(ii) Figure 13 shows the percentage of each base in human DNA.

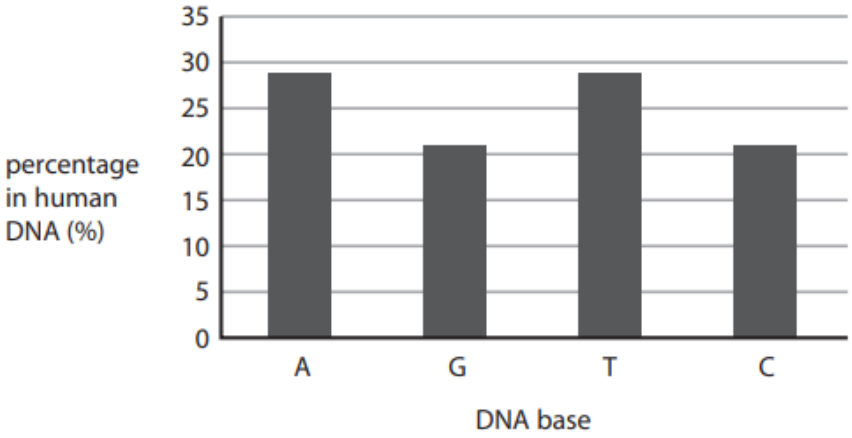



**Figure 13**

Describe how this data provides evidence for base pairing in DNA.

**(2)**

The percentage of bases A and T are the same, and the percentage of G and C are the same. This suggests that bases A and T are paired and G pairs with C.

(b) Element **E** has an atomic number of 5.
In a sample of **E** there are two isotopes. One isotope has a mass number of 10 and the other isotope has a mass number of 11.

(i) Explain, in terms of subatomic particles, what is meant by the term **isotopes**.

**(2)**

Isotopes are the same element which contain the same number of protons and electrons, but different number of neutrons.

(ii) All atoms of element **E** in this sample contain

**(1)**

☒ **A** 5 protons

☒ **B** 5 neutrons

☒ **C** 6 protons

☒ **D** 6 neutrons

(c) Element **X** has an atomic number of 18.

State the electronic configuration of an atom of element **X**.

**(1)**

2 . 8 . 8

**2** Chlorine has an atomic number of 17.

(a) Figure 3 shows the arrangement of electrons in an atom of chlorine.

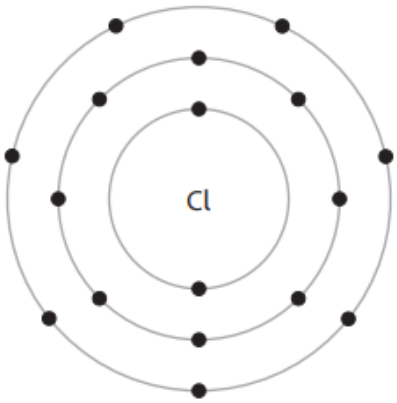



**Figure 3**

(i) What is the electronic configuration of this atom?

(1)

- ☒ **A** 10.7
- ☒ **B** 17
- ☒ **C** 2.8.7
- ☒ **D** 7.8.2

(ii) Explain, using Figure 3, why chlorine belongs to group 7 of the periodic table.

(2)

Chlorine has 7 electrons in the outermost shell. All group 7 elements have 7 electrons in their outer shells and react by gaining 1 electron to form a -1 ion.

(b) The nucleus of an atom is made up of protons and neutrons.
Atoms of chlorine contain 17 protons.

Figure 4 shows some information about a proton, a neutron and an electron.

| | relative mass | relative charge |
|---|---|---|
| proton | 1 | +1 |
| neutron | 1 | 0 |
| electron | very small | −1 |

**Figure 4**

(i) Explain, using the information in Figure 3 and Figure 4, why atoms of chlorine have no overall charge.

**(2)**

Chlorine atoms have 17 protons which give a charge of +17. The 17 electrons will have a charge of -17. The charges cancel out each other so there is no overall charge. Neutrons have no charge as well.

(ii) Atoms of chlorine-37 have a mass number of 37.

Calculate the number of neutrons in atoms of chlorine-37.

**(1)**

37 - 17 = 20

number of neutrons = 20

(iii) There are two isotopes of chlorine, chlorine-35 and chlorine-37.

Explain the meaning of the term **isotopes**.

**(2)**

Isotopes are atoms of the same element with the same number of protons and electrons, but different number of neutrons.

**(Total for Question 2 = 8 marks)**

**4** (a) In the 19th century, Mendeleev arranged the elements known at the time to form his periodic table.
Mendeleev's periodic table is different from the modern periodic table.

State **one** difference between Mendeleev's periodic table and the modern periodic table.

**(1)**

In the Mendeleev's periodic table, elements are arranged according to their relative atomic mass instead of their atomic number.

(c) Gallium, Ga, is in the same group of the modern periodic table as aluminium.

The formula of aluminium oxide is $Al_2O_3$.

(i) Predict the formula of gallium oxide.

**(1)**

$Ga_2O_3$

**8** (a) A chlorine atom contains 17 electrons, 18 neutrons and 17 protons.

(i) State the mass number of this chlorine atom.

17+18 = 35

35

(1)

(ii) Give the electronic configuration of this chlorine atom.

(1)

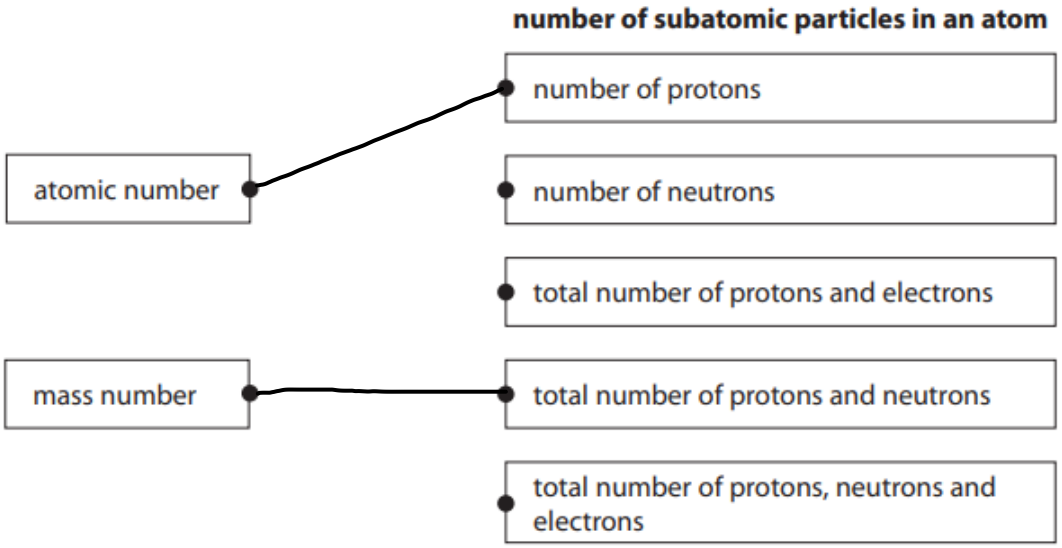
2.8.7

1.

(c) An atom of an element has an atomic number and a mass number.

Draw one straight line from each of these to the numbers of subatomic particles it shows to be present in an atom.

(2)



8.

(b) Potassium and caesium are in the same group of the periodic table.

Explain, in terms of electrons, why potassium and caesium are in the same group.

(2)

Both potassium and caesium have 1 electron in the outermost shell.

They lose 1 electron to form a +1 ion.

**TOTAL FOR PAPER IS 29 MARKS**