

Atoms, Ions and Isotopes

Questions for GCSE Physics (Answers)



1. Name the three subatomic particles found in an atom.

Electrons, protons and neutrons

2. Where in an atom are **protons** and **neutrons** found?

The nucleus

3. What is the relative charge of:

a) a proton

+1

b) a neutron

0

c) an electron?

-1

4. What is the relative mass of:

a) a proton

1

b) a neutron

1

c) an electron?

0 (or 1/2000 - accurately 1/1836)

5. Which subatomic particle determines which **element** an atom belongs to?

*The (number of) **protons**.*

6. Explain why an atom normally has no overall electrical charge.

It has the same number of protons (+) as electrons (-) and so they cancel out.

7. Explain how a neutral atom can become a positive ion.

It loses electrons which are negative, and so it becomes positive.

(It has more positive protons than it has negative electrons making it positive overall)

8. A neutral magnesium atom contains 12 protons.

a) How many electrons does it contain?

12

b) The atom loses two electrons. How many electrons does it now contain?

10

c) What is the overall charge of the ion formed?

-2

9. An ion contains 17 protons and 18 electrons. What is its charge?

-1

10. What is meant by the term isotopes?

Isotopes are atoms of the same element with the same number of protons

but different numbers of neutrons.



11. An atom contains 11 protons, 11 electrons and 12 neutrons. What is its:

a) atomic number

11 (it has 11 protons)

b) mass number?

23 (it has 11 protons + 12 neutrons)

12. Carbon-12 and carbon-14 are isotopes of carbon. State what is **the same** and what is **different** about their nuclei..

They each have the same numbers of protons (6) but different numbers of neutrons.

Carbon 12 has 6 neutrons and carbon 14 has 8 neutrons.

13. Chlorine has an atomic number of 17. A chlorine-37 atom gains one electron. State the number of protons, neutrons, and electrons in the resulting ion.

17 protons, 20 neutrons, 18 electrons (it has a charge of -1)

14. Two atoms have the following structures:

Atom A: 19 protons, 20 neutrons, 19 electrons

Atom B: 19 protons, 21 neutrons, 18 electrons

Explain **two ways** in which these atoms are different

(they are both atoms of the same element because they both have 19 protons making them potassium)

1. *they have different numbers of neutrons – they are different isotopes*

2. *atom A is neutral (19 protons and 19 electrons) but atom B is a positive ion (it has lost an electron)*

15. Write the correct nuclear notation for the two atoms in question 14.
[Hint: Use 'K' for the symbol for potassium.]

Atom A: ${}_{19}^{39}\text{K}$

Atom B: ${}_{19}^{40}\text{K}^{+}$

