

Atomic structure and the Periodic Table

Question Paper 2

Level	IGCSE
Subject	Chemistry (0620/0971)
Exam Board	Cambridge International Examinations (CIE)
Topic	Atoms, elements and compounds
Sub-Topic	Atomic structure and the Periodic Table
Booklet	Question Paper 2

Time Allowed: 47 minutes

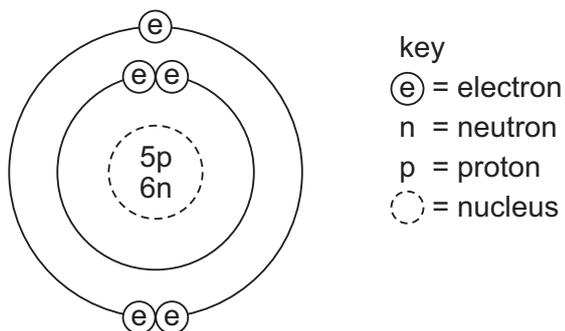
Score: /39

Percentage: /100

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>85%	75%	68%	60%	53%	48%	40%	33%	<25%

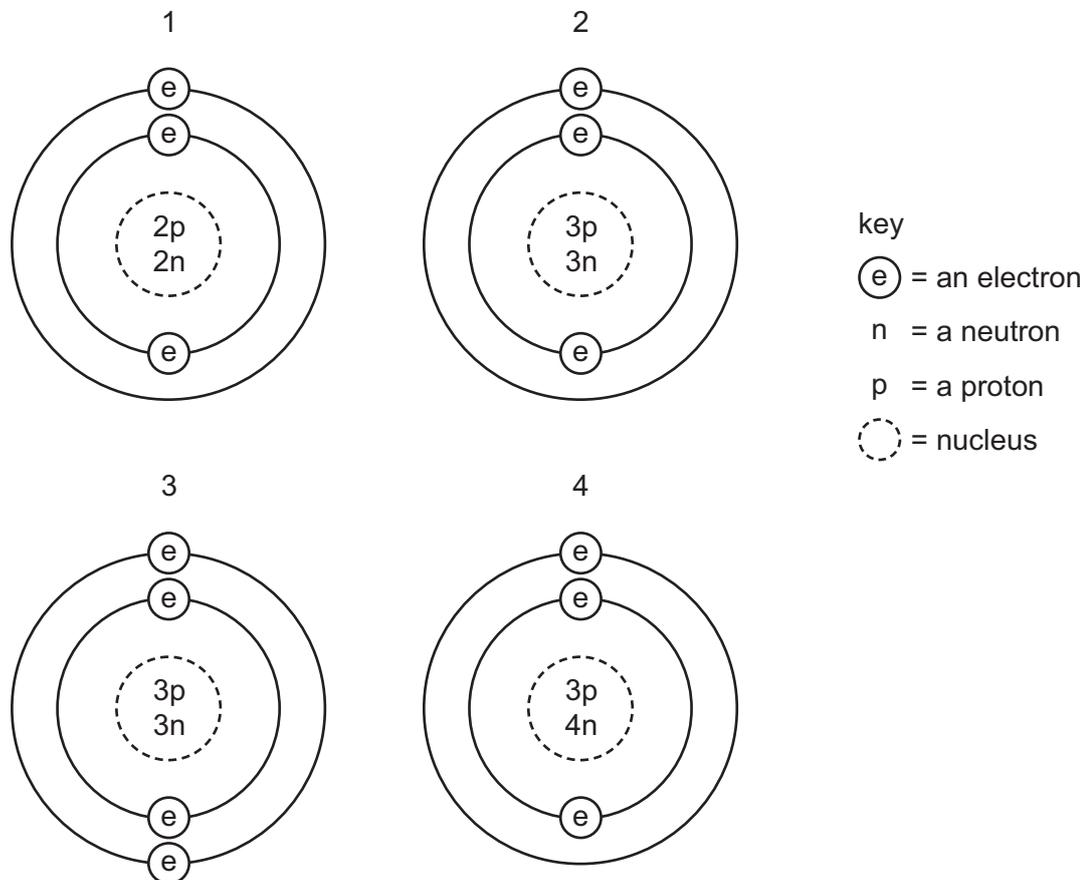
1 The diagram shows the structure of an atom of element X.



What is X?

- A boron
- B carbon
- C sodium
- D sulfur

2 The diagrams show four particles.



Which two diagrams show **atoms** that are isotopes of each other?

- A 1 and 2
- B 1 and 3
- C 2 and 3
- D 2 and 4

3 A compound contains one atom of calcium, two atoms of hydrogen and two atoms of oxygen.

What is the correct chemical formula of the compound?

- A** CaO_2H_2 **B** HOCaOH **C** H_2CaO_2 **D** $\text{Ca}(\text{OH})_2$

4 Which statements about a phosphorus atom, $^{31}_{15}\text{P}$, are correct?

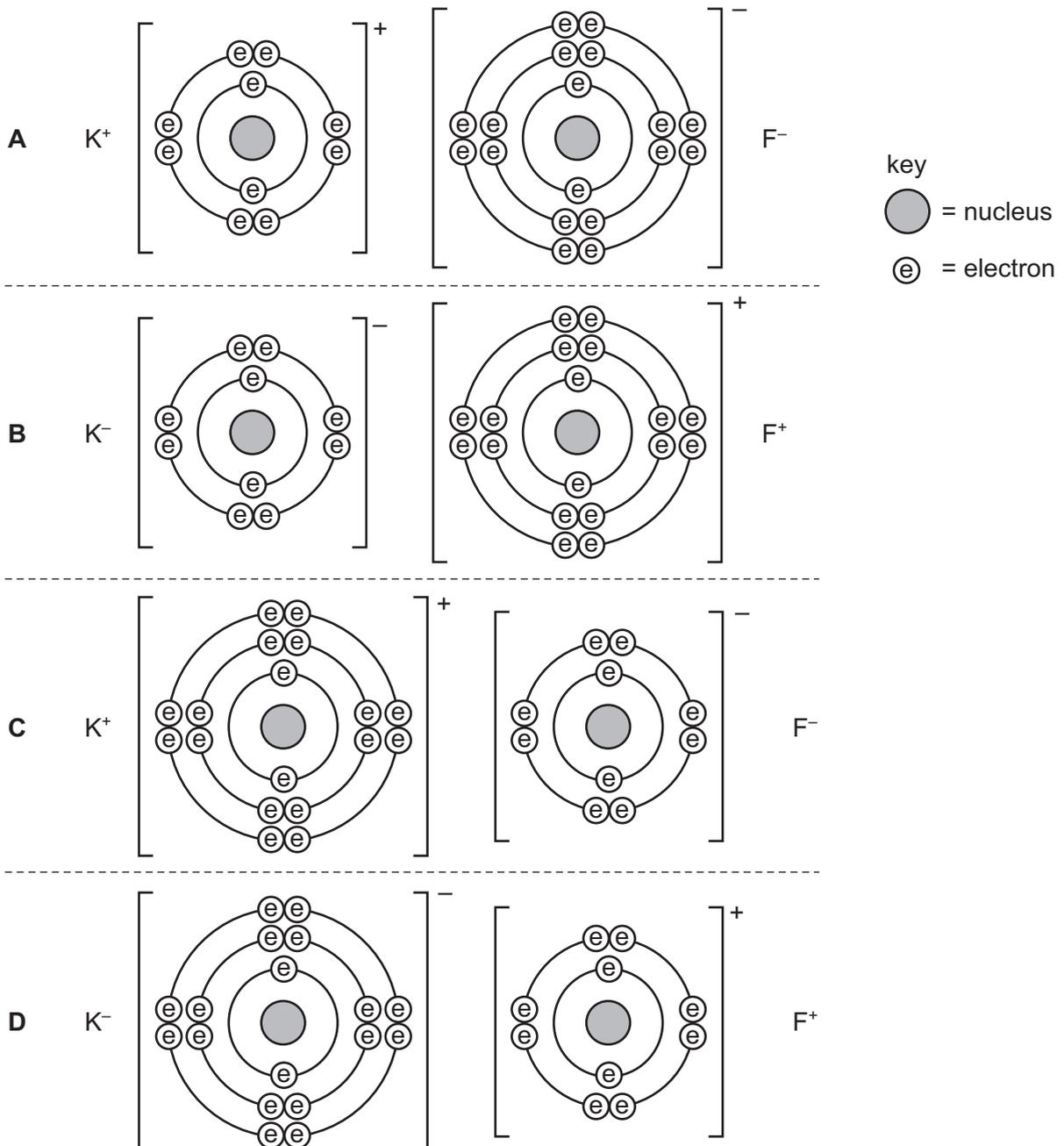
- 1 The nucleon number is 16.
- 2 The number of outer electrons is 5.
- 3 The proton number is 15.

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

5 Which statement about atoms is correct?

- A Atoms contain protons and electrons in the nucleus.
- B Neutrons are negatively charged.
- C Protons are positively charged.
- D The nucleon number is the number of neutrons.

6 Which diagram correctly shows the ions present in the compound potassium fluoride?



7 What do the nuclei of ${}^1_1\text{H}$ hydrogen atoms contain?

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

8 The table shows the nucleon number and the number of neutrons in one atom of isotopes W, X, Y and Z.

isotope	nucleon number	number of neutrons
W	35	18
X	37	20
Y	39	20
Z	40	22

Which statement about W, X, Y and Z is correct?

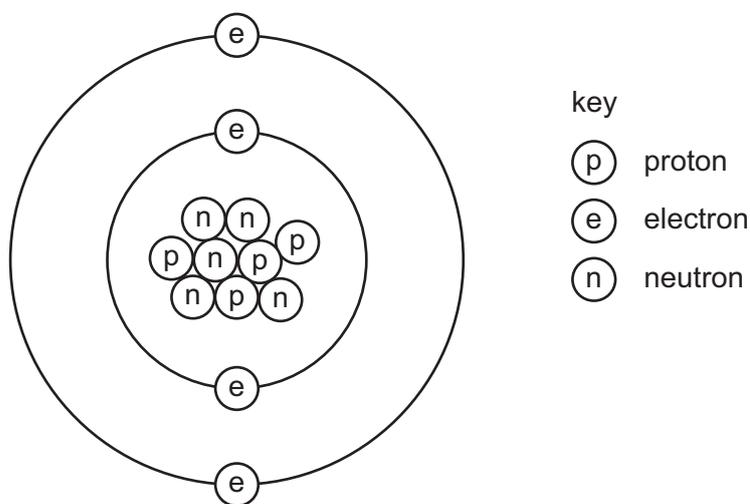
- A W and X are isotopes of the same element.
 - B X and Y are isotopes of elements in the same group of the Periodic Table.
 - C Y and Z are isotopes of elements in the same period of the Periodic Table.
 - D Z has a higher proton number than Y.
- 9 The relative atomic mass of chlorine is 35.5.
- When calculating relative atomic mass, which particle is the mass of a chlorine atom compared to?
- A a neutron
 - B a proton
 - C an atom of carbon-12
 - D an atom of hydrogen-1

10 Atoms contain electrons, neutrons and protons.

What is the definition of nucleon number?

- A** the number of neutrons in the nucleus of an atom
- B** the number of protons in the nucleus of an atom
- C** the total number of neutrons and protons in the nucleus of an atom
- D** the total number of particles in an atom

11 The diagram shows the atomic structure of an element X.



What is X?

- A** aluminium
- B** beryllium
- C** boron
- D** fluorine

12 Which statements comparing the properties of electrons, neutrons and protons are correct?

	neutrons and protons are both heavier than electrons	only electrons and neutrons are charged
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

13 The atomic structures of four particles are shown.

particle	electrons	neutrons	protons
W	8	9	8
X	7	9	7
Y	8	10	8
Z	9	10	9

Which two particles are isotopes?

- A** W and X **B** W and Y **C** X and Z **D** Y and Z

14 Two atoms, X and Y, can be represented as shown.



Which statement is **not** correct?

- A** X and Y are atoms of different elements.
B X and Y are isotopes.
C X and Y have different mass numbers.
D X and Y have the same number of electrons.

15 Two atoms have the same relative atomic mass but different chemical properties.

Which row about the proton and neutron numbers of these atoms is correct?

	proton numbers	neutron numbers
A	different	different
B	different	same
C	same	different
D	same	same

16 The table shows the numbers of particles present in the nuclei of four atoms or ions.

	protons	neutrons	electronic structure
1	18	22	2,8,8
2	19	20	2,8,8
3	19	21	2,8,8,1
4	20	20	2,8,8,2

Which two particles belong to the same element?

- A** 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

17 An aluminium atom has a nucleon number of 27 and a proton number of 13.

How many neutrons does this aluminium atom contain?

- A** 13 **B** 14 **C** 27 **D** 40

18 An atom of element Q contains 19 electrons, 19 protons and 20 neutrons.

What is Q?

- A** calcium
B potassium
C strontium
D yttrium

19 The table shows the atomic structure of four atoms.

Which atom is **not** a metal?

	electrons	neutrons	protons
A	18	22	18
B	19	20	19
C	19	21	19
D	20	20	20

20 Which statements about isotopes of the same element are correct?

- 1 They are atoms which have the same chemical properties because they have the same number of electrons in their outer shell.
- 2 They are atoms which have the same number of electrons and neutrons but different numbers of protons.
- 3 They are atoms which have the same number of electrons and protons but different numbers of neutrons.

A 1 and 2 **B** 1 and 3 **C** 2 only **D** 3 only

21 In which row are the substances correctly classified?

	element	compound	mixture
A	brass	sulfur	water
B	sulfur	brass	water
C	sulfur	water	brass
D	water	sulfur	brass

22 Element Q has 4 electrons in its outer shell and has 69 neutrons. Q conducts electricity.

What is Q?

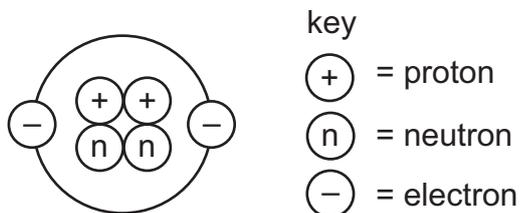
- A carbon (C)
- B lead (Pb)
- C thulium (Tm)
- D tin (Sn)

23 X and Y are isotopes of the same element.

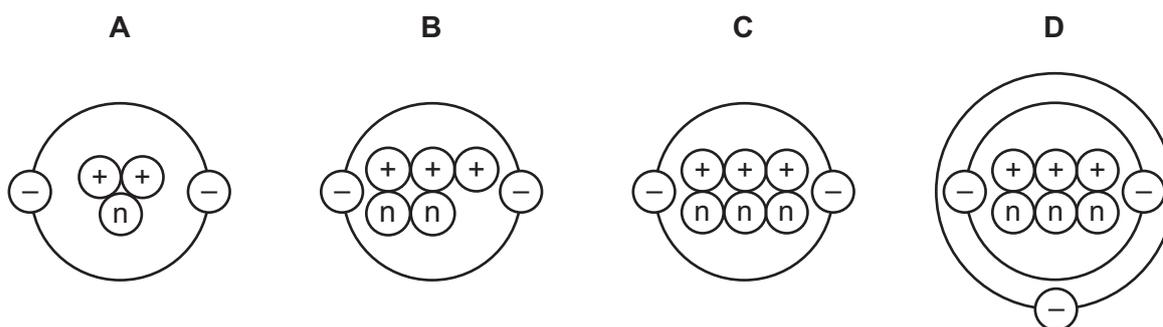
Which statement is correct?

- A X and Y have atoms with different numbers of electron shells.
- B X and Y have atoms with the same nucleon number.
- C X and Y have atoms with the same number of outer shell electrons.
- D X and Y have different chemical properties.

24 The diagram shows the structure of an atom.



Which diagram shows the structure of an isotope of this atom?



25 The table shows the structure of different atoms and ions.

particle	proton number	nucleon number	number of protons	number of neutrons	number of electrons
Mg	12	24	12	W	12
Mg ²⁺	X	24	12	12	10
F	9	19	9	Y	9
F ⁻	9	19	9	10	Z

What are the values of W, X, Y and Z?

	W	X	Y	Z
A	10	10	9	9
B	10	12	10	9
C	12	10	9	10
D	12	12	10	10

26 Element Y has a nucleon number of 19 and a proton number of 9.

Which group in the Periodic Table does it belong to?

- A** I **B** III **C** VII **D** VIII

27 The nucleon number and proton number of the lithium atom are shown by the symbol ${}^7_3\text{Li}$.

What is the correct symbol for the lithium ion in lithium chloride?

- A** ${}^6_2\text{Li}^-$ **B** ${}^6_3\text{Li}^+$ **C** ${}^7_3\text{Li}^+$ **D** ${}^7_3\text{Li}^-$

28 The number of particles in atoms W, X, Y and Z are shown.

	protons	electrons	neutrons
W	6	6	6
X	6	6	7
Y	7	7	7
Z	7	7	8

Which statement is correct?

- A** W and X are isotopes of carbon.
B X and Y are isotopes of nitrogen.
C X has a mass number of 12.
D Z has an atomic number of 8.

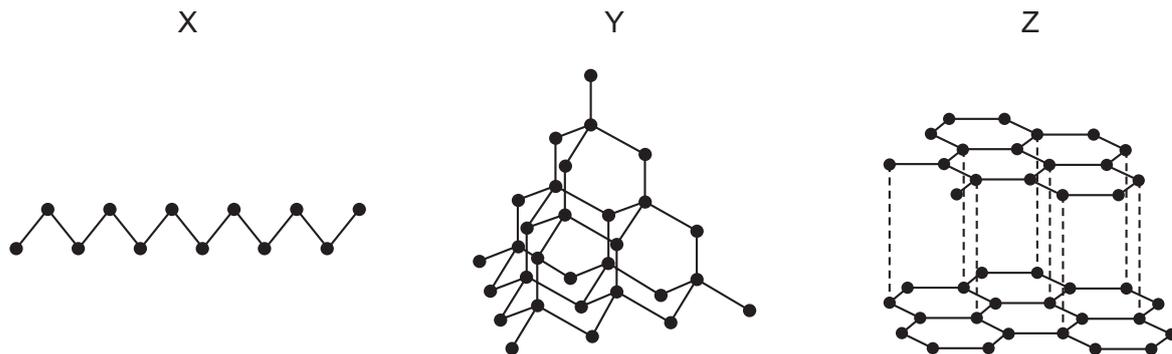
29 Which pair of atoms contains the same number of neutrons?

- A** ${}^{59}_{27}\text{Co}$ and ${}^{59}_{28}\text{Ni}$
B ${}^{64}_{29}\text{Cu}$ and ${}^{65}_{29}\text{Cu}$
C ${}^{64}_{29}\text{Cu}$ and ${}^{65}_{30}\text{Zn}$
D ${}^{65}_{29}\text{Cu}$ and ${}^{65}_{30}\text{Zn}$

30 Which row gives the number of protons, electrons and neutrons found in an atom of zinc?

	protons	electrons	neutrons
A	30	30	35
B	30	35	35
C	35	30	30
D	35	35	30

31 The diagrams, X, Y and Z, show part of a polymer and two giant covalent structures.



Which of X, Y or Z could be used as a cutting tool and which of X, Y or Z could be used to reduce friction?

	cutting tool	reduce friction
A	X	Y
B	Y	Z
C	Z	X
D	Z	Y

32 Which statement explains why isotopes of the same element have the same chemical properties?

- A** They have a different number of neutrons in the nucleus.
- B** They have the same number of neutrons in the nucleus.
- C** They have the same number of outer shell electrons.
- D** They have the same number of protons as neutrons.

33 Why do isotopes of the same element have the same chemical properties?

- A** They have the same nucleon number.
- B** They have the same number of electrons in the outer shell.
- C** They have the same number of neutrons in the nucleus.
- D** They have the same number of protons as neutrons.

34 Carbon has three naturally occurring isotopes, ^{12}C , ^{13}C and ^{14}C .

Which statement explains why the isotopes have the same chemical properties?

- A** They have the same number of electrons in the first shell.
- B** They have the same number of electrons in the outer shell.
- C** They have the same number of neutrons in the nucleus.
- D** They have the same number of protons as neutrons.

35 Which part of an atom has a relative mass of 1 and a relative charge of 0?

- A** electron
- B** neutron
- C** nucleus
- D** proton

- 36 Which element does **not** form a stable ion with the same electronic structure as argon?
- A aluminium
 - B chlorine
 - C phosphorus
 - D potassium
- 37 Which definition of isotopes is correct?
- A atoms of the same element that have the same number of electrons and nucleons
 - B atoms of the same element that have the same number of neutrons and protons
 - C atoms of the same element that have the same number of protons but a different number of electrons
 - D atoms of the same element that have the same number of protons but a different number of nucleons
- 38 The aluminium ion, Al^{3+} , has the same electronic structure as an atom of which noble gas?
- A argon
 - B helium
 - C krypton
 - D neon
- 39 Which statement explains why isotopes of an element have the same chemical properties?
- A They have different numbers of neutrons.
 - B They have the same number of electrons as protons.
 - C They have the same number of electrons in the outer shell.
 - D They have the same number of protons in the nucleus.