

ATOMIC STRUCTURE 1

Q1. This question is about gold (Au).

(a) An atom of gold is represented as:



How many neutrons are in this atom of gold?

(1 mark)

(b) Gold ions are used as a catalyst.

How does a gold atom (Au) become a gold ion (Au^{3+})?

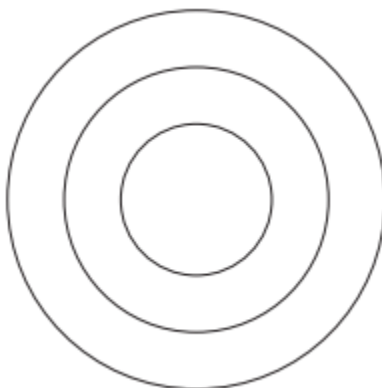
(2 marks)

Q2. During electrolysis, potassium metal is produced at the negative electrode.

(i) Describe how potassium atoms are formed from potassium ions.

(2 marks)

(ii) Complete the diagram to show the electronic structure of a chloride ion (Cl^-).



(1 mark)

Q3. The atmosphere of Venus contains the isotopes ^2_1H and ^1_1H .

Describe the similarities and the differences in the isotopes ^2_1H and ^1_1H .

You should refer to the sub-atomic particles in each isotope.

(3 marks)

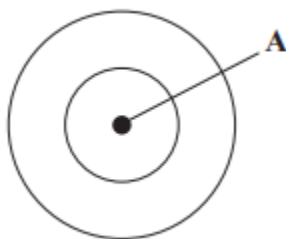
Q4. This question is about oxygen atoms. The periodic table may help you to answer this question.

(a)

(i) Oxygen atoms have 8 electrons.

Complete the diagram to represent the arrangement of electrons in an oxygen atom.

Use crosses (×) to represent the electrons.

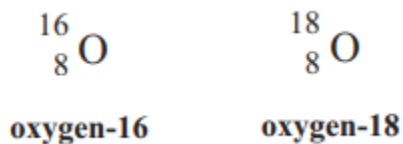


(1 mark)

(ii) Name the part of the oxygen atom that is labelled A on the diagram.

(1 mark)

(b) Two isotopes of oxygen are oxygen-16 and oxygen-18.



Explain, in terms of particles, how the nucleus of an oxygen-18 atom is different from the nucleus of an oxygen-16 atom.

(2 marks)

Q5. The table gives information about two isotopes of hydrogen, hydrogen-1 and hydrogen-2.

(a)

	Hydrogen-1	Hydrogen-2
Atomic number	1	1
Mass number	1	2

An atom of hydrogen-1 is represented as: ${}^1_1\text{H}$

Show how an atom of hydrogen-2 is represented.

(1 mark)

(b) Calculate the relative formula mass (M_r) of water, H_2O

Relative atomic masses: $\text{H} = 1$; $\text{O} = 16$.

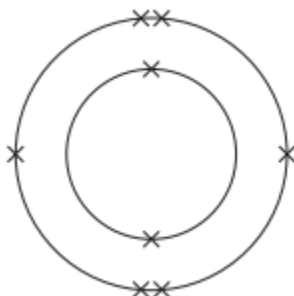
(1 mark)

Q6.

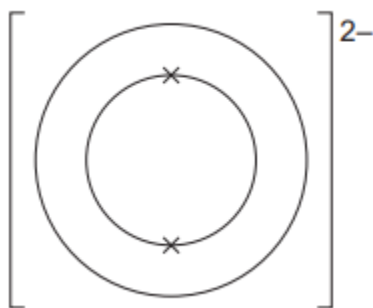
(i) Explain in terms of electrons how an iron atom (Fe) can change into an iron(III) ion (Fe^{3+}).

(2 marks)

(ii) The diagram below represents the electronic structure of an oxygen atom (O).

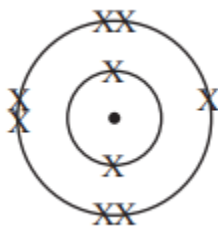


Complete the diagram below to show the electronic structure of an oxide ion (O^{2-}).



(1 mark)

Q7. The diagram represents the electron arrangement of a fluorine atom.



Explain how a fluorine atom can change into a fluoride ion, F^- .

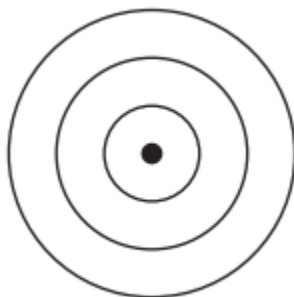
(2 marks)

Q8. Aluminium is a useful metal.

The atomic number (proton number) of aluminium is 13.

Complete the diagram to show the electronic structure of an aluminium atom.

Use crosses (x) to represent the electrons.



(1 mark)

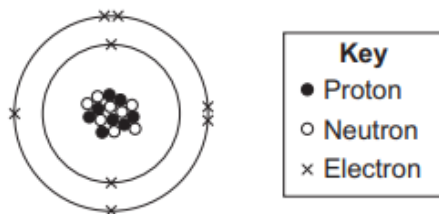
Q9.

(a) Complete the table to show the relative masses of the particles in atoms.

Name of particle	Relative mass
Proton
Neutron	1
Electron

(2 marks)

(b) The diagram shows an oxygen atom.



Key
 ● Proton
 ○ Neutron
 × Electron

Use the correct number to complete each sentence.

8	16	18	24
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The atomic (proton) number of the oxygen atom shown above is

The mass number of the oxygen atom shown above is

(2 marks)

(c)(i) Draw a ring around the correct answer to complete the sentence.

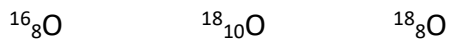
Oxygen atoms with different numbers of neutrons are called

isotopes.
molecules.
polymers.

(1 mark)

(ii) An oxygen atom with a different number of neutrons has 10 neutrons.

Draw a ring around the symbol which represents this atom.



(1 mark)

(d) A water molecule contains hydrogen and oxygen atoms.

Use the correct answer to complete the sentence.

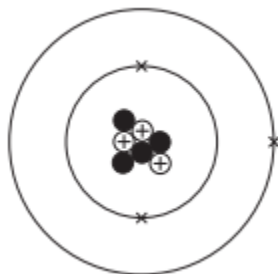
a compound	an element	a mixture
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Water is

(1 mark)

Q10. A lithium atom can be represented as ${}^7_3\text{Li}$.

The diagram represents the lithium atom.



(i) Some particles in the nucleus have a positive charge. What is the name of these particles?

(1 mark)

(ii) Some particles in the nucleus have no charge. What is the name of these particles?

(1 mark)

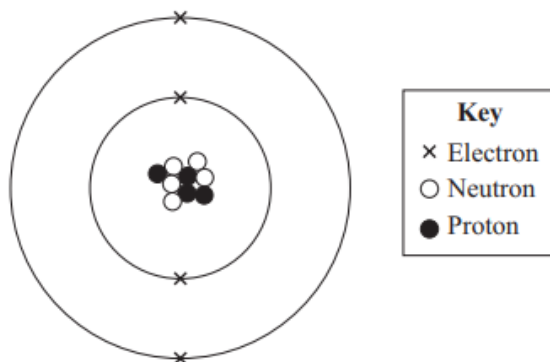
(iii) Use the correct answer from the box to complete the sentence.

3	4	7
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The mass number of this atom of lithium is

(1 mark)

Q11. The diagram represents an atom of beryllium.



Use a number from the box to complete each sentence.

4	7	9	12
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(a) The atomic number (proton number) of this atom is _____.

(1 mark)

(b) The mass number of this atom is _____.

(1 mark)

Q12. Lithium nitride is an ionic compound that contains lithium ions (Li^+) & nitride ions (N^{3-}).

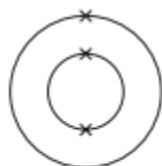
(i) The periodic table may help you to answer this question.

Which diagram, **A**, **B** or **C**, represents the electronic structure of a lithium atom?

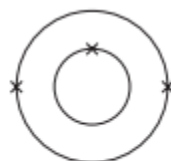
Write your answer in the box.



A



B



C

Diagram

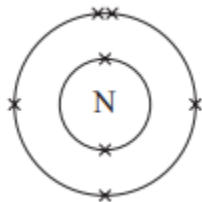
(1 mark)

(ii) Tick (9) the statement which describes how a lithium atom (Li) changes into a lithium ion (Li^+).

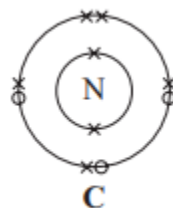
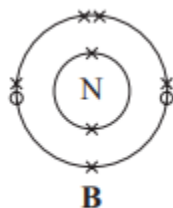
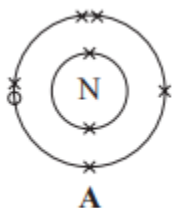
Statement	Tick (✓)
A lithium atom loses a neutron.	
A lithium atom loses an electron.	
A lithium atom loses a proton.	

(1 mark)

(iii) The diagram shows the electronic structure of a nitrogen atom.



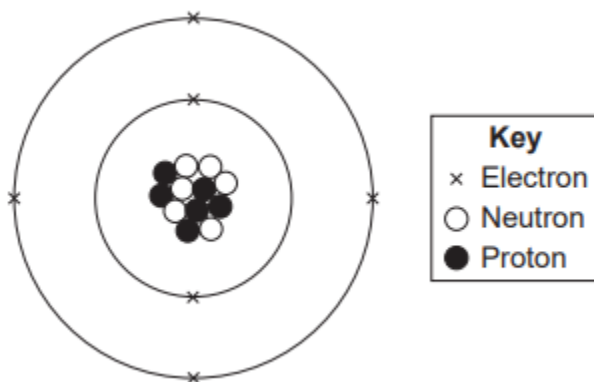
Which diagram, A, B or C, represents the electronic structure of a nitride ion (N^{3-})? Write your answer in the box.



Diagram

(1 mark)

Q13. The diagram represents a carbon atom.



Use the diagram above to help you to answer these questions.

(i) Draw a ring around the atomic (proton) number of this carbon atom.

6

12

18

(1 mark)

(ii) Draw a ring around the mass number of this carbon atom.

6

12

18

(1 mark)

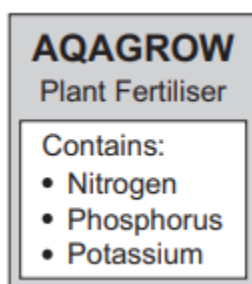
(iii) A different carbon atom has 6 protons and 8 neutrons.

Draw a ring around the symbol that represents this atom.

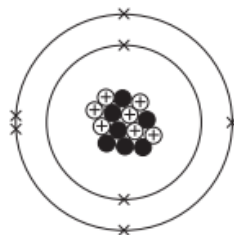


(1 mark)

Q14. Fertilisers contain elements that plants need.



The figure represents a nitrogen atom.



Complete each sentence.

(i) The mass number of this nitrogen atom is _____.

(1 mark)

(ii) Atoms of nitrogen with different numbers of neutrons are called _____.

(1 mark)

(iii) Compared with a proton, the mass of an electron is _____.

(1 mark)

Total marks (42)