OCR
Oxford Cambridge and RSA

AS Level Chemistry A

H032/01 Breadth in chemistry

Question Set 18

1. This question is about atomic structure and the compounds of calcium, nitrogen and oxygen.

(a) Most elements contain different isotopes.

State **two** differences between isotopes of the same element.

[1]

(b) Complete the table for an atom and an ion of two different elements.

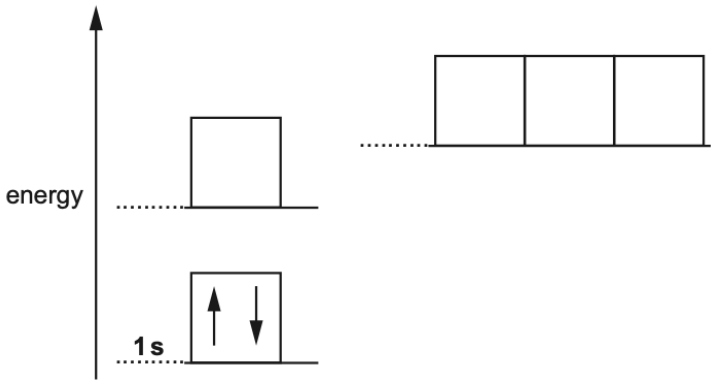
Element	Mass number	Protons	Neutrons	Electrons	Charge
.....	.....	26	28	.....	0
.....	80	.....	.....	36	2−

[2]

(c) Electrons occupy orbitals which are arranged in energy levels.

In the diagram below, each box represents an orbital and each electron is shown as an arrow.

Label the sub-shells and add arrows to show how electrons occupy orbitals in an atom of oxygen.



[2]

(d) Calcium reacts with nitrogen to form calcium nitride, Ca_3N_2, which is an ionic compound.

(i) Construct a 'dot-and-cross' diagram for Ca_3N_2.
Show outer electrons only and the charges on each ion.

[2]

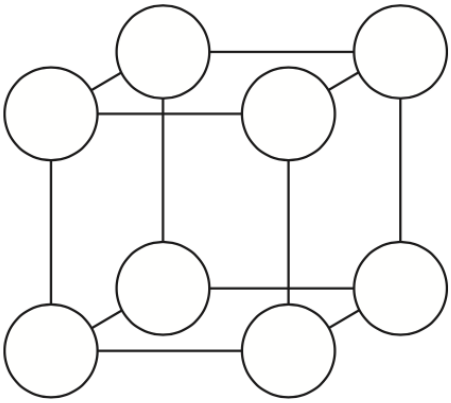
(ii) Calcium nitride reacts with water to form a solution containing two alkaline compounds.

Write an equation for this reaction.

[2]

Calcium reacts with oxygen to form a compound which has a giant ionic lattice structure.
The diagram shows ions as circles in part of the lattice.

Complete the diagram by showing the symbols of the ions, including charges.



[2]

Nitrogen forms an oxide with the formula N_2O. A molecule of N_2O is linear and has a nitrogen atom in the centre.

Draw a 'dot-and-cross' diagram for an N_2O molecule.

Show outer electrons only.

[2]

Total Marks for Question Set 18: 13