Topic 3 – structure questio

1 The table gives the composition of three particles.

particle	number of protons	number of electrons	number of neutrons
A	15		16
B	15		16
C	15		17

(a) What is the evidence in the table for each of the following?

(i) Particle **A** is an atom.

.....

..... [1]

(ii) **A**, **B** and **C** are all particles of the same element.

.....

..... [1]

(iii) Particles **A** and **C** are isotopes of the same element.

.....

..... [2]

(b) **(i)** What is the electronic structure of particle **A**?

..... [1]

(ii) Is element **A**, a metal or a non-metal? Give a reason for your choice.

.....

..... [1]

[Total: 6]

5 (a) The symbols of six particles are shown below.

Na^+ Ca^{2+} Kr P Si O^{2-}

Select from the list of particles to answer the following questions. A particle may be selected once, more than once or not at all.

(i) Which **two** ions have the same electronic structure? ..... [1]

(ii) Which ion has the same electronic structure as an atom of argon? ..... [1]

(iii) Which atom can form an ion of the type X^{3-}? ..... [1]

(iv) Which atom can form a hydride which has a formula of the type XH_4? ..... [1]

(b) (i) How many protons, neutrons and electrons are there in one copper(II) ion $^{64}_{29}Cu^{2+}$?

number of protons .....

number of neutrons .....

number of electrons .....

[2]

(ii) $^{45}_{21}Sc$ represents an atom of scandium.

How many nucleons and how many charged particles are there in one atom of scandium?

number of nucleons .....

number of charged particles .....

[2]

(c) Two different atoms of sodium are $^{23}_{11}Na$ and $^{24}_{11}Na$.

(i) Explain why these two atoms are isotopes.

.....

..... [2]

(ii) $^{24}_{11}Na$ is radioactive. It changes into an atom of a different element which has one more proton.

Identify this element.

..... [1]

(iii) State **two** uses of radioactive isotopes.

.....

..... [2]

[Total: 13]

1 (a Complete the table which gives the names, symbols, relative masses and relative charges of the three subatomic particles.

name	symbol	relative mass	relative charge
electron			
proton		1	
	n		0

[3]

(b) Use the information in the table to explain the following.

(i) Atoms contain charged particles but they are electrically neutral because they have no overall charge.

.....

..... [2]

(ii) Atoms can form positive ions.

.....

..... [2]

(iii) Atoms of the same element can have different masses.

.....

..... [2]

(iv) Scientists are certain that there are no undiscovered elements missing from the Periodic Table from hydrogen to lawrencium.

..... [1]

[Total: 10]

3 The table below gives the number of protons, neutrons and electrons in atoms or ions.

particle	number of protons	number of electrons	number of neutrons	symbol or formula
A		10	10	$^{19}_{9}F^-$
B	11	11	12	
C	18	18	22	
D	15	18	16	
E	13	10	14	

(a) Complete the table. The first line is given as an example. [6]

(b) Which atom in the table is an isotope of the atom which has the composition 11p, 11e and 14n? Give a reason for your choice.

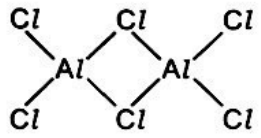
.....

..... [2]

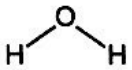
[Total: 8]

1 The structures of six compounds are shown below.

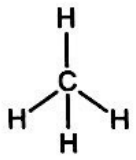
A



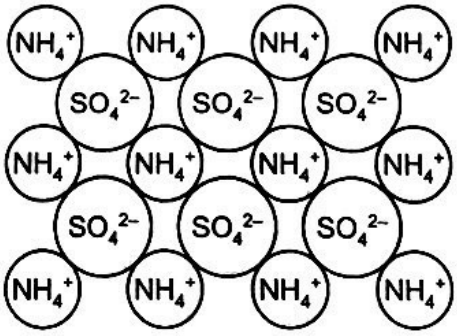
B



C

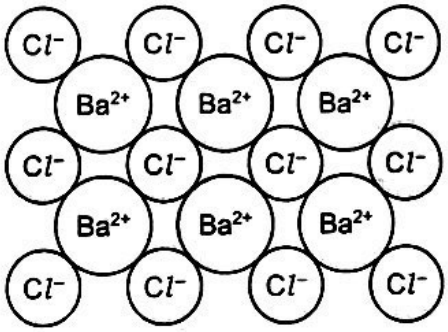


D



E

F



Answer the following questions about these substances.
Each compound may be used once, more than once or not at all.

(a) Which substance, **A**, **B**, **C**, **D**, **E** or **F**,

(i) gives a white precipitate on addition of an aqueous solution of sodium sulfate, ... [1]

(ii) is a component of many fertilisers, ... [1]

(iii) contains a Group III element, ... [1]

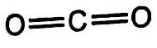
(iv) is an acidic gas at room temperature, ... [1]

(v) turns anhydrous cobalt chloride pink, ... [1]

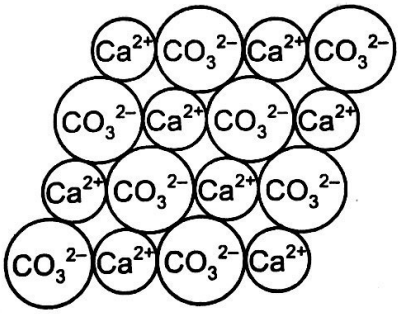
(vi) is the main component of natural gas? ..... [1]

1 The structures of six substances containing carbon are shown below.

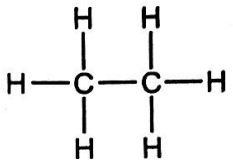
A



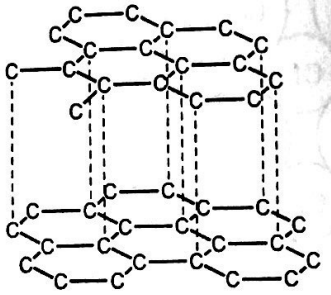
B



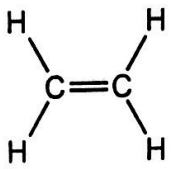
C



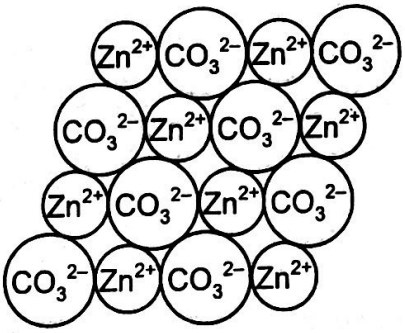
D



E



F



Answer the following questions about these substances.
Each substance may be used once, more than once or not at all.

(a) Which substance, **A**, **B**, **C**, **D**, **E** or **F**,

(i) is an element, ... [1]

(ii) is a saturated hydrocarbon, ... [1]

(iii) is added to the blast furnace to help in the extraction of iron, ... [1]

(iv) has a giant covalent structure, ... [1]

(v) is a product of respiration, ... [1]

(vi) contains a metal ion with 20 protons? ..... [1]

(b) Complete the word equation for the thermal decomposition of substance **B**.

..... $\xrightarrow{\text{heat}}$ calcium oxide + ...

[2]

(c) Describe a test for substance **A**.

test .....

result .....

[2]

[Total: 10]