

1 The table below gives the composition of six particles which are either atoms or ions.

particle	number of protons	number of neutrons	number of electrons
<b>A</b>	33	40	33
<b>B</b>	19	20	18
<b>C</b>	34	45	36
<b>D</b>	33	42	33
<b>E</b>	13	14	13
<b>F</b>	24	28	21

(a) Which particles are atoms? Explain your choice.

.....  
..... [3]

(b) Which particle is a negative ion and why has this particle got a negative charge?

.....  
..... [2]

(c) Which particles are positive ions?

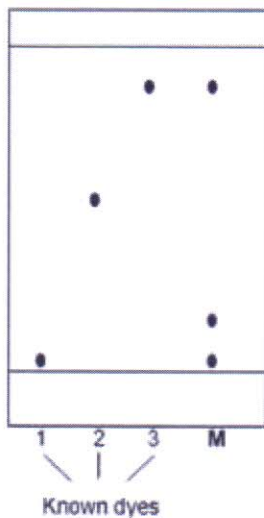
..... [2]

(d) Explain why particle **A** and particle **D** are isotopes.

.....  
..... [2]

[Total: 9]

- 2 A mixture of coloured dyes, **M**, was separated by chromatography. The dyes were insoluble in water. The chromatogram below shows the result of separating the mixture and the chromatography of three known dyes 1, 2 and 3.



On the diagram, label the baseline (origin).

[1]

- (a) Name a solvent that could be used in this separation.

..... [1]

- (b) How many dyes were there in the mixture, **M**?

..... [1]

- (c) What are your conclusions about the identity of the dyes in the mixture, **M**?

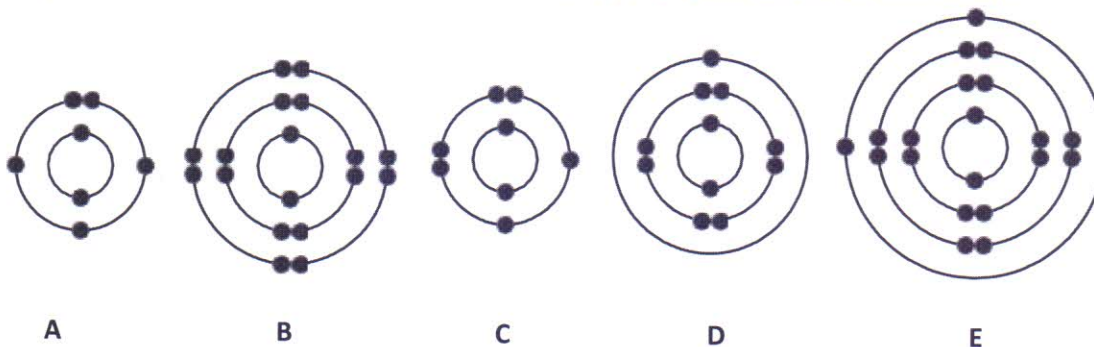
.....  
 .....  
 ..... [3]

- (d) How could the reliability of the results be checked?

..... [1]

**[Total: 7]**

3 (a) The electronic structure of five atoms, A, B, C, D and E, are shown below.



Answer the following questions about these structures.

Each structure can be used once, more than once or not at all.

(a) Which structure:

- (i) Represents an atom of an element in Group V of the Periodic Table, ..... [1]
- (ii) Has a complete outer shell of electrons, ..... [1]
- (iii) Represents an oxygen atom, ..... [1]
- (iv) Has a proton number of 20, ..... [1]
- (v) Is an atom of an element in Period 4 of the Periodic Table, ..... [1]
- (vi) Has a single valency electron? ..... [1]

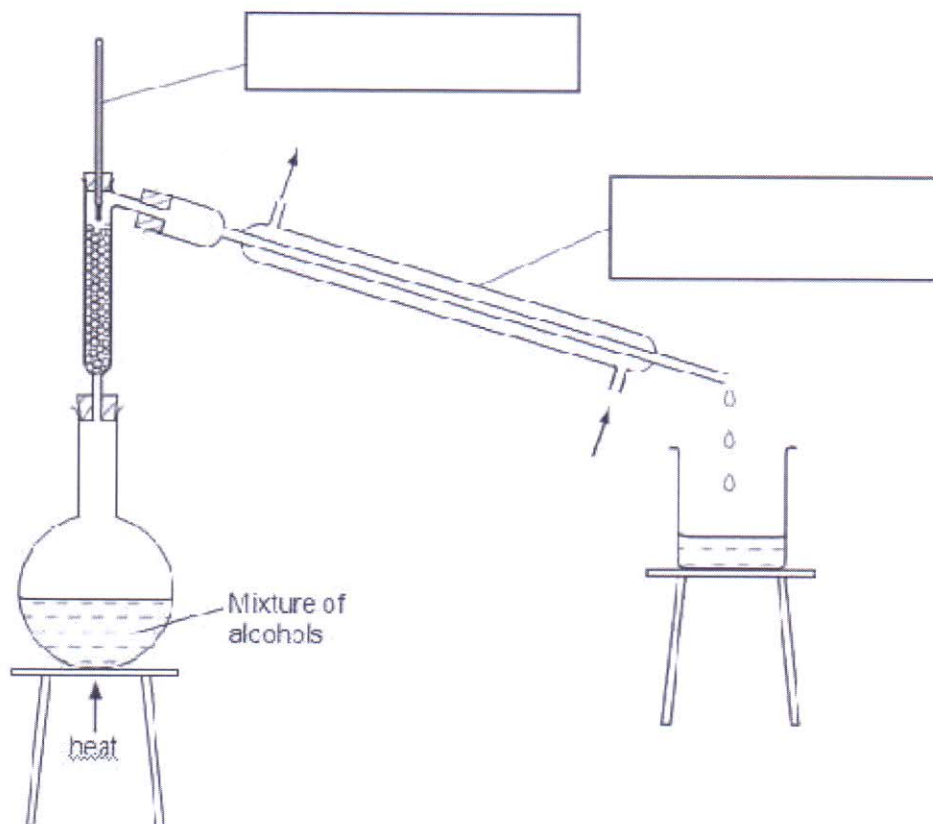
(b) Complete the following sentences about isotopes using words from the list below.

**atoms ions molecules neutrons nuclei protons element**

Isotopes are .....of the same..... with the same number of..... but different numbers of..... [4]

[Total: 10]

- 4 Student separated a mixture of two alcohols, ethanol (boiling point 78°C) and butanol (boiling point 118°C). The apparatus used is shown below.



- (a) Complete the boxes to identify the pieces of apparatus labelled. [2]
- (b) Label the arrows. [2]
- (c) State the name of this separation process.  
 ..... [2]
- (d) (i) Which liquid is first to collect in the beaker?  
 ..... [1]
- (ii) How would the student know when all of this liquid had collected?  
 .....  
 ..... [1]
- (e) Identify and explain a possible hazard in this experiment.  
 .....  
 ..... [2]

**[Total: 10]**

5 Substances can be classified as:

**elements      mixtures**

Compounds and Elements can be divided into:

**metals      non-metals**

a. Define each of the following terms.

(i) *element*

.....  
..... [2]

(ii) *compound*

.....  
..... [2]

(iii) *mixture*

.....  
..... [2]

b. Classify each of the following as either an element, compound or mixture.

(i) Air ..... [1]

(ii) Carbon dioxide..... [1]

(iii) Copper..... [1]

c. Which physical property is used to distinguish between metals and non-metals?

It is possessed by all metals but by only one non-metal.

..... [1]

**[Total: 10]**

6 The diagram shows part of the Periodic Table.

										He	
						B	C	N	O	F	Ne
						Al	Si	P	S	Cl	Ar
Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
									I	Xe	

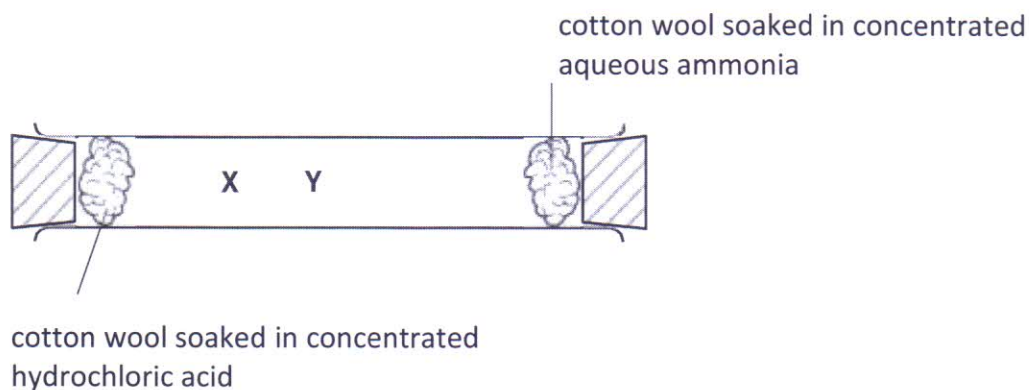
Answer these questions using only the elements shown in the diagram. Each element can be used once, more than once or not at all.

Write the symbol for

- (i) an element which is in Group 5 and Period 3,  [1]
- (ii) an element which is used as a gas in balloons,  [1]
- (iii) an element which is used for catalyst,  [1]
- (iv) an element which has the highest atomic number,  [1]
- (v) two elements which belong to halogens,  &  [2]

[Total: 6]

7 A student set up the apparatus shown below.



Colourless fumes of hydrogen chloride are given off by the hydrochloric acid.

Colourless fumes of ammonia are given off by the aqueous ammonia.

(a) After a few seconds, white fumes were seen at point X or Y in the tube..... [1]

Name the compound formed.

..... [1]

(b) Use the kinetic particle theory to explain this observation.

.....  
.....  
.....  
..... [4]

(c) The student repeated the experiment using a solution of methylamine,  $\text{CH}_3\text{NH}_2$ , in place of ammonia,  $\text{NH}_3$ .

The white fumes were seen at point Y in the tube, rather than at point X.  
Explain this difference.

.....  
..... [2]

[Total: 8]