Topica Past Papers IGCSE Edexcel

CHEMISTRY

PAPER 2C, 2CR 2015- Winter 2019

1 - (4CH0-W 2017-Paper 2C-Q1) - *KINETIC THEORY AND DIFFUSION, OXYGEN AND OXIDES*

The box contains the names of some substances.

air	chlorine	hydrogen	iron
nitrogen	oxygen	potassium	sodium

Choose a substance from the box that best matches each description.

Each substance may be used once, more than once or not at all.

(a) Which substance is a mixture?

(1)

.....

(b) Which substance is a gas that makes a squeaky pop when ignited?

(1)

.....

(c) Which substance is an element that is a green gas at room temperature?

(1)

.....

(d) Which substance is used to sterilise water?

(1)

.....

(e) Which substance is a metal that can be made by heating its oxide with carbon?

(1)

.....

1 - (4CH0-S 2015-Paper 2C-Q1) - *ATOMIC STRUCTURE*

The table shows the numbers of protons, neutrons and electrons in some atoms and ions.

Atom or ion	Protons	Neutrons	Electrons
P	6	8	6
Q	5	6	5
R	9	10	10
S	3	4	2
T	6	6	6

(a) (i) Which particles have the same mass?

(1)

☒ **A** electrons and protons

☒ **B** electrons and neutrons

☒ **C** neutrons and protons

☒ **D** electrons, neutrons and protons

(ii) What is the atomic number of P?

(1)

☒ **A** 6

☒ **B** 8

☒ **C** 12

☒ **D** 14

(iii) What is the mass number of Q?

(1)

☒ **A** 5

☒ **B** 6

☒ **C** 10

☒ **D** 11

(b) Which group of the Periodic Table contains element T?

(1)

.....

(c) (i) Which two letters represent isotopes of the same element?

(1)

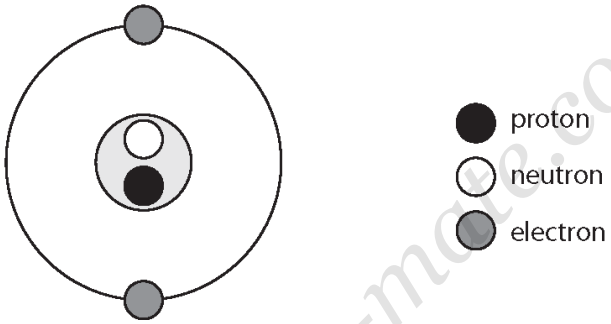
..... and .....

(ii) Which letter represents a positive ion?

(1)

.....

(d) The diagram shows the arrangement of particles in another ion.



How does the diagram show that this ion has a negative charge?

(1)

.....

.....

2 - (4CH0-S 2015-Paper 2CR-Q1) - *ATOMIC STRUCTURE*

An atom of an element has an atomic number of 6 and a mass number of 12.

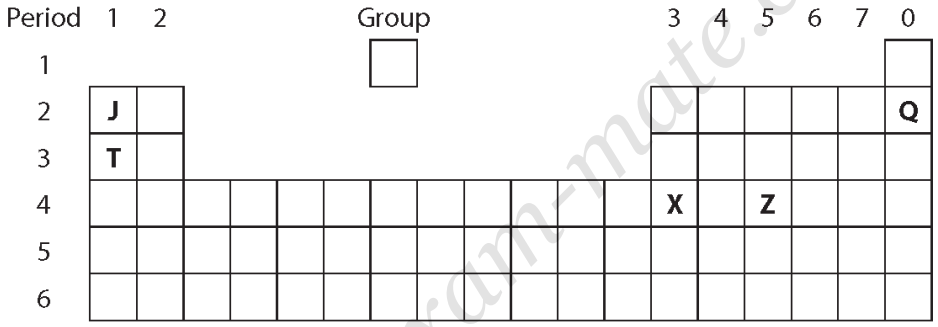
(a) Using this information, complete the table to show the numbers of protons, neutrons and electrons in one atom of this element.

(2)

number of protons	
number of neutrons	
number of electrons	

(b) The Periodic Table shows the positions of five elements, J, Q, T, X and Z.

The letters do **not** represent the symbols for the elements.



(i) How many electrons are there in the outer shell of an atom of X?

(1)

.....

(ii) There are 31 protons in an atom of X.

Using this information, explain how many protons there are in an atom of Z.

(2)

.....

.....

.....

.....

(iii) What is the electronic configuration of an atom of Q?

(1)

.....

(iv) State one similarity and one difference between the electronic configurations of atoms of J and T.

(2)

similarity .....

difference .....

3 - (4CH0-S 2017-Paper 2C-Q2) - *ATOMIC STRUCTURE, BONDING, THE PERIODIC TABLE*

The diagram shows the positions of some elements in part of the Periodic Table.

							He
Li		B		N		F	
	Mg		Si		S		Ar

(a) How many periods and groups are shown in this diagram?

(1)

	Periods	Groups
☒ **A**	2	4
☒ **B**	3	4
☒ **C**	2	8
☒ **D**	3	8

(b) How many elements shown in the diagram are noble gases?

(1)

☒ **A** 1

☒ **B** 2

☒ **C** 3

☒ **D** 4

(c) What is the formula of the compound formed between magnesium and fluorine?

(1)

☒ **A** MgF

☒ **B** Mg_2F

☒ **C** MgF_2

☒ **D** Mg_2F_2

(d) The table shows the percentage composition by mass of a sample of silicon.

Isotope	^{28}Si	^{29}Si	^{30}Si
Percentage (%)	92.2	4.70	3.10

Calculate the relative atomic mass of this sample of silicon.

Give your answer to one decimal place.

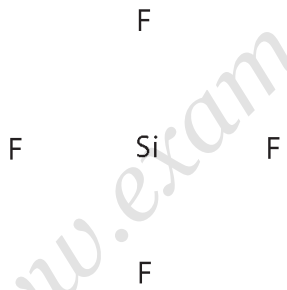
(2)

relative atomic mass = ...

(e) A molecule of silicon tetrafluoride (SiF_4) contains covalent bonds.

Draw a dot and cross diagram to show the outer electrons in this molecule.

(2)



(f) The table shows the boiling points of some compounds containing silicon. All of these compounds contain covalent bonds.

Compound	Boiling point in °C
SiF_4	–86
$SiCl_4$	58
SiO_2	2950

SiF_4 and $SiCl_4$ have simple molecular structures.

SiO_2 has a giant covalent structure.

(i) Explain why the boiling point of $SiCl_4$ is greater than the boiling point of SiF_4

(2)

(ii) Explain why the boiling point of SiO_2 is very much greater than the boiling point of $SiCl_4$

(2)

ANSWERS

1 - (4CH0-W 2017-Paper 2C-Q1) - *KINETIC THEORY AND DIFFUSION, OXYGEN AND OXIDES*

(a)	air		1
(b)	hydrogen	**ACCEPT** H_2 **IGNORE** H	
(c)	chlorine	**ACCEPT** Cl_2 **IGNORE** Cl	1
(d)	chlorine	**ACCEPT** Cl_2 **IGNORE** Cl	1
(e)	iron	**ACCEPT** Fe	1

1 - (4CH0-S 2015-Paper 2C-Q1) - *ATOMIC STRUCTURE*

	a	i	C (neutrons and protons)		1
		ii	A (6)		1
		iii	D (11)		1
	b		4		1
	c	i	P AND T		1
		ii	S		1
	d		(one) more electron than protons **OR** (one) fewer proton than electrons	Accept more electrons than protons Accept fewer protons than electrons Accept 2 electrons and 1 proton Ignore references to electron gained	1
					Total 7 marks

2 - (4CH0-S 2015-Paper 2CR-Q1) - *ATOMIC STRUCTURE*

a

Number of protons	6
Number of neutrons	6
Number of electrons	6

b i 3

ii M1 33

M2 Z is two places/columns/groups/positions after X
OR
Z is in Group 5 and X is in Group 3

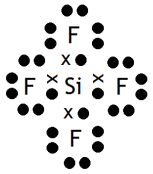
iii 2.8 / 2,8 / 2 and 8 separated by other mark
eg : or / or) or space

b iv	M1 (similarity) one electron/same number of electrons in outer shell M2 (difference) different number of (electron) shells / T has (one) more (electron) shell / J has (one) less (electron) shell /J has 2 shells and T has 3 /J is 2.1 and T is 2.8.1	

3 - (4CH0-S 2017-Paper 2C-Q2) - *ATOMIC STRUCTURE, BONDING, THE PERIODIC TABLE*

(a)	**D (3 periods and 8 groups)** **The only correct answer is D** A is not correct because there are 3 periods and 8 groups shown not 2 periods and 4 groups B is not correct because there are 3 periods and 8 groups shown not 3 periods and 4 groups C is not correct because there are 3 periods and 8 groups shown not 2 periods and 8 groups		1
(b)	**B (2)** **The only correct answer is B** A is not correct because there are 2 noble gases shown not 1 C is not correct because there are 2 noble gases shown not 3 D is not correct because there are 2 noble gases shown not 4		1

(c)	**C (MgF_2)** **The only correct answer is C** A is not correct because MgF is not the correct formula for magnesium fluoride B is not correct because Mg_2F is not the correct formula for magnesium fluoride D is not correct because Mg_2F_2 is not the correct formula for magnesium fluoride		1
(d)	**M1** $(28 \times 0.922) + (29 \times 0.047) + (30 \times 0.031)$ OR 28.109 **M2** 28.1	**ACCEPT** $\frac{(28 \times 92.2) + (29 \times 4.7) + (30 \times 3.1)}{100}$ Answer must be to one decimal place Correct final answer with no working scores 2	2

(e)		**M1** all four Si-F bonding pairs **M2** all 24 non-bonding electrons **M2** DEP on **M1** **ALLOW** any combination of dots and crosses If overlapping/touching circles used both electrons must be within the overlapping/touching area **IGNORE** inner shell electrons even if incorrect	2

(f) (i)	**M1** intermolecular forces (of attraction) / forces (of attraction) between molecules **M2** stronger in $SiCl_4$ /weaker in SiF_4	**ALLOW** intermolecular bonds/van der Waals forces/London forces/dispersion forces/instantaneous dipole-induced dipole forces **ACCEPT** more energy is required to overcome the forces in $SiCl_4$ (or reverse argument) **M2** DEP on **M1** **ACCEPT** attraction between $SiCl_4$ molecules is greater (than that between SiF_4 molecules) or reverse argument for 2 marks Award 0/2 if any reference to breaking covalent bonds	2
(ii)	**M1** SiO_2 has strong covalent bonds (that must be broken) **M2** (whereas) $SiCl_4$ has weak intermolecular forces (of attraction must be overcome)	**ACCEPT** strong intramolecular bonds/forces **ACCEPT** strong bonds between the atoms **REJECT** any mention of intermolecular forces or ionic bonding **ALLOW** intermolecular bonds/van der Waals forces/London forces/dispersion forces/instantaneous dipole-induced dipole forces **ACCEPT** more energy required to break covalent bonds in SiO_2 than is required to overcome intermolecular forces (of attraction) in $SiCl_4$ for 2 marks	2

4 - (4CH0-S 2017-Paper 2CR-Q1) **-** *ATOMIC STRUCTURE*

(a) (i)	**C** (proton) **The only correct answer is C** A is not correct because X is not an electron B is not correct because X is not an ion D is not correct because X is not a neutron		1
(ii)	**C** (9) **The only correct answer is C** A is not correct because the sum of the number of protons and neutrons is 9 not 4 B is not correct because the sum of the number of protons and neutrons is 9 not 5 D is not correct because the sum of the number of protons and neutrons is 9 not 5		1
(iii)	beryllium	**ACCEPT** Be	1