GCSE Chemistry A (Gateway Science)

J248/03 C1-C3 and C7 Higher (Higher Tier)

Question Set 2

Multiple Choice Questions

C2: Elements, Compounds and Mixtures

1 Sodium is an element that can be found in the Periodic Table.

A sodium atom contains 11 electrons.

Which statement about sodium is **true**?

A Sodium is in Group 2 of the Periodic Table.

B Sodium is in Period 2 of the Periodic Table.

C Sodium is in Period 3 of the Periodic Table.

D Sodium is in Group 3 of the Periodic Table.

Your answer ☐

[1]

2 Carbon dioxide exists as a simple molecule.

Why do simple molecules have low boiling points?

A Simple molecules have weak covalent bonds between atoms.

B Simple molecules have weak intermolecular forces between atoms.

C Simple molecules have weak ionic bonds between the molecules.

D Simple molecules have weak intermolecular forces between the molecules.

Your answer ☐

[1]

3 Mendeleev's arrangement of elements led to our modern Periodic Table.

How did Mendeleev arrange the elements in his Periodic Table?

A In order of decreasing atomic mass and similar physical properties.

B In order of increasing atomic number and similar physical properties.

C In order of decreasing atomic number and similar chemical properties.

D In order of increasing atomic mass and similar chemical properties.

Your answer ☐

[1]

4 R_f values are used to compare the different spots on a chromatogram.

What is the formula used to calculate an R_f value?

A $R_f = \frac{\text{distance travelled by solvent}}{\text{distance travelled by substance}}$

B $R_f = \frac{\text{distance travelled by substance}}{\text{distance travelled by solvent}}$

C $R_f = \frac{\text{distance travelled by stationary phase}}{\text{distance travelled by mobile phase}}$

D $R_f = \frac{\text{distance travelled by solvent}}{\text{distance travelled by mobile phase}}$

Your answer ☐

[1]

5 Carbon can form different **allotropes**.

Which of these are allotropes of carbon?

A Diamond, graphite, graphene.

B Diamond, granite, graphite.

C Fullerene, graphene, ethene.

D Granite, graphite, graphene.

Your answer ☐

[1]

6 What is the electronic structure of sulfur?

A 2

B 2, 6

C 2, 8, 6

D 2, 8, 8, 6

Your answer ☐

[1]

7 The melting point of bromine is −7 °C.

The boiling point of bromine is 59 °C.

What state would bromine be at room temperature?

A Aqueous

B Gas

C Liquid

D Solid

Your answer ☐ **[1]**

8 Paper chromatography can be used to separate the colours in ink.

Water is the solvent used to separate the colours in water soluble ink.

What name is given to the water used in paper chromatography?

A Absorption phase

B Liquid phase

C Mobile phase

D Stationary phase

Your answer ☐ **[1]**

9 What is the amount, in mol, of 15 g of carbonate ions, CO_3^{2-}?

A 0.18

B 0.25

C 4.0

D 5.6

Your answer ☐ **[1]**

10 Which of these substances has a **giant covalent structure**?

A Carbon dioxide

B Magnesium oxide

C Sulfur dioxide

D Silicon dioxide

Your answer ☐

[1]

11 Which statement about nanoparticulate materials is **not** correct?

A Nanoparticles are much smaller than atoms.

B Nanoparticulate materials can be used as catalysts.

C Nanoparticulate materials have an extremely large surface area to volume ratio.

D There are possible risks when using nanoparticulate materials which are difficult to predict.

Your answer ☐

[1]

12 Ethanol is a liquid at room temperature. It has a low melting point and boiling point.

Why?

A Ethanol is an ionic compound.

B The forces of attraction between ethanol molecules are strong.

C The forces of attraction between ethanol molecules are weak.

D There are no forces of attraction between ethanol molecules.

Your answer ☐

[1]

13 Which statement about **covalent** bonding is true?

A Electrons are transferred from one atom to another.

B Electrons are delocalised.

C Electrons are shared between atoms.

D Ions are formed.

Your answer ☐

[1]

14 Which statement correctly describes a pure substance?

A Consists of just one element or compound

B Has a low melting point

C Is a mixture of two or more substances

D Melts over a range of temperatures

Your answer ☐

[1]

15 A student separates a dye using thin layer chromatography.

She puts a thin layer of solid alumina onto a glass plate. She puts the dye on the pencil line. She puts the glass plate into a tank containing water.

Which of the following is the **stationary** phase?

A Alumina

B Glass

C Pencil line

D Water

Your answer ☐

[1]

16 What is the approximate size of a nanoparticle?

A 0.07 nm

B 0.40 nm

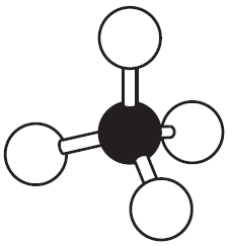
C 50 nm

D 1000 nm

Your answer ☐

[1]

17 Look at the diagram of a methane molecule.



Which statement about methane is correct?

A Electrons are transferred from hydrogen atoms to carbon atoms.

B The covalent bonds in methane are weak.

C The force of attraction between methane molecules is weak.

D The ionic bonds between carbon and hydrogen are very strong.

Your answer ☐

[1]

18 A student separates the colours in a sample of black ink using paper chromatography.

• He puts a spot of black ink onto a piece of filter paper.

• He dips the filter paper into ethanol in a beaker.

What phase describes **ethanol** in this experiment?

A Gas phase

B Mobile phase

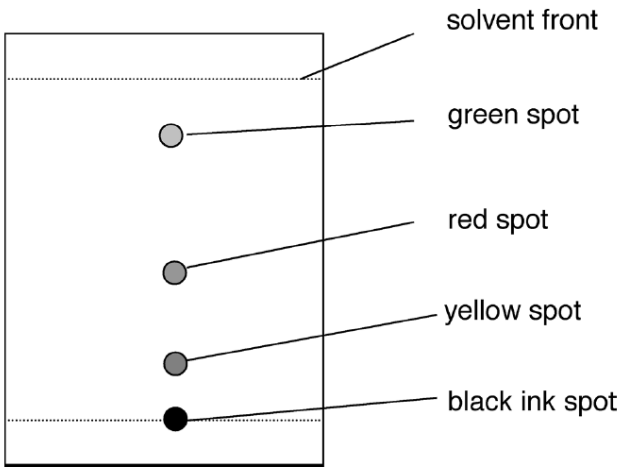
C Solid phase

D Stationary phase

Your answer ☐

[1]

19 Look at the chromatogram.



What is the R_f value of the **green** spot? Use a ruler to help you.

A 0.17

B 0.42

C 0.83

D 1.00

Your answer ☐

[1]

20 The **molecular formula** of decene is $C_{10}H_{20}$.

What is the **empirical formula** of decene?

A CH_2

B C_2H_4

C C_5H_{10}

D $C_{20}H_{40}$

Your answer ☐

[1]

21 A student tests the conductivity of an ionic compound.

Which row in the table shows the correct results?

	Solid ionic compound	Ionic compound dissolved in water	Molten ionic compound
A	conducts	conducts	does not conduct
B	conducts	conducts	conducts
C	does not conduct	does not conduct	conducts
D	does not conduct	conducts	conducts

Your answer ☐

[1]

22 Crude oil can be separated in the laboratory into fractions which have different boiling points.

Look at the table. It shows possible relationships between:

- boiling point
- number of carbon atoms in the molecule
- size of intermolecular forces.

Which letter shows the correct relationship?

	Boiling point	Number of carbon atoms in the molecule	Size of intermolecular forces
A	high	less than 20	large
B	high	more than 50	small
C	low	less than 20	small
D	low	more than 50	large

Your answer ☐

[1]

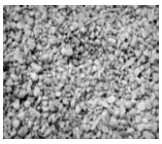
23 Look at the diagrams.

Which diagram shows a solid with the **largest** surface area to volume ratio?

A 

B 

C 

D 

Your answer ☐

[1]

Total Marks for Question Set 2: 23

The Periodic Table of the Elements

(1)	(2)											(3)	(4)	(5)	(6)	(7)	(0)
1																	18
1 **H** hydrogen 1.0	2											13	14	15	16	17	2 **He** helium 4.0
3 **Li** lithium 6.9	4 **Be** beryllium 9.0											5 **B** boron 10.8	6 **C** carbon 12.0	7 **N** nitrogen 14.0	8 **O** oxygen 16.0	9 **F** fluorine 19.0	10 **Ne** neon 20.2
11 **Na** sodium 23.0	12 **Mg** magnesium 24.3	3	4	5	6	7	8	9	10	11	12	13 **Al** aluminium 27.0	14 **Si** silicon 28.1	15 **P** phosphorus 31.0	16 **S** sulfur 32.1	17 **Cl** chlorine 35.5	18 **Ar** argon 39.9
19 **K** potassium 39.1	20 **Ca** calcium 40.1	21 **Sc** scandium 45.0	22 **Ti** titanium 47.9	23 **V** vanadium 50.9	24 **Cr** chromium 52.0	25 **Mn** manganese 54.9	26 **Fe** iron 55.8	27 **Co** cobalt 58.9	28 **Ni** nickel 58.7	29 **Cu** copper 63.5	30 **Zn** zinc 65.4	31 **Ga** gallium 69.7	32 **Ge** germanium 72.6	33 **As** arsenic 74.9	34 **Se** selenium 79.0	35 **Br** bromine 79.9	36 **Kr** krypton 83.8
37 **Rb** rubidium 85.5	38 **Sr** strontium 87.6	39 **Y** yttrium 88.9	40 **Zr** zirconium 91.2	41 **Nb** niobium 92.9	42 **Mo** molybdenum 95.9	43 **Tc** technetium	44 **Ru** ruthenium 101.1	45 **Rh** rhodium 102.9	46 **Pd** palladium 106.4	47 **Ag** silver 107.9	48 **Cd** cadmium 112.4	49 **In** indium 114.8	50 **Sn** tin 118.7	51 **Sb** antimony 121.8	52 **Te** tellurium 127.6	53 **I** iodine 126.9	54 **Xe** xenon 131.3
55 **Cs** caesium 132.9	56 **Ba** barium 137.3	• 57–71 lanthanoids	72 **Hf** hafnium 178.5	73 **Ta** tantalum 180.9	74 **W** tungsten 183.8	75 **Re** rhenium 186.2	76 **Os** osmium 190.2	77 **Ir** iridium 192.2	78 **Pt** platinum 195.1	79 **Au** gold 197.0	80 **Hg** mercury 200.6	81 **Tl** thallium 204.4	82 **Pb** lead 207.2	83 **Bi** bismuth 209.0	84 **Po** polonium	85 **At** astatine	86 **Rn** radon
87 **Fr** francium	88 **Ra** radium	• 89–103 actinoids	104 **Rf** rutherfordium	105 **Db** dubnium	106 **Sg** seaborgium	107 **Bh** bohrium	108 **Hs** hassium	109 **Mt** meitnerium	110 **Ds** darmstadtium	111 **Rg** roentgenium	112 **Cn** copernicium		114 **Fl** flerovium		116 **Lv** livermorium		

Key
atomic number
Symbol
name
relative atomic mass