Year 10 Chemistry

States of Matter

Methods of Separation

Atomic Structure

Periodic Table

Reactivity Series

Crude Oil

Name: .....

Answer all questions using ink.

Answers in pencil will not be marked.

A periodic table is given on the last page of this booklet.

There are **45** marks for this test.

1 Matter can exist in three different states: solid, liquid and gas. The following passage describes the arrangement of the particles in each of the three states. Important words have been omitted. Complete the descriptions by writing in the missing words. Choose the words from the list given at the end of the passage.

In the solid state the particles are _____ packed together. The particles do not move from place to place, but merely _____ about a _____ point.

In the liquid state the particles are still very close together but now they are free to move from place to place in a _____ motion, continually colliding with each other.

In a gas, the particles are very _____ spaced. They move in a _____, random motion in _____ lines, continually _____ with each other.

widely straight closely fixed colliding rapid random vibrate

(4)

2 Arrange the following substances in increasing order of the kinetic energy content of their particles by writing the number 1 to 6 in the boxes above each substance. **1** being the lowest kinetic energy and **6** being the highest.

☐	☐	☐
Ice at 0 ^{O}C	***Liquid nitrogen***	***Steam***
☐	☐	☐
Nitrogen gas in this room	***Ice at -5 ^{O}C***	***water vapour at 65 ^{O}C***

(2)

3 Your specification lists the following techniques for the separation of mixtures:

simple distillation	***fractional distillation***	***filtration***	***crystallisation***	***paper chromatography***	***evaporation***

Decide which one of these techniques would be appropriate for the following separations.

Mixture	**Substance Required**	**Technique**
solution of sodium chloride dissolved in water	sodium chloride	
solution of potassium chloride dissolved in water	water	
Mixture of different coloured food dyes	food dyes	
Mixture of ethanol (B.Pt. 78 ^{O}C) and water	ethanol and water separated from each other	
mixture of insoluble barium sulphate and water	barium sulphate	
solution of copper (II) sulphate in water	hydrated copper (II) sulphate crystals	
solution of copper (II) sulphate in water	water	

(7)

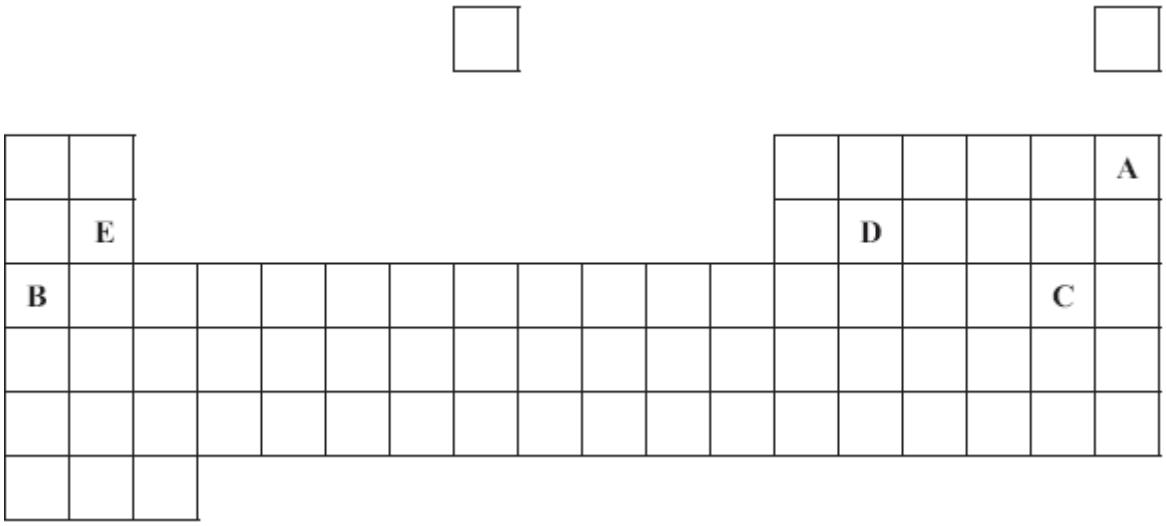
4 Complete the table below relating to atomic structure.

Particle	Relative Mass	Charge	Location
		Positive	Nucleus
		Neutral	
			Shells or orbitals

(4)

5 Use the Periodic Table to help you answer this question.

(a) Part of the Periodic Table is shown.



In each part of this question, write the letter, **A, B, C, D, or** E, that represents:

(i) a metal that reacts violently with water ..... **(1)**

(ii) a noble gas ..... **(1)**

(iii) a Group 2 metal ..... **(1)**

(iv) a halogen ..... **(1)**

6 The elements selected for our reactivity series are as follows:

Aluminium *Calcium* *Copper* *Gold* *(Hydrogen)* *Iron* *(Carbon)*

Lithium *Magnesium* *Potassium* *Silver* *Sodium* *Zinc*

In the boxes below write down the <u>symbol</u> of each element placing them in decreasing order of reactivity. i.e. Place the most reactive first and the least reactive last.

(3)

7 The use of most metals depends on their reactivity.

The reactivity of metals can be compared by using displacement reactions. The reactions of four metals **R**, **S**, **T** and **U** with their salt solutions are shown. (These letters are not the chemical symbols for the metals.)

Metal salt solution	**Metal**			
	R	**S**	**T**	**U**
R		x	x	✓
S	✓		x	✓
T	✓	✓		✓
U	x	x	x	

✓ = reaction x = no reaction

(a) Use the information to arrange the metals **R**, **S**, **T** and **U** in order of reactivity, with the most reactive first.

..... **(2)**

(b) Metal **R** was zinc and metal **T** was copper. State the colour change that occurs when zinc reacts with copper (II) sulphate solution and what are the causes of this colour change.

Colour change: ..... **(1)**

Cause of colour change .....

..... **(2)**

(c) Suggest identities for the metals **S** and **U**

..... **(2)**

8 The following questions are all about crude oil and its products.

(i) *Crude oil is a mixture of a particular type of chemical compound. What is its name?*

…….. ***(1)***

(ii) *What name is given to the process whereby crude oil is separated into its components?*

…….. ***(1)***

(iii) *Give the names of **six** fractions that are obtained from crude oil.*

…….. ***(3)***

(iv) Which gas, produced by burning crude oil fractions, is thought to be responsible for global warming?

…… ***(1)***

(v) Name two gases, produced when crude oil fractions are burned, that are responsible for acid rain.

…… ***(2)***

*(vi) Which gas, produced by the **incomplete** combustion of crude oil fractions, is poisonous?*

…… ***(1)***

*(vii) Petrol has the formula C_8H_{18}. When petrol is burned in a plentiful supply of air, **complete** combustion takes place and carbon dioxide and water are formed. Write the equation.*

…… ***(2)***

*(viii) When petrol is burned in a limited supply of air, **incomplete** combustion takes place and carbon monoxide and water are formed. Write the equation.*

…… ***(2)***

(ix) What is CNG?

…… ***(1)***

The Periodic Table of the Elements

1	2											3	4	5	6	7	0
							1 H hydrogen 1										4 He helium 2
7 Li lithium 3	9 Be beryllium 4											11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

** The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.*

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.