

5.1 Atomic Structure questions

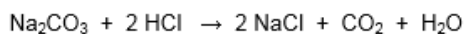
1. Either give the name or the symbol of the following

bromine	SiO ₂	NaHCO ₃	nitrogen
sulfuric acid	KNO ₃	sodium carbonate	H ₂
NH ₃	NaOCl	PbO	sodium chloride
ammonium chloride	N ₂	lead oxide	Mg
HNO ₃	SO ₃	methane	nitric acid

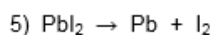
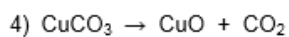
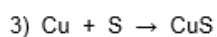
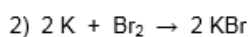
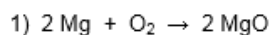
Formula	Name
O ₂	
CuO	
Cu	
CuSO ₄	
CuS	
CuCO ₃	
FeSO ₄	
Fe(NO ₃) ₂	
N ₂	
H ₂ SO ₄	
CO	
CO ₂	
NO ₂	

2.

Convert the following equations into word equations. Here is an example

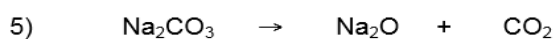
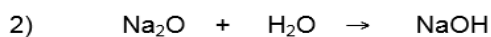
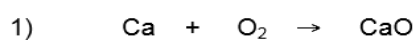


sodium carbonate + hydrochloric acid → sodium chloride + water + carbon dioxide



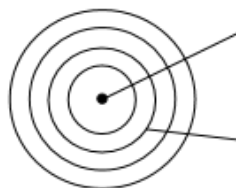
Questions

Put your final answers here although you may wish to do your working on a separate sheet of paper or on the back.



Atoms consist of a central containing protons and The nucleus is compared to the size of the whole atom. The nucleus is surrounded by in energy levels (also called). Atoms have no electric charge because they contain the same number of protons and The electrons are arranged in energy levels (.....).

sub-atomic particle	relative mass	relative charge
proton		
neutron		
electron		



Atomic number = number of

Mass number = number of + number of

The number of protons, neutrons and electrons in an atom can be worked out using the atomic number and mass number.

Number of protons =

Number of neutrons =

Number of electrons =

Atoms can be represented as follows:

mass number **Symbol** e.g. ${}^{19}_9\text{F}$ protons = neutrons = electrons =

Atoms of the same element have the same number of In fact, it is the number of that determines what type of atom it is (e.g. all atoms with 6 protons are carbon atoms). Atoms of different elements have different numbers of

Isotopes are atoms with the same number of but a different number of This means they are atoms of the same with the same number but a different number.

	${}^{35}_{17}\text{Cl}$	${}^{37}_{17}\text{Cl}$
protons		
neutrons		
electrons		

Atom	Atomic number	Mass number	Number of protons	Number of neutrons	Number of electrons
${}^{23}_{11}\text{Na}$					
Li	3	7			
Ar		40	18		
K			19	20	
Al				14	13
${}^{235}_{92}\text{U}$					
${}^{238}_{92}\text{U}$					

ATOMS & IONS 1

Complete the following table about some atoms and ions. The first row has been done for you.

Particle	Atom or ion	Atomic number	Mass number	Number of protons	Number of neutrons	Number of electrons	Electron structure
${}^{23}_{11}\text{Na}^+$	ion	11	23	11	12	10	2,8
${}^{31}_{15}\text{P}$							
		13	27			13	
		13	27			10	
	atom	2	4				
		16	32				2,8,8
				12	12		2,8

Complete the table to show some differences between mixtures and compounds. All the answers are below the table. Write them into the most suitable column.

Mixture of elements		Compound
	Are the elements bonded to each other?	
	Properties	
	Formula	
	Is it easy to separate the elements and why?	
	Some methods that can be used to produce the elements	

The elements are bonded to each other
The elements are not bonded to each other

The elements still have their own properties
It has its own unique properties that are different to the elements

The formula is fixed with atoms in fixed ratios
The atoms can be in any ratio

It is very hard to separate the elements as the atoms are bonded to each other
It is easy to separate the elements as the atoms are not bonded to each other

Filtration
Thermal decomposition
Distillation
Chromatography
Electrical decomposition (electrolysis)
Separating funnel
Fractional distillation
Crystallisation

Periodic table

How did Dalton and Newland's arrange the periodic table?

How did Mendeleev arrange it?

What did Mendeleev do that Dalton and Newlands didn't which gained Mendeleev recognition and acceptance? What discovery proved him right?

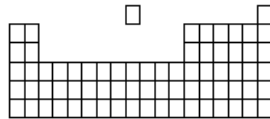
The diagram below represents the Periodic Table. Some symbols have been placed in some of the boxes. In the questions below choose the correct symbol from **this** Periodic Table below.

	an element in Group 5
	a halogen
	an alkali metal
	a metal in Group 6
	a gas made up of individual atoms
	an element that forms 1+ ions
	the most reactive element in Group 1
	the most reactive element in Group 7
	an element that is a good catalyst
	an element that does not react with anything
	a metal that floats on water
	an element with a full outer energy level of electrons

	a non metal
	a transition metal
	a noble gas
	the element in Group 6, period 5
	a gas made up of diatomic molecules
	an element that forms 1- ions
	the Group 1 element with the highest melting point
	the Group 7 element with the highest boiling point
	an element with 3 electrons in its outer energy level
	an element that forms coloured compounds
	an element that has a coloured vapour
	a metal that can form ions with different charges

INTRODUCTION & DATA

1) Shade in Group 1 on the Periodic Table shown.



2) Give the name for Group 1.

.....

3) Complete the table about the Group 1 elements.

name	symbol	atomic number	relative atomic mass	number of electrons in outer shell	melting point (°C)	state at room temperature	atomic radius (pm)	density (g/dm ³)
lithium			7		181		123	0.53
sodium			23		98		157	0.97
potassium			39		63		203	0.86
rubidium			85		39		216	1.53
caesium			133		28		235	1.87

PHYSICAL PROPERTIES OF THE ELEMENTS

4) List some physical properties of the Group 1 metals.

.....

5) The Group 1 elements have low densities for metals. Which Group 1 elements float on water?

.....

6) What is the trend in melting points in Group 1?

.....

CHEMICAL PROPERTIES OF THE ELEMENTS

7) a) When Group 1 metals react, what happens to the Group 1 metal atoms in terms of electrons?

.....

.....

b) Where do these electrons go?

.....

c) What type of compound is formed?

d) Explain why this happens when Group 1 metals react in terms of electron structure.

.....

.....

.....

.....

CHEMICAL PROPERTIES OF THE ELEMENTS

4) a) What is special about the electron structure of the noble gases?

.....

b) Describe and explain the chemical reactivity of the noble gases.

.....

.....

5) a) Some food packets (e.g. crisps) contain argon gas. Explain why a noble gas is used and why it is argon.

.....

.....

.....

b) Welding is done in atmosphere of argon. Explain why.

.....

.....

.....

.....





GROUP 7 – HALOGENS

INTRODUCTION & DATA

1) Shade in Group 7 on the Periodic Table shown.

2) Give the name for Group 7.

.....

3) Complete the table about the Group 7 elements.

element	fluorine	chlorine	bromine	iodine
atomic number				
symbol of atoms				
formula of molecules				
type of structure				
melting point (°C)	-220	-101	-7	114
boiling point (°C)	-188	-34	59	184
appearance at room temperature				
colour of vapour				

PHYSICAL PROPERTIES OF THE ELEMENTS

4) List some physical properties of the Group 7 elements.

.....

.....

.....

.....

.....

5) The Group 7 elements are all made of diatomic molecules (F₂, Cl₂, Br₂, I₂). What are diatomic molecules?

.....

6) What is the trend in boiling points down Group 7?

CHEMICAL PROPERTIES OF THE ELEMENTS

7) a) When Group 7 halogens react with metals, what happens to the Group 7 atoms in terms of electrons?

.....

.....

b) What type of compound is formed?

8) a) When Group 7 halogens react with non-metals, what happens to the Group 7 atoms in terms of electrons?

.....

b) What type of compound is formed?

9) Complete the table about reactions of the Group 7 elements.

Group 7 element	Element it reacts with	Electrons:		Compound formed:	
		shared?	transferred?	ionic?	covalent?
chlorine	sodium				
bromine	sulfur				
fluorine	oxygen				
iodine	magnesium				