

Atomic structure

Explain, in terms of electrons, why does reactivity change as you go down the group.

Group 7

Atomic structure

Describe the reaction between a more reactive halogen and a less reactive halogen which is in an aqueous solution of its salt.

Group 7

Atomic structure

Complete the following equation and balance: $\text{Cl}_2 + \text{KI} \rightarrow$

Group 7

Atomic structure

Complete the following equation and balance: $\text{I}_2 + \text{KBr} \rightarrow$

Group 7

Atomic structure

Complete the following equation and balance: $\text{F}_2 + \text{KCl} \rightarrow$

Group 7

Bonding, structure and the properties of matter

Name three types of strong chemical bonds.

Chemical bonds

Bonding, structure and the properties of matter

Describe the role of electrons in an ionic bond.

Chemical bonds

Bonding, structure and the properties of matter

Describe the role of electrons in a covalent bond.

Chemical bonds

Bonding, structure and the properties of matter

Describe the role electrons in a metallic bond.

Chemical bonds

Bonding, structure and the properties of matter

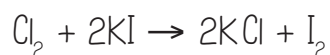
Which bonding occurs in compounds formed from non-metals?

Chemical bonds

A displacement reaction will occur where the more reactive halogen will displace the least reactive halogen and bind with the salt.

Reactions occur because of the electrons in the outer shell. As you go down the group the electron shells increase. The further away the outer shell is from the nucleus, the harder it is to attract an extra electron.

$I_2 + KBr \rightarrow I_2 + KBr$ (no reaction because Iodine is less reactive than bromine)



Ionic, covalent and metallic.



Electrons are shared.

Electrons are either donated or received.

Covalent.

Outer shell electrons are delocalised.

Bonding, structure and the properties of matter

Which bonding occurs in metallic elements and alloys?

Chemical bonds

Bonding, structure and the properties of matter

Which bonding occurs in compounds formed from metals and non-metals?

Chemical bonds

Bonding, structure and the properties of matter

What happens when a metal reacts with a non-metal?

Ionic bonding

Bonding, structure and the properties of matter

What type of ions do metals form?

Ionic bonding

Bonding, structure and the properties of matter

What type of ions do non-metals form?

Ionic bonding

Bonding, structure and the properties of matter

What is the charge of ions produced by group 1 elements?

Ionic bonding

Bonding, structure and the properties of matter

What is the charge of ions produced by group 2 elements?

Ionic bonding

Bonding, structure and the properties of matter

What is the charge of ions produced by group 6 elements?

Ionic bonding

Bonding, structure and the properties of matter

What is the charge of ions produced by group 7 elements?

Ionic bonding

Bonding, structure and the properties of matter

What electronic structure do the ions produced have?

Ionic bonding

Ionic.

Metallic.

Positively charged ions.

Electrons in the outer shell of the metal atom are transferred.

+1

Negatively charged ions.

-2

+2

The ions have the electronic structure of a noble gas (group 0)

-1

Bonding, structure and the properties of matter

Describe the structure of an ionic compound.

Ionic compounds

Bonding, structure and the properties of matter

What are forces of attraction in ionic bonding called?

Ionic compounds

Bonding, structure and the properties of matter

What is the empirical formula for potassium chloride (group 1 + group 7)?

Ionic compounds

Bonding, structure and the properties of matter

What is the empirical formula for beryllium oxide (group 2 + group 6)?

Ionic compounds

Bonding, structure and the properties of matter

What is the empirical formula for sodium oxide? (group 1 + group 6)?

Ionic compounds

Bonding, structure and the properties of matter

What is the empirical formula for magnesium iodide (group 2 + group 7)?

Ionic compounds

Bonding, structure and the properties of matter

How are covalent bonds formed?

Covalent bonding

Bonding, structure and the properties of matter

Name two covalent compounds which are simple molecules.

Covalent bonding

Bonding, structure and the properties of matter

Name a covalent compound which is a very large molecule.

Covalent bonding

Bonding, structure and the properties of matter

Name two covalently bonded substances which form giant covalent structures.

Covalent bonding

Ionic structures are held in place by strong electrostatic forces of attraction between oppositely charged ions.

A giant structure of ions

BeO

KCl

MgI₂

Na₂O

Ammonia, water, methane or hydrogen chloride.

They are formed when atoms share electrons.

Diamond and silicon dioxide.

Polymers

Bonding, structure and the properties of matter

Describe the structure of metals.

Metallic bonding

Bonding, structure and the properties of matter

What are delocalised electrons?

Metallic bonding

Bonding, structure and the properties of matter

How are metallic bonds formed?

Metallic bonding

Bonding, structure and the properties of matter

Name the three states of matter.

The three states of matter

Bonding, structure and the properties of matter

Describe the structure of solids in terms of particles.

The three states of matter

Bonding, structure and the properties of matter

Describe the structure of liquids in terms of particles.

The three states of matter

Bonding, structure and the properties of matter

Describe the structure of gases in terms of particles.

The three states of matter

Bonding, structure and the properties of matter

What term describes solid turning into liquid at a specific temperature.

The three states of matter

Bonding, structure and the properties of matter

What term describes liquid turning into gas at a specific temperature.

The three states of matter

Bonding, structure and the properties of matter

What term describes gas turning into liquid at a specific temperature.

The three states of matter

Outer shell electrons of metal atoms which are free to move through the whole structure.

Metals consist of giant structures of atoms arranged in a regular pattern.

Solid, liquid and gas.

The sharing of delocalised electrons gives rise to strong metallic bonds.

Particles are close together but can move over each other. There are weak forces of attraction between the particles. The particles are constantly moving.

Particles are close together in fixed positions and form a regular structure. There are strong forces of attraction between the particles. The particles vibrate in position.

Melting

Particles are far apart. There are very weak forces of attraction between the particles. Particles move constantly in straight lines.

Condensation

Boiling

Bonding, structure and the properties of matter

What term describes liquid turning into solid at a specific temperature.

The three states of matter

Bonding, structure and the properties of matter

What term describes solid turning into gas at a specific temperature.

The three states of matter

Bonding, structure and the properties of matter

Bromine has a melting point of -7°C and a boiling point of 59°C . What state is it at 75°C ?

The three states of matter

Bonding, structure and the properties of matter

Why does a single atom not have a state of matter?

The three states of matter

Bonding, structure and the properties of matter

What are the limitations of particle theory (HT only).

The three states of matter

Bonding, structure and the properties of matter

Describe the energy required to change states.

The three states of matter

Bonding, structure and the properties of matter

Describe how the forces between particles affects the melting points and boiling points.

The three states of matter

Bonding, structure and the properties of matter

What does the state symbol (aq) represent?

State symbols

Bonding, structure and the properties of matter

What does the state symbol (l) represent?

State symbols

Bonding, structure and the properties of matter

What does the state symbol (g) represent?

State symbols

Sublimation

Freezing

Atoms themselves do not have the bulk properties of materials

Gas

The energy required to change state depends on the strength of forces between the particles.

Particle theory represents particles as solid in elastic spheres which have no forces between them.

Aqueous (dissolved)

The stronger the forces between the particles the higher the melting and boiling points.

Gas.

Liquid.

Bonding, structure and the properties of matter

What does the state symbol (s) represent?

State symbols

Bonding, structure and the properties of matter

Describe the structure of an ionic compound.

Properties of ionic compounds

Bonding, structure and the properties of matter

Describe the general properties of ionic compounds.

Properties of ionic compounds

Bonding, structure and the properties of matter

What can happen if ionic compounds are melted or dissolved in water?

Properties of ionic compounds

Bonding, structure and the properties of matter

What type of bonding is found in small molecules?

Properties of small molecules

Bonding, structure and the properties of matter

Describe the general properties of small molecules.

Properties of small molecules

Bonding, structure and the properties of matter

What are the forces of interaction between small molecules called?

Properties of small molecules

Bonding, structure and the properties of matter

Describe what happens to small molecules when they melt or boil.

Properties of small molecules

Bonding, structure and the properties of matter

What is a monomer?

Polymers

Bonding, structure and the properties of matter

What is a polymer?

Polymers

Ionic compounds have regular structures called giant ionic lattices. There are strong forces of attraction between oppositely charged ions.

Solid.

The ionic compounds will conduct electricity.

Ionic compounds have high melting points and boiling points because a large amount of energy is required to break the multitude of strong bonds.

Small molecules are usually gases or liquids which have low melting and boiling points.

Covalent bonding.

The weak intermolecular forces between the molecules are broken, not the covalent bonds between the atoms.

Weak intermolecular forces.

Polymers are very large molecules made of repeating units.

A single unit of a polymer.

Bonding, structure and the properties of matter

What is the role of strong covalent bonds in a polymer?

Polymers

Bonding, structure and the properties of matter

How do intermolecular forces affect the properties of polymers?

Polymers

Bonding, structure and the properties of matter

Describe the general structure of giant covalent structures.

Giant covalent structures

Bonding, structure and the properties of matter

Describe the properties of giant covalent structures.

Giant covalent structures

Bonding, structure and the properties of matter

Give three examples of giant covalent structures.

Giant covalent structures

Bonding, structure and the properties of matter

What is an alloy?

Properties of metal and alloys

Bonding, structure and the properties of matter

Describe the general structure of metals and alloys.

Properties of metal and alloys

Bonding, structure and the properties of matter

What are the general properties of metals?

Properties of metal and alloys

Bonding, structure and the properties of matter

How are the atoms arranged in pure metals?

Properties of metal and alloys

Bonding, structure and the properties of matter

What properties of pure metals are a result of the arrangement of atoms?

Properties of metal and alloys

The intermolecular forces between polymers are relatively strong so polymers are usually solids at room temperature.

Strong covalent bonds link the atoms together in polymers.

They are solids with high melting points.

The atoms in the structures are linked to other atoms by strong covalent bonds.

An alloy is a mixture of metals e.g. 18 carat Gold is a mixture of gold and silver.

Diamond, graphite and silicon dioxide (silica)

Metals are usually solid at room temperature and have high melting points and boiling points

Giant structures of atoms with strong metallic bonding.

Metals can be bent and shaped.

Atoms in metals are arranged in layers. These layers can slide over each other.

Bonding, structure and the properties of matter

Explain why alloys are harder than pure metals.

Properties of metal and alloys

Bonding, structure and the properties of matter

Why are metals good conductors of electricity?

Metals as conductors

Bonding, structure and the properties of matter

Why are metals good conductors of thermal energy?

Metals as conductors

Bonding, structure and the properties of matter

How many covalent bonds does each carbon atom form in diamond?

Diamond

Bonding, structure and the properties of matter

What type of structure is diamond?

Diamond

Bonding, structure and the properties of matter

Describe three properties of diamond.

Diamond

Bonding, structure and the properties of matter

How many covalent bonds does each carbon atom form in graphite?

Graphite

Bonding, structure and the properties of matter

How many delocalised electrons does each carbon atom in graphite have?

Graphite

Bonding, structure and the properties of matter

Describe the structure of graphite.

Graphite

Bonding, structure and the properties of matter

Why does graphite have similar properties to metals?

Graphite

Delocalised electrons carry charge through the metal.

Alloys are harder because the mixture of metal atoms causes a distortion of the layers which prevents them sliding easily over each other.

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Delocalised electrons transfer energy through the metal.

Very hard, a very high melting point and it does not conduct electricity.

A giant covalent structure

1

3

Delocalised electrons.

Layers of hexagonal rings formed by covalent bonds between the carbon atoms. There are no covalent bonds between the layers which means they are free to slide over each other.

Bonding, structure and the properties of matter

Describe the structure of graphene.

Graphene and fullerenes

Bonding, structure and the properties of matter

What is graphene useful for?

Graphene and fullerenes

Bonding, structure and the properties of matter

How many delocalised electrons does each carbon atom in graphene have?

Graphene and fullerenes

Bonding, structure and the properties of matter

What is a fullerene?

Graphene and fullerenes

Bonding, structure and the properties of matter

What is the structure of fullerene based on?

Graphene and fullerenes

Bonding, structure and the properties of matter

What was the first fullerene to be discovered?

Graphene and fullerenes

Bonding, structure and the properties of matter

What are cylindrical fullerenes called?

Graphene and fullerenes

Bonding, structure and the properties of matter

What is the ratio between the length and diameter in cylindrical fullerenes.

Graphene and fullerenes

Bonding, structure and the properties of matter

What are cylindrical fullerenes useful for?

Graphene and fullerenes

Quantitative chemistry

What is the law of conservation of mass?

Conservation of mass and balanced chemical equations

Electronics and composites.

A single layer of graphite.

Molecules of carbon atoms with hollow shapes.

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Buckminsterfullerene (C_{60})

Hexagonal rings of six carbon atoms, but they may also have rings of 5 or carbon atoms.

High length to diameter ratios (long and thin)

Nanotubes

As no atoms are lost or made in a chemical reaction, the mass of the products will equal the mass of the reactants.

Their properties make them useful for nanotechnology, electronics and materials.