Revision 1 ANSWERS

# Topic 1: Materials and Their Atoms

* 1. M(Mg2Si) = (24.31x2) +(28.09)

M = 76.71 g.mol-1

* 1. $n=\frac{m}{M}$

$$n=\frac{0.700}{76.71}$$

$n=0.0091 moles$ *or 9.1x10-3 moles*

1. $n=\frac{m}{M}$

*∴*

$$M=\frac{m}{n}$$

$$M=\frac{7.00}{0.1198}$$

*M = 58.40 g.mol-1*

1. $n=\frac{m}{M}$

*∴*

$$m=nM$$

$$m=2.335×44.01$$

$$m=102.76 grams $$

1. a) Periods
2. Groups
3. The ability of an atom to attract electrons during bonding
4. Atomic radius becomes smaller across the periodic table (left to right). Chlorine has a smaller atomic radius, therefore it will have a higher attractive force, because the distance between the nucleus of one atom and the valence electron of a neighbouring atom is shorter.
5. Phosphorus has a high nuclear charge (charge on the nucleus) because it has a high atomic number. Since there is a high positive charge in the centre, phosphorus pulls the electrons in tighter, causing a small atomic radius.
6. The number of electron shells increases down the periodic table, which causes greater electron shielding. There is a larger distance between the outer electrons and the nucleus which reduces the attraction between the nucleus and electrons, this causes the atom to be more reactive.



# Topic 2: Combining Atoms

1. Metallic, ionic and covalent.
2. a) Ionic- between a metal and a non-metal

b) Metallic- between two metals

c) Covalent- between two non-metals

1. Because they have delocalised electrons which can carry the electric charge through the metallic substance.
2. Ionic. As a liquid, the ionic substance has free ions that can carry the electric charge, while in solid form, there are no free ions to carry the electric charge.
3. Metallic.
4. Ionic compounds are made up of cations and anions. Cations are positively charged ions while anions are negatively charged ions. They form a 3D structure called a lattice.
5. It is a covalent network compound. It has a high melting point but is a poor conductor of electricity.
6. A bond where a metal (positively charged ion) is attracted towards another metal due to that metals valence electrons. In a metallic bond, the electrons act as a “glue”, keeping a definite structure within the material.
7. Great thermal and electrical conductivity, generally strong, malleable and ductile, possess generally high melting and boiling points, and are light reflective.
8. Because the metals are always fully charged atoms, and attract electrons towards themselves strongly, increasing their bond strength, whilst molecular bonds usually only contain either partially charged atoms, or atoms that possess no charge, and don’t attract other particles very strongly, decreasing their bond strength.
9. A bond where a non-metal (negatively charged ions) and a metal (positively charged ions) are attracted to each other through electrostatic forces to form a bond.
10. Brittle, generally high melting and boiling points, electrically conductive (when either dissolved or melted).
11. Lattice
12. 0. All complete ionic bonds possess a charge of 0, because ionic bonds only form between atoms of equal opposing charges (e.g AlP, where Aluminium has a charge of +3, whilst Phosphorous has a charge of -3; therefore, AlP should instead be written as Al+3P-3).
13. 1s2 2s2 2p6 3s2 3p6 4s2 3d2
14. They don’t have a full 4s subshell (e.g Copper= 1s2 2s2 2p6 3s2 3p6 4s1 3d10)
15. A bond where two or more electrons are shared between two or more non-metals.
16. The line would start from Fr, and go up-right until it reached Fluorine. The further up and right an element is, the higher its electronegativity.
17. Because different elements possess different electronegativities. And because covalent bonds are bonds where electrons are shared, the element with the higher electronegativity will always be partially negative, as there is a higher chance that there will be a shared electron orbiting it at any given moment than there would be for the element with the lower electronegativity.
18. The oxygen is partially negative, whilst the hydrogen is partially positive.
19. Molecules, and continuous substances. Molecules can be represented with molecular formula (i.e H2O), whilst continuous substances can be represented with empirical (the most simplistic) formula (i.e CO2 instead of C6x10^23O12x10^23)​

# Topic 3: Molecules

1. (1) Valence-shell electron pair repulsion (2) It is used to predict the shape of a molecule.

1.

1. Trigonal planar. The carbon has 4 valence electrons, two single electron pairs shared and one double electron pair shared. Bonding electrons pairs repels to maximise separation.

1.