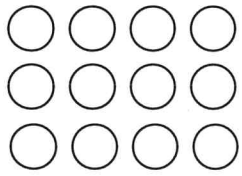
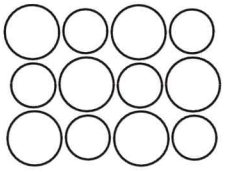
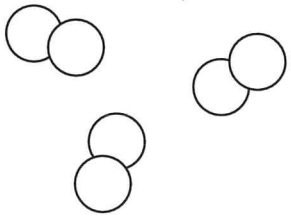
Worksheet 2.1
Review of strong bonding

NAME: **CLASS:**

INTRODUCTION

This worksheet revises the bonding and structure of ionic, metallic and covalent molecular and network substances. .

No.	Question	Answer
1	Classify the strong bonding type between particles in each of the following substances as ionic, covalent or metallic. **a** Carbon dioxide **b** Iron(III) chloride **c** Silicon dioxide **d** Brass **d** Ammonia **d** Calcium oxide	
2	Consider the following three substances. **a** Complete and label the diagram to show the particles present. **b** Name the bonding that holds the particles together. **c** Bonding is all substances is due to electrostatic attraction between particles. Identify the types of particles that attract one another.	

Sodium	Sodium chloride	Chlorine, Cl_2
		
Bonding: Electrostatic attraction between	Bonding: Electrostatic attraction between	Bonding: Electrostatic attraction between

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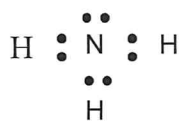
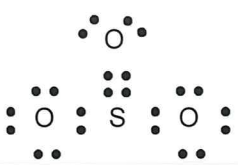
3	What type of strong bonding will exist between the atoms of the compounds formed in the reaction of elements from the following groups? **a** Group 2 and group 17 **b** Group 13 and group 16 **c** Group 16 and group 17	
4	An ionic compound has the formula Z_3X. Elements Z and X could be found in which groups of the periodic table?	
5	Nitrogen, from group 15, forms a compound with an element X, from group 17. Give a likely formula of this compound.	
6	Potassium telluride has the ionic formula K_2Te. Without consulting a periodic table, suggest the group of the element tellurium.	
7	Draw electron dot diagrams to represent the transfer of electrons and the number of atoms required to produce calcium phosphide from calcium and phosphorus.	
8	Draw electron dot diagrams of the following molecules: **a** NH_3 **b** SO_3 **c** CO_2	

9 For each of the following pairs of species, determine whether the atomic/ionic radius of the first particle listed is larger than (>), the same size (=) or smaller than (<) the radius of the second particle.

	First particle	>, =, <	Second particle
a	Sulfur atom (S)		Sulfide ion (S^{2-})
b	Hydrogen ion (H^+)		Hydrogen atom (H)
c	Chloride ion (Cl^-)		Fluoride ion (F^-)
d	Magnesium atom (Mg)		Aluminium atom (Al)

Worksheet 2.1: Solutions
Review of strong bonding

No.	Answer
1	**a** Covalent **b** Ionic **c** Covalent **d** Metallic **e** Covalent **f** Ionic
2	**Sodium** **a** The diagram should show positive sodium ions, Na^+ and a delocalised electron from every positive ion. **b** Metallic bonding **c** Electrostatic attraction between the positive sodium ions and the delocalised electrons **Sodium chloride** **a** The diagram should show alternating positive sodium ions, Na^+ and negative chloride ions, Cl^- (the larger ion is Cl^-). **b** ionic bonding **c** electrostatic attraction between the positive sodium ions and the negative chloride ions **Chlorine** **a** The diagram should show two chlorine atoms bonded together for each molecule. **b** Covalent bonding between the atoms in the molecule and weak bonding between the molecules **c** Electrostatic attraction between the shared electrons and the positive nuclei of the two atoms (also weak electrostatic attraction between the neutral molecules that act as instantaneous dipoles (see Chapter 4))
3	**a** Ionic bonding **b** Ionic bonding **c** Covalent bonding
4	The compound consists of Z^+ and X^{3-} ions so element Z is in group 1 and element X in group 15.
5	N will react by gaining 3 electrons and X by gaining 1 electron, so the formula will be NX_3
6	The telluride ion must be Te^{2-}, so tellurium is from group 16.
7	
8	**a**  **b**  **c** 

9 Anions are larger than their parent atoms (due to increased electron repulsions), while cations are smaller than their parent atoms (due to a reduction in the number of occupied electron shells). Atomic radius decreases across a period in the periodic table. Atom/ion size increases as the number of occupied electron shells increases.

No.	First particle	>, =, <	Second particle
a	Sulfur atom (S)	<	Sulfide ion (S^{2-})
b	Hydrogen ion (H^{+})	<	Hydrogen atom (H)
c	Chloride ion (Cl^{-})	>	Fluoride ion (F^{-})
d	Magnesium atom (Mg)	>	Aluminium atom (Al)