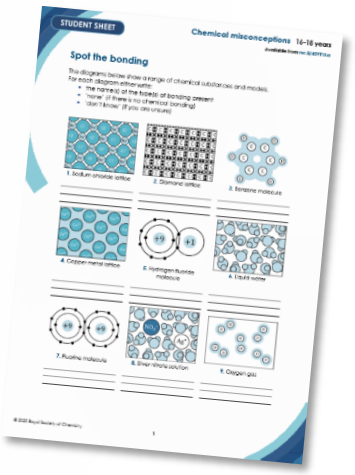
Spot the bonding

This resource is from **Chemical misconceptions – prevention, diagnosis and cure**, which can be viewed at: rsc.li/456d4fF. This series of resources includes classroom activities you can use to identify learner misconceptions; challenge some of these alternative ideas; and help learners construct the chemical concepts they need to grasp.

Resource components

Student sheet: a set of diagrams where learners must identify the type/s of bonding represented in each one.



How to use this resource

Use this resource to quickly audit learners' awareness of different bond types. (Use the **Interactions** resource to explore post-16 learners' more detailed understanding of the same topic: rsc.li/3qEUZTr.)

Point out to learners that some of the diagrams refer to individual atoms or molecules, while others show some of the particles in named substances and they should therefore pay close attention to the labels under the figures.

When to use?	Introduce	**Develop**	Revise	**Assess**
	Use with 16–18 learners, who have completed studying bonding at post-16 level.			
Group size?	**Independent**	Small group	Whole class	Homework
	Suitable for independent work in class to diagnose learners' misconceptions.			
Topics assessed?	Chemical bonding (including: ionic, covalent, metallic, polar, hydrogen, dipole-dipole, van der Waals, solvation, dative, double, delocalised).			
How long?			10–15 minutes	

Rationale

Research suggests that learners focus on covalent and ionic bonding, and can either miss, or down-play the importance of, other types of bonding. You can read a discussion of learners' ideas about atomic structure and other chemical structures here: rsc.li/3NOaVvL.

A variety of types of diagram are used in this resource, as it is important for learners to be able to interpret and use various ways of representing chemical species (read more about learners' beliefs in alternative ideas at: rsc.li/44mXmJf).

Scaffolding

An alternative version of this resource has been adapted for learners aged 14–16 years and is available here: rsc.li/3ILA7mt

The 14-16 version includes lesson slides, two levels of worksheet (one with fewer diagrams selected for their familiarity to 14–16 learners) and an acknowledgement of the limited range of bond types met at the 14–16 level.

Answers

Question	Figure	Answer
1	Sodium chloride lattice	ionic
2	Diamond lattice	covalent
3	Benzene molecule	covalent, delocalised
4	Copper lattice	metallic
5	Hydrogen fluoride molecule	covalent, polar
6	Liquid water	covalent, polar, hydrogen, van der Waals forces, dipole-dipole forces
7	Fluorine molecule	covalent
8	Silver nitrate solution	covalent (water), polar, hydrogen, van der Waals forces, dipole-dipole forces, solvent-solute interactions
9	Oxygen gas	(double) covalent, van der Waals, sigma + pi
10	Sulfur molecule	covalent
11	Sodium atom	no chemical bonding (although intra-atomic forces of similar nature)
12	Aluminium chloride dimer	covalent, polar, including dative (coordinate) covalent
13	Carbon dioxide molecule	(double) covalent, polar (double/sigma + pi)
14	Ethanoic acid dimer	covalent, polar, hydrogen
15	Iodine lattice	covalent, van der Waals forces
16	Ammonia molecule	covalent, polar
17	Magnesium oxide lattice	ionic
18	Liquid hydrogen chloride	covalent, polar, van der Waals forces

Notes

(a) Where a bond has significant polarity, it could be described as polar rather than covalent (or polar covalent).
(b) The term *van der Waals forces* has been used for induced dipole-dipole forces.
(c) Learners may forget to mention van der Waals forces in cases where they recognise hydrogen-bonds are present (i.e. items 6, 8, and 18).
(d) The presence of some covalent character in the magnesium oxide lattice may be spotted by some learners.