

The pictures below show some changes that might happen in a jeweller's workshop.
Look at the drawings and click on the correct change, **physical** or **chemical**, for each one.



Molten silver turning into a solid.

physical or **chemical**



Propane gas burning to melt gold.

physical or **chemical**



Testing stones with acid to see if they are marble.

physical or **chemical**



Metal coin being heated and turning black. This is used as a test for the metal.

physical or **chemical**



A solid is dissolved to make a solution used to clean jewellery.

physical or **chemical**



The solid must be turned into a powder to be used in polishing gemstones.

physical or **chemical**

The box below contains descriptions of possible properties of a substance.

Click on the words and phrases that describe chemical properties.

strength	flammability	colour	flexibility	reaction with water
	conduction of heat	pH		

Complete these sentences about some groups of elements in the periodic table.

- a Elements can be represented by international symbols like _____ for carbon,
_____ for calcium, _____ for cobalt and _____ for copper.

Which of these properties of iron is a chemical property? Tick **one** box.

- ☐ A iron melts at a temperature of 1538 °C
- ☐ B iron has a density of 7.874 g/cm³ at room temperature
- ☐ C iron rusts to form iron oxide when oxygen and water are present
- ☐ D iron conducts heat well

Writing chemical formulae to express compounds depends on their valency.

Group in periodic table	1	2	3	4	5	6	7
Valency	1	2	3	4	3	2	1
Examples	H Li Na	Be Mg Ca	B Al	C Si	N P	O S	F Cl

The easiest way of working out a formula is to use the *cross-over method*.

This involves the following steps:

- 1 Write the symbols of the elements.
- 2 Write the valencies of the elements below the symbols.
- 3 Cancel down or simplify the valencies if possible.
- 4 Cross-over the numbers and tidy up to give the formula.

Some examples are shown opposite.

Try the following examples:

Example 1 aluminium oxide	<p>1. symbols Al O</p> <p>2. valency 3 2</p> <p>4. cross-over</p> <p>Formula Al_2O_3</p>
Example 2 silicon dioxide	<p>1. symbols Si O</p> <p>2. valency 4 2</p> <p>3. cancel</p> <p>4. cross-over</p> <p>Formula SiO_2</p>

1 calcium sulfide	CaS	Ca ₂ S	CaS ₂	
2 lithium nitride	LiN	Li ₃ N	LiN ₃	
3 magnesium fluoride	MgF	Mg ₂ F	MgF ₂	
4 carbon chloride	CCl	C ₄ Cl	CCl ₄	
5 phosphorus hydride	PH	P ₃ H	PH ₃	
6 lithium phosphide	LiP	Li ₃ P	LiP ₃	
7 sodium sulfide	NaS	Na ₂ S	NaS ₂	
8 calcium oxide	CaO	Ca ₂ O	CaO ₂	
9 carbon oxide	CO	C ₂ O	CO ₂	
10 boron phosphide	BP	B ₃ P	BP ₃	
11 aluminium nitride	AlN	Al ₃ N	AlN ₃	
12 silicon carbide	SiC	Si ₄ C	SiC ₄	