

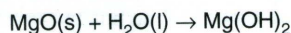
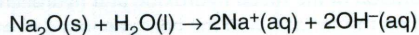


Oxides of the third period (sodium → argon)

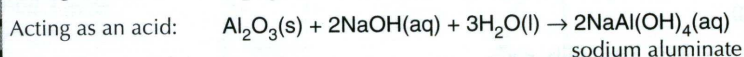
OXIDES OF PERIOD 3 ELEMENTS

The oxides of sodium, magnesium, and aluminium are all ionic. This accounts for their high melting points and electrical conductivity when molten. Silicon dioxide has a diamond-like macromolecular structure with a high boiling point. At the other end of the period the difference in electronegativities between the element and oxygen is small, resulting in simple covalent molecular structures with low melting and boiling points.

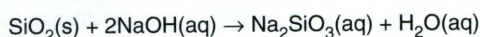
The acid-base properties of the oxides are also linked to their structure. The oxides of the electropositive elements are very basic and form solutions that are alkaline.



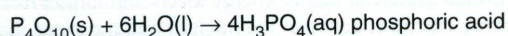
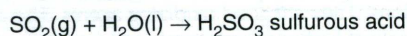
The amphoteric nature of aluminium oxide can be seen from its reactions with hydrochloric acid and sodium hydroxide.



Silicon dioxide behaves as a weak acid. It does not react with water but will form sodium silicate with sodium hydroxide.



The oxides of phosphorus, sulfur, and chlorine are all strongly acidic.



Oxides of period 3 elements

Formula	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₄ O ₁₀ (P ₄ O ₆)	SO ₃ (SO ₂)	Cl ₂ O ₇ (Cl ₂ O)
State at 25 °C	Solid	Solid	Solid	Solid	Solid (Solid)	Liquid (Gas)	Liquid (Gas)
Melting point / °C	1275	2852	2027	1610	24	17	-92
Boiling point / °C	—	3600	2980	2230	175	45	80
Electrical conductivity in molten state	Good	Good	Good	Very poor	None	None	None
Structure	Ionic		Covalent macromolecular		Simple covalent molecular		
Reaction with water	Forms NaOH(aq), an alkaline solution	Forms Mg(OH) ₂ , weakly alkaline	Does not react	Does not react	P ₄ O ₁₀ forms H ₃ PO ₄ , an acidic solution	SO ₃ forms H ₂ SO ₄ , a strong acid	Cl ₂ O ₇ forms HClO ₄ , an acidic solution
Nature of oxide	Basic		Amphoteric		Acidic		