Chasing the glow
Demonstration of the pyrophoricity of silanes
Electrostatic attraction between shared electrons and the nuclei of their atoms
Acids + metal oxides

**Reduction and oxidation**

- Hydrochloric acid + magnesium oxide $\rightarrow$ magnesium chloride + water
  
  \[ 2\text{HCl} + \text{MgO} \rightarrow \text{MgCl}_2 + \text{H}_2\text{O} \]

**Structure and bonding**

- Metallic
  - Stronger electrostatic force between delocalised electrons and metal ions in Mg

- Giant covalent
  - Strong covalent bonds between all atoms

**Magnesium reduces silicon dioxide**

- The more reactive magnesium "steals" the oxygen

\[ 2\text{Mg} + \text{SiO}_2 \rightarrow 2\text{MgO} + \text{Si} \]
Alkane \(C_nH_{2n+2}\)

Silane \(Si_nH_{2n+2}\)

Bigger atoms?
Magnesium
Mg
Metallic structure

Search:
Exhibition Chemistry
Steaming ahead with magnesium

Silica
(silicon dioxide)
SiO₂
Giant covalent structure
Metallic
Stronger electrostatic force between delocalised electrons and metal ions in Mg

Giant covalent
Strong covalent bonds between all atoms

Search:
Exhibition Chemistry
Finding the NaK
Magnesium reduces silicon dioxide

The more reactive magnesium ‘steals’ the oxygen

Magnesium + silicon dioxide $\rightarrow$ magnesium oxide + silicon

$2Mg + SiO_2 \rightarrow 2MgO + Si$
Magnesium reduces silicon

Magnesium gives electrons to the silicon

Magnesium + silicon $\Rightarrow$ magnesium silicide

$2\text{Mg} + \text{Si} \Rightarrow \text{Mg}_2\text{Si}$
hydrochloric acid + magnesium oxide $\Rightarrow$ magnesium chloride + water

$2\text{HCl} + \text{MgO} \Rightarrow \text{MgCl}_2 + \text{H}_2\text{O}$
Silane
Longer bonds are weaker.

\[ \text{C–H} \quad 108 \text{ pm} \quad 414 \text{ kJ/mol} \]

\[ \text{Si–H} \quad 148 \text{ pm} \quad 323 \text{ kJ/mol} \]
Need a spark
Stronger bond = higher activation energy

Pyrophoric
Spontaneously combusts in air at room temp