



**AS91166**  
**Demonstrate understanding of chemical reactivity**  
**Level 2 4 Credits**

This achievement standard involves demonstrating understanding of chemical reactivity.

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of chemical reactivity.	Demonstrate in-depth understanding of chemical reactivity.	Demonstrate comprehensive understanding of chemical reactivity.

Chemical reactivity is limited to rates of reaction and equilibrium principles.

**Rates of reaction:**

- ☐ factors affecting rates of reaction – restricted to changes in
  - concentration
  - temperature
  - surface area
  - presence of a catalyst
- ☐ use of collision theory to explain the factors (includes activation energy)

**Equilibrium principles:**

- ☐ the dynamic nature of equilibrium
- ☐ the effect of changes on equilibrium systems
  - temperature
  - concentration
  - pressure
  - addition of a catalyst
- ☐ the significance of the equilibrium constant ( $K_c$ ) for homogeneous systems
  - this may involve calculations
- ☐ the nature of acids and bases in terms of proton transfer
  - Brønsted-Lowry definitions / theory
  - acid-base conjugate pairs
- ☐ properties of aqueous solutions of strong and weak acids and bases including ionic species. The properties are restricted to
  - conductivity
  - rate of reaction
  - pH
- ☐ calculations involving  $K_w$  and pH (restricted to strong acids and bases).
  - $\text{pH} = -\log [\text{H}_3\text{O}^+]$
  - $[\text{H}_3\text{O}^+] = 10^{-\text{pH}}$
  - $K_w = [\text{H}_3\text{O}^+][\text{OH}^-] = 1 \times 10^{-14}$  (at 25°C)

