5.2 Oxidation of Zinc by Hydrochloric acid

Subject: Oxidation/reduction, gas forming reaction, acid properties, net ionic equations, exothermic reactions

Description: Observation of the oxidation of zinc metal by hydrochloric acid to form hydrogen gas and zinc chloride.

Materials:
Mossy zinc (1 piece)
1 M Hydrochloric acid, HCl
Petri dish
Tweezers
Flask (optional)
Balloons (optional)

‡HCl is located in the cabinet under the hood.

Procedure:
Note: Use the demo camera for displaying the reaction in ISB135.
1. Add a small amount of HCl to the Petri dish or flask.
2. Add a small piece of zinc metal to the HCl and observe the reaction. Hydrogen gas will be produced.
Optional: Put a balloon over the flask opening to collect the gas. Ignite the balloon.

Discussion:
Zinc is oxidized by hydrochloric acid to form zinc chloride. In the process, hydrogen gas is produced. The reaction is given below.

Zn(s) + 2HCl(aq) → ZnCl₂(aq) + H₂(g)

Zn(s) + 2H⁺ → Zn²⁺(aq) + H₂(g)  (Net ionic equation)

Safety: HCl and zinc chloride are corrosive and can cause skin irritations or burns. Wear appropriate protective equipment, including gloves and safety glasses.

Disposal: Solutions of zinc chloride should be disposed in appropriate hazardous waste container.

References:
For a more thorough description and variations see:
1. B.Z. Shakhashiri; Chemical Demonstrations: A Handbook for Teachers of Chemistry; Wisconsin; 1985; Volume 1; p. 25-26