

## Solutions

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Each answer shows the steps, then the **result**.

### 2.1

- silver chloride is **insoluble**

### 2.2

- an insoluble salt is made by **precipitation**

### 2.3

- sodium chloride and potassium nitrate are soluble
- **barium sulfate** is insoluble

### 2.4

- $\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \rightarrow \text{AgCl}(\text{s})$

### 2.5

- excess solid uses up **all of the acid**
- the leftover solid is filtered off, leaving **only the salt** in solution

### 3.1 B

- **react** (excess base), **filter**, **evaporate**, **crystallise**
- A and C mix the order; D is precipitation

### 3.2

- add **excess** copper(II) oxide to warm dilute sulfuric acid until no more reacts
- **filter** off the excess solid
- **evaporate** some water from the filtrate
- leave to **crystallise**, then dry

### 3.3

- mix a soluble barium salt (e.g. barium chloride) with a soluble sulfate (e.g. sodium sulfate)
- then **filter, wash and dry** the precipitate

### 3.4

(a)

- $\text{ZnCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2\text{O} + \text{CO}_2$

(b)

- warm the dilute sulfuric acid
- add zinc carbonate a little at a time until it is in **excess**
- **filter** to remove the excess solid

- evaporate until crystals form at the edge
- cool, crystallise, and dry between filter papers

(c)

- solid stays at the bottom and **no more bubbles**
- that shows **all the acid has reacted**

(d)

- e.g. **lead(II) nitrate** and **potassium iodide**
- $\text{Pb}^{2+}(\text{aq}) + 2\text{I}^{-}(\text{aq}) \rightarrow \text{PbI}_2(\text{s})$

(e)

- **filter, wash** with distilled water, **dry**
- washing removes soluble salt that would **contaminate** the product