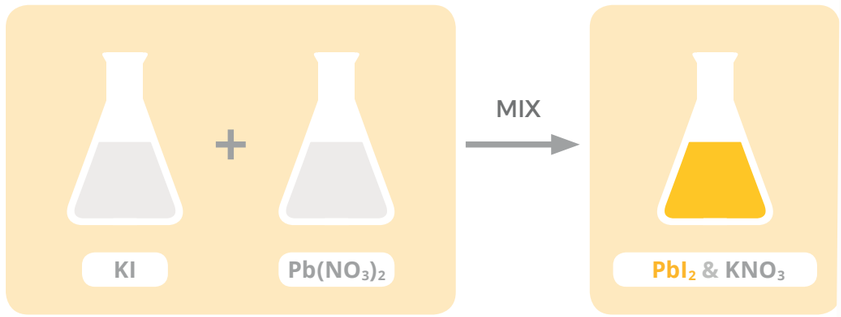
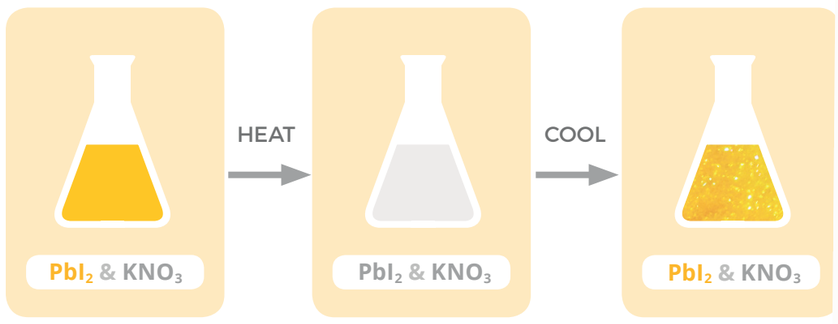
THE LEAD IODIDE 'GOLDEN RAIN' REACTION

The reaction between potassium iodide and lead nitrate is often used to demonstrate differences in solubilities, as well as the recrystallisation process.

THE EXPERIMENT



The lead iodide is more soluble in warm water than in cold. It dissolves when heated, reappearing as 'golden rain' on cooling.



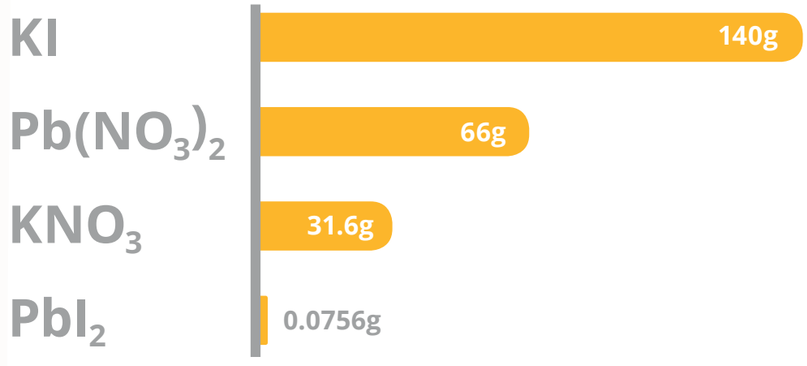
Lead salts are toxic and can cause lead poisoning so any skin contact should be avoided. They are also harmful to the environment.

THE EXPLANATION

$$2KI + Pb(NO_3)_2 \rightarrow PbI_2 + 2KNO_3$$

When the two solutions of potassium iodide (KI) and lead nitrate ($Pb(NO_3)_2$) react, they produce soluble potassium nitrate (KNO_3) and insoluble lead iodide (PbI_2). This is visible as a yellow precipitate in the solution.

The lead iodide produced dissolves in the solution if it is heated, causing the yellow precipitate to disappear and leaving a colourless solution. If this solution is allowed to cool slowly, crystals of lead iodide begin to form, causing the glistening 'golden rain' effect.



SOLUBILITY IN 100ml OF WATER (AT 20°C)

Lead iodide's solubility at 100°C increases to approximately 0.41g per millilitre.

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