

### The scenario

<b>Subject</b>	<b>Solubility equilibrium/How does temperature affect solubility?</b>
<b>Length</b>	7:19
<b>Main objectives</b>	To study how temperature increases $K_s$ value
<b>Detailed objectives</b>	
<b>Structure and description of experiments:</b>	
<b>1. Introduction</b>	Description: The motivation for the experiment is to determine how solubility is affected by temperature
<b>2. Main subject</b>	Description: Why does temperature influence solubility?
<b>Part 1</b>	
<b>(0:40), Experiment 1 (0:42)</b>	<p><b>Tools:</b> <math>\text{KNO}_3</math>, stir plate and thermometer</p> <p><b>Description:</b> Add water in a beaker, then add <math>\text{KNO}_3</math> and stir. Then, increase the temperature of the solution and observe how the solid solves (disappear), and more salt can be added. Repeat the operation at several temperatures. Solubility increases with temperature; this is because higher temperatures increase the vibration or kinetic energy (<math>K_s</math>) of the solute molecules. Solute molecules are held together by intermolecular attractions.</p> <p>In the end, let the saturated solution cool down and observe the crystals formed. The start of crystallization indicates that the solution has become saturated at this temperature.</p> <p><b>Questions:</b> Does the solubility change with temperature? – Yes, the solubility of most solid substances can change with temperature; at higher temperatures, most solids are more soluble. Why do <math>\text{KNO}_3</math> crystals form on cooling? – When you dissolve as much <math>\text{KNO}_3</math> as you can at high temperatures, it is forced to crystallize as the liquid cools.</p> <p><b>Conclusions:</b> The higher the temperature is, the easier a solid will be able to dissolve. Likewise, the lower the temperature the harder is for a solid element to dissolve.</p>
<b>3. Summary, evaluation and notes</b>	<p><b>Application:</b> In the pharmaceutical field, solubility parameters are primarily used to guide organic solvent selection, cocrystals and salt screening, lipid-based delivery, solid dispersions, and nano- or microparticulate drug delivery systems.</p> <p>Solubility provides fundamental information necessary to make predictions of transport path- ways in aqueous systems.</p>



	<b>Level:</b> secondary school
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