

# 27 Solubility energetics – Part 2

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

## Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

| English                      | 中文   | Write it 3 times (English) |
|------------------------------|------|----------------------------|
| enthalpy change of solution  | 溶解焓变 | _____                      |
| enthalpy change of hydration | 水合焓变 | _____                      |
| solubility                   | 溶解度  | _____                      |

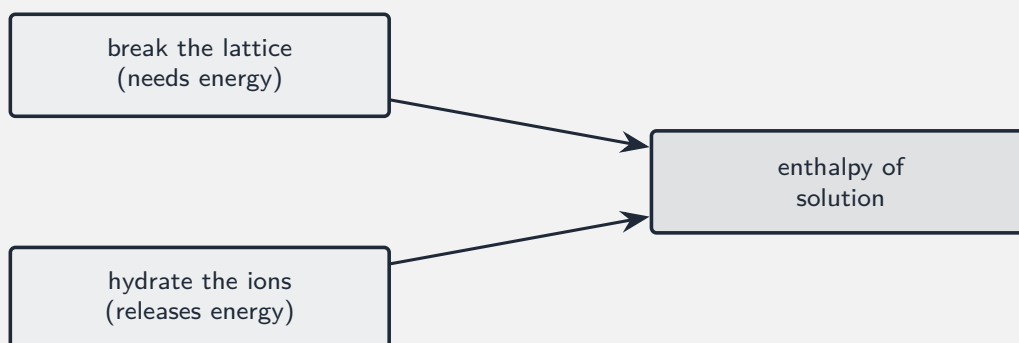
## Recall

When an ionic solid dissolves, two energy changes compete. Their balance decides how soluble it is.

## New ideas

Read these first, then do the Practice.

### ■ 1 Enthalpy of solution



The **enthalpy change of solution** 溶解焓变 is the sum of breaking the lattice (needs the lattice energy) and the **enthalpy change of hydration** 水合焓变 (water surrounds the ions, releasing energy).

## ■ 2 Opposite trends

**hydroxides**  
get *more* soluble  
down the group

**sulfates**  
get *less* soluble  
down the group

Down the group, the **solubility** 溶解度 of the hydroxides *increases* but the sulfates *decreases* —because the two energy terms shrink at different rates.

**Watch out:** the enthalpy of solution = lattice-breaking (energy *in*) + hydration (energy *out*) —the two compete. The hydroxide and sulfate trends go *opposite* ways because the two terms change at different rates down the group.

## Practice

Try these in order.

**27.6** What two energy changes compete when a solid dissolves? [2]

**27.7** Which step *needs* energy? [1]

**27.8** Which step *releases* energy? [1]

**27.9** Down Group 2, do the *hydroxides* get more or less soluble? [1]

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**27.10** Down Group 2, do the *sulfates* get more or less soluble? [1]

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**27.11 Challenge.** Dissolving a solid involves breaking the lattice (endothermic) and hydrating the ions (exothermic). Explain what makes the *overall* enthalpy of solution exothermic. [2]

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