Saturation and Crystallization

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

A saturated solution has the maximum dissolved amount at equilibrium for that temperature. A supersaturated solution temporarily holds more dissolved solute than the equilibrium limit.

1 A salt's solubility is 35 g per 100 g water at 25 °C. Which sample contains an unsaturated solution at that temperature?

(1) 25 g dissolved in 100 g water

(2) 35 g dissolved in 100 g water

(3) 40 g dissolved in 100 g water

(4) 45 g dissolved in 100 g water

2 Explain what happens at equilibrium when 5 g more of the same solid is added to a saturated solution at constant temperature with no solvent added. [1]

Answer and work

_____

_____

3 A clear supersaturated solution is seeded with a tiny crystal of its solute. What can happen?

(1) The crystal turns the water into more solute.

(2) Excess dissolved solute forms solid crystals.

(3) The solution loses its dissolved solute completely.

(4) The solubility must increase permanently.

4 Explain why a solution described as saturated at one temperature can be unsaturated at another temperature. [1]

Answer and work

_____

_____

Model Crystallization Trays

Use the information below to answer the questions.

Three clear model solutions each contain 100 g of water at the same temperature. The salt’s equilibrium solubility is 45 g per 100 g water. Tray R is temporarily supersaturated.

Tray	Mass of dissolved salt (g)
P	33
Q	45
R	52

5 Which tray is saturated at the stated equilibrium limit?

(1) P

(2) Q

(3) R

(4) All three

6 Tray R reaches equilibrium without losing water. How much of the original dissolved salt forms solid crystals? Show your calculation. [1]

Answer and work

7 How much additional salt can dissolve in tray P at this temperature?

(1) 0 g

(2) 7 g

(3) 12 g

(4) 45 g

8 An equal mass of pure water is added to tray Q without changing temperature. Explain whether the resulting solution is saturated. [1]

Answer and work