Strategic Intervention Material in Science 7: How Much Is Dissolved?

An invented example for teaching, from NASH Reviewer (https://nash.com.ph/blog/strategic-intervention-material). It is not a DepEd-approved learning resource.

Title Card

Science 7 · Term 1 · Strategic Intervention Material 1

How Much Is Dissolved? The Concentration of Solutions

Learning competency: Express quantitatively the amount of solute present in a given volume of solvent. (Grade 7 Science budget of work, Term 1, weeks 6 to 8)

For learners who answered most of the concentration items wrong on the first summative test. Three sessions of 30 minutes.

Guide Card

Is one glass of palamig sweeter than another? A solution can hold more or less solute. In this SIM you will learn to say exactly how much, with a number.

You have met solutes and solvents in class, and you know how to find a percent of a number.

Focus skills

1. Name the solute, the solvent and the solution.
2. Compute the percent by mass of a solution.
3. Use the percent on a label to find how much solute a solution holds.

Activities: Which Is Which? · How Sweet Is the Palamig? · Read the Label. Your output: a drink you make at home to a percent by mass you planned (Enrichment Card).

Work through the cards in order, and check the Answer Card only after you finish each activity.

Activity Card 1: Which Is Which?

Directions: For each mixture, write the solute, the solvent and the solution.

a. Two tablespoons of sugar stirred into a glass of water

b. Rock salt dissolved in water to make a brine for itlog na maalat

c. A sachet of powdered juice stirred into a pitcher of water

d. Why is the water, and not the sugar, the solvent in (a)? Explain in one or two sentences.

Well done: you can name the parts of a solution. Next, put numbers on them.

Activity Card 2: How Sweet Is the Palamig?

Lola dissolves 25 g of sugar in 225 g of water. The solution's mass is 25 g + 225 g = 250 g. Percent by mass = 25 g ÷ 250 g × 100 = 10% sugar.

Your turn: find the solution's mass first, then the percent.

a. 10 g of salt in 90 g of water

b. 30 g of sugar in 120 g of water

c. 8 g of salt in 192 g of water

d. Why do we divide by the mass of the solution and not by the mass of the water?

You can now put a number on how concentrated a solution is.

Activity Card 3: Read the Label

A 300 g bottle of brine is labeled 10% salt by mass. It holds 10 ÷ 100 × 300 g = 30 g of salt, and 300 g − 30 g = 270 g of water.

Your turn: find the grams of solute and of water.

a. 200 g of a syrup labeled 15% sugar by mass

b. 500 g of a solution labeled 4% salt by mass

c. 400 g of a syrup labeled 25% sugar by mass

d. Two bottles are both labeled 10% salt by mass: one holds 300 g, the other 600 g. Which holds more salt? Which is saltier? Explain.

You can now read what a label's percent really says.

Assessment Card

Directions: Choose or write the answer. Show your solution for items 3 and 5.

1. 12 g of salt are dissolved in 88 g of water. What is the percent by mass of salt? A. 12% B. 13.6% C. 88% D. 100%

2. How many grams of sugar are in 250 g of a solution that is 12% sugar by mass? A. 12 g B. 30 g C. 220 g D. 238 g

3. Ana wrote: “20 g of sugar in 80 g of water make a 25% sugar solution.” What did Ana do wrong? What is the right percent?

4. Which is more concentrated? P: 10 g of salt in 90 g of water. Q: 18 g of salt in 182 g of water. A. P B. Q C. They are the same. D. You cannot tell.

5. A 350 g jar is labeled “Sugar, 40% by mass.” Name its solute and solvent, and find the mass of each.

Enrichment Card

1. With an adult at home, make 200 g of a drink that is 5% sugar by mass. How many grams of sugar and of water do you need? Why not simply add 10 g of sugar to 200 g of water?

2. Mathematics link: dissolve 5 g, 10 g, 15 g and 20 g of sugar in 100 g of water, each time. Make a table of the percents. Does the percent go up by the same amount each time? Why or why not?

Reference Card

Reading: Why the solution, and not the solvent?

When you dissolve sugar in water, the sugar does not disappear: its mass becomes part of the solution's mass. Concentration compares the solute with the whole solution, so that two people who make the same drink in different amounts get the same percent.

Read more

- Your Science 7 textbook: the lesson on solutions and their concentration.
- CK-12, Introductory Chemistry, 16.7 Percent Solutions (LibreTexts): the same formula, with more worked examples.

Answer Card

Activity 1: (a) sugar, water, sugared water; (b) salt, water, brine; (c) the juice powder, water, juice drink; (d) the water is the part present in the greater amount, the one the sugar dissolves in.

Activity 2: (a) 100 g, 10%; (b) 150 g, 20%; (c) 200 g, 4%; (d) the solute is part of the solution, so the whole is solute plus solvent.

Activity 3: (a) 30 g sugar, 170 g water; (b) 20 g salt, 480 g water; (c) 100 g sugar, 300 g water; (d) the 600 g bottle holds more salt (60 g against 30 g), but both are equally salty: the same percent.

Assessment: 1. A (12 ÷ 100 × 100); B is 12 ÷ 88, the water's mass. 2. B (12 ÷ 100 × 250). 3. Ana divided by the water, 80 g; the solution is 100 g, so 20%. 4. A (P is 10%, Q is 9%). 5. Sugar is the solute and water the solvent; 140 g sugar, 210 g water.

Enrichment: 1. 10 g sugar and 190 g water; adding 10 g to 200 g of water makes 210 g of solution, 4.8% sugar. 2. 4.8%, 9.1%, 13.0%, 16.7%: no, because the solution grows with each gram of sugar too.

Notes for the teacher

Competency: Express quantitatively the amount of solute present in a given volume of solvent. (Grade 7 Science budget of work, Term 1, weeks 6 to 8).

Focus skills, and where each appears:

1. Name the solute, the solvent and the solution. (Guide Card; Activity Card 1: Which Is Which?; Activity Card 2: How Sweet Is the Palamig?; Activity Card 3: Read the Label; Assessment Card; Reference Card; Answer Card)

2. Compute the percent by mass of a solution. (Guide Card; Activity Card 2: How Sweet Is the Palamig?; Assessment Card; Enrichment Card; Reference Card; Answer Card)

3. Use the percent on a label to find how much solute a solution holds. (Guide Card; Activity Card 3: Read the Label; Assessment Card; Enrichment Card; Answer Card)

How each assessment item differs from the activities:

Item 1: Same form as the drill, new numbers.

Item 2: The formula turned around.

Item 3: Find the error.

Item 4: Compare two solutions.

Item 5: A new label, two skills at once.

The SIM's own assessment checks the learner's progress. A study of the SIM's effect needs a separate pretest and post-test built from a table of specifications, given to a comparison group too.