Solutions

Introduction

These questions are designed to help you to develop your mental models (pictures in your head) of what happens to the particles when a substance dissolves. This will help you to develop your ability to explain your observations.

Macroscopic: what we can see. Think about the properties that we can observe, measure and record.

Sub-microscopic: smaller than we can see. Think about the particle or atomic level.

Symbolic: representations. Think about how we represent chemical ideas including symbols and diagrams.

Questions

1. A student adds substances to test tubes of water to find out if they dissolve.

(a) First they test everyday cooking ingredients. State whether the substances are soluble or insoluble.

i. salt _____

ii. flour _____

iii. sugar _____

Next, the student tests substances from the lab and describes their observations in a table.

(b) Give the meaning of the word colourless.

_____

_____

(c) Give the meaning of the word clear.

_____

_____

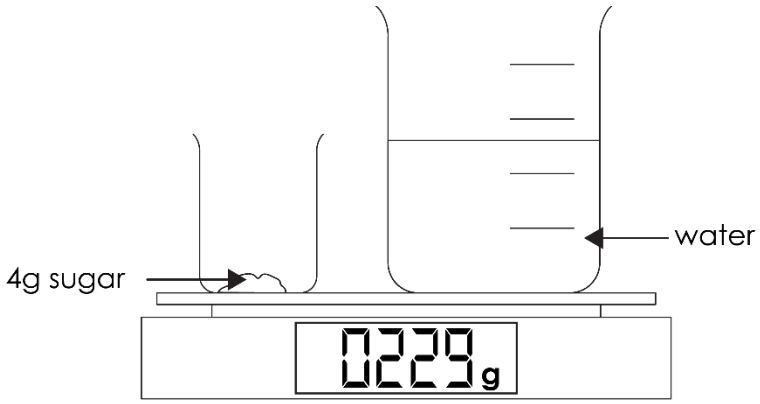
(d) Complete the table to show whether each unknown substance is soluble or insoluble.

Unknown substance	Observation after adding to water	Soluble or insoluble?
W	white lump and clear and colourless liquid	
X	cloudy and white	
Y	clear and colourless	
Z	clear and blue	

(e) Select the observation that tells you that the substance has dissolved and a solution has formed. Circle your answer.

A colourless
B cloudy
C clear

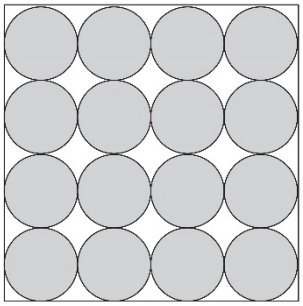
2. A teacher measures the combined mass of a beaker of water and a smaller beaker containing 4 g of sugar.
The teacher adds the sugar to the beaker of water and replaces the smaller beaker on the balance.



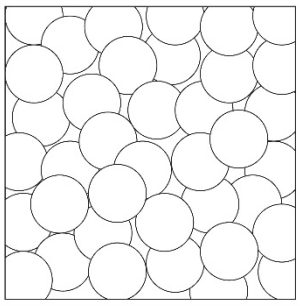
(a) Predict the mass reading on the balance when the sugar is added to the water.

_____ g

(b) The particle diagrams for water and sugar are shown below.

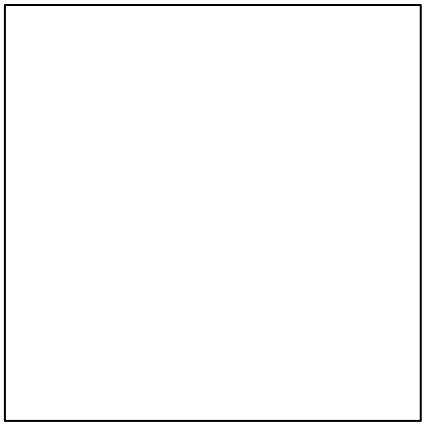


sugar particles



water particles

Draw a new particle diagram to show sugar dissolved in water.



sugar particle

water particle

(c) Use your diagram to explain your answer to part (a).

_____

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_____

3. A student adds chalk powder to water. Chalk is insoluble in water. When chalk powder is added to water it forms a mixture called a suspension. The suspension mixture looks cloudy and white.

(a) Explain why the suspension looks cloudy.

_____

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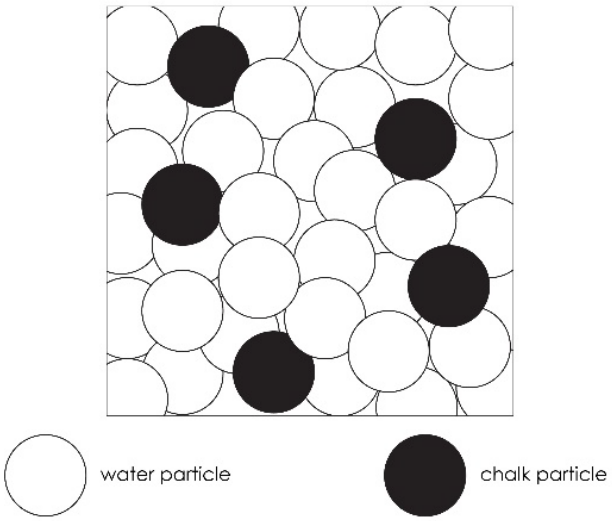
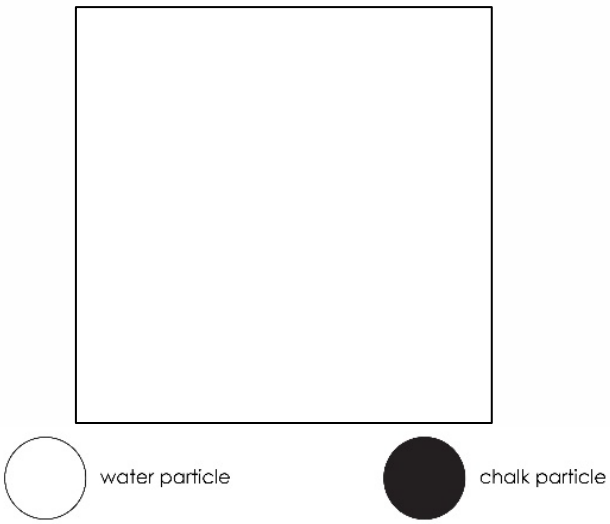
_____

(b) The student draws a diagram to explain what happens to the particles.



Explain why this particle diagram does **not** represent a suspension.

(c) Draw an improved diagram to represent a suspension.



(d) After leaving the mixture the student notices that the liquid no longer looks cloudy. There is a layer of white at the bottom of the test tube.

Explain the change that has occurred.