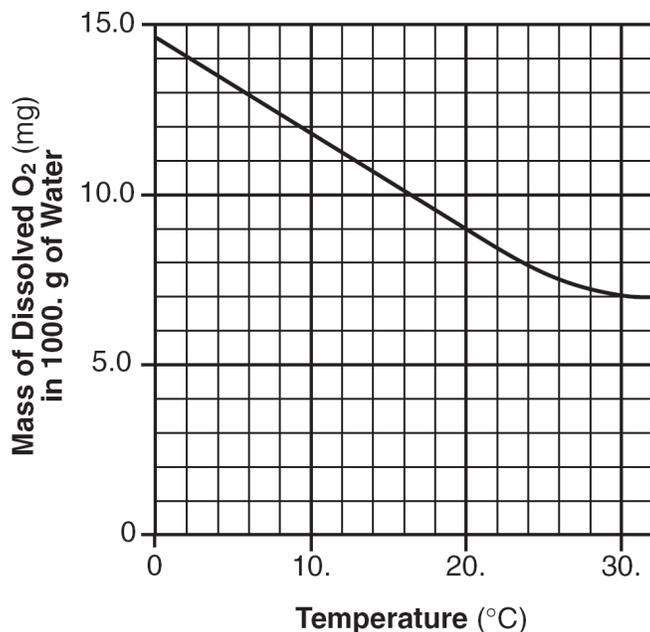


Base your answers to questions 1 and 2 on the information below

Scientists who study aquatic ecosystems are often interested in the concentration of dissolved oxygen in water. Oxygen, O_2 , has a very low solubility in water, and therefore its solubility is usually expressed in units of milligrams per 1000. grams of water at 1.0 atmosphere. The graph below shows a solubility curve of oxygen in water.

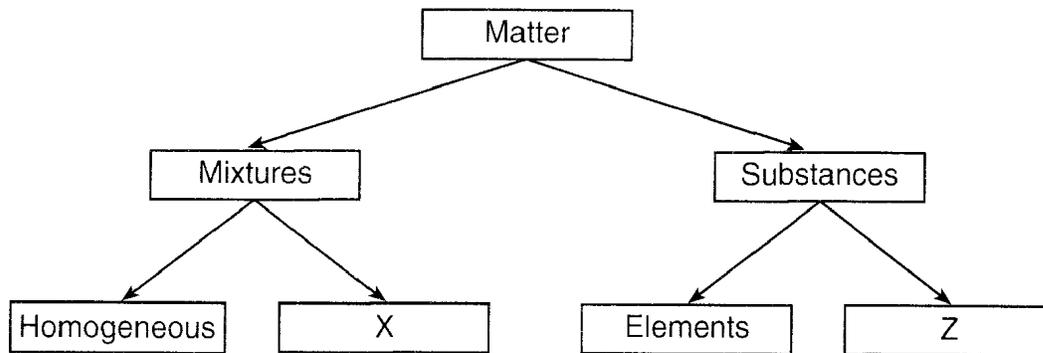
Solubility of Oxygen in Water Versus Temperature



1. An aqueous solution has 0.0070 gram of oxygen dissolved in 1000. grams of water. Calculate the dissolved oxygen concentration of this solution in parts per million. Your response must include *both* a correct numerical setup and the calculated result.
2. Explain, in terms of molecular polarity, why oxygen gas has low solubility in water. Your response must include *both* oxygen and water.

Base your answers to questions 3 through 6 on the diagram below concerning the classification of matter.

Classification of Matter



3. Given a mixture of sand and water, state *one* process that can be used to separate water from the sand.

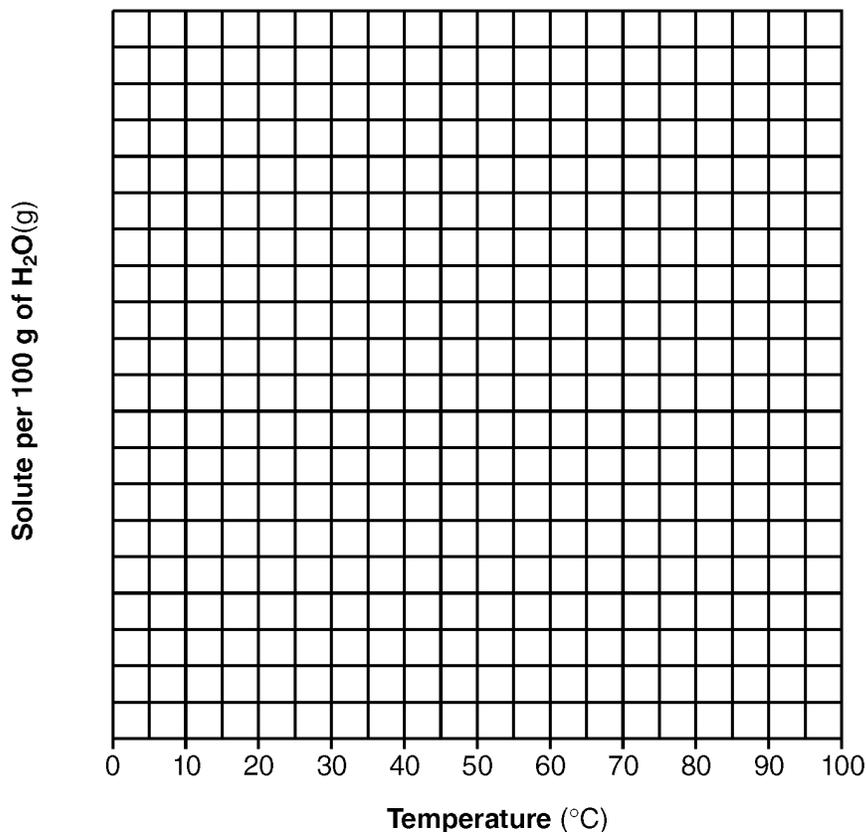
4. Explain, in terms of particle arrangement, why NaCl(aq) is a homogeneous mixture.

5. What type of substance is represented by *Z*?

6. What type of mixture is represented by *X*?

7. Base your answer to the following question on the data table below, which shows the solubility of a solid solute.

Solubility Curve



The Solubility of the Solute at Various Temperatures

Temperature (°C)	Solute per 100 g of H ₂ O(g)
0	18
20	20
40	24
60	29
80	36
100	49

Based on the data table, if 15 grams of solute is dissolved in 100 grams of water at 40°C, how many *more* grams of solute can be dissolved in this solution to make it saturated at 40°C?

Base your answers to questions 8 and 9 on the information below.

Naphthalene, a nonpolar substance that sublimates at room temperature, can be used to protect wool clothing from being eaten by moths.

8. Explain why naphthalene is *not* expected to dissolve in water.

9. Explain, in terms of *intermolecular forces*, why naphthalene sublimes.

Base your answers to questions **10** and **11** on the information below.

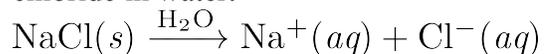
A student uses 200 grams of water at a temperature of 60°C to prepare a saturated solution of potassium chloride, KCl.

10. According to Reference Table *G*, how many grams of KCl must be used to create this saturated solution?

11. This solution is cooled to 10°C and the excess KCl precipitates (settles out). The resulting solution is saturated at 10°C. How many grams of KCl precipitated out of the original solution?

12. Base your answer to the following question on the information below.

Given the equation for the dissolving of sodium chloride in water:



Explain, in terms of *particles*, why NaCl(s) does *not* conduct electricity.

13. Show a correct numerical setup for determining how many liters of a 1.2 M solution can be prepared with 0.50 mole of C₆H₁₂O₆.

Base your answers to questions **14** and **15** on the information below.

When cola, a type of soda pop, is manufactured, $\text{CO}_2(\text{g})$ is dissolved in it.

14. *a* Draw a set of axes and label one of them “Solubility” and the other “Temperature.”
b Draw a line to indicate the solubility of $\text{CO}_2(\text{g})$ versus temperature on the axes drawn in part *a*.

15. A capped bottle of cola contains $\text{CO}_2(\text{g})$ under high pressure. When the cap is removed, how does pressure affect the solubility of the dissolved $\text{CO}_2(\text{g})$?

Unit 7 Constructed Response practice 2013-2014

1.
$$M^{mol} = \frac{0.0070 \text{ gram } O_2}{(1000. \text{ grams of water} + 0.0070 \text{ gram of } O_2)} \times 1,000,000$$

$$(0.0070 / 1000.0070) \times 1,000,000$$

2. Oxygen molecules are nonpolar and water molecules are polar.

3. Examples: –
 Evaporate the water. –
 Decant the water.
 -filtration

4. Examples: – The water molecules, sodium ions, and chloride ions are uniformly mixed together.
 – All particles distribute evenly.

5. compound or compounds

6. Examples: –
 heterogeneous –
 nonuniform

7. 9

8. Acceptable responses:
 Naphthalene is nonpolar and water is polar; Nonpolar won't dissolve in polar; Like dissolves like.

9. Acceptable responses:
 Naphthalene has weak intermolecular forces; They are weak.

10. Allow credit for **90** (± 2).

11. Allow credit for **30** (± 2). *or* Allow credit for a response consistent with the student's answer to previous question.

12. Examples: –NaCl(s) ions cannot move (are not mobile). –no charged particles are free to move

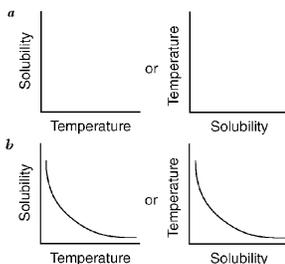
13.
$$1.2 \text{ M} = \frac{0.50 \text{ mole}}{.x}$$

or
$$1.2 \text{ M} = \frac{0.50}{x}$$

or
$$0.50 \text{ mol} \times \frac{1 \text{ L}}{1.2 \text{ mol}}$$

or
$$\frac{1.2 \text{ M}}{1 \text{ L}} = \frac{.5 \text{ mole}}{x}$$

14.



15. Solubility of CO₂(g) decreases with a decrease in pressure