

Base your answers to questions 8 on the information below and on your knowledge of chemistry.

A 100.-gram sample of liquid water is heated from 20.0°C to 50.0°C. Enough $\text{KClO}_3(\text{s})$ is dissolved in the sample of water at 50.0°C to form a saturated solution.

- 8 Based on Table G, determine the mass of $\text{KClO}_3(\text{s})$ that must dissolve to make a saturated solution in 100. g of H_2O at 50.0°C.

Base your answers to questions 9 on the information below and on your knowledge of chemistry.

A bottled water label lists the ions dissolved in the water. The table below lists the mass of some ions dissolved in a 500.-gram sample of the bottled water.

Ions in 500. g of Bottled Water

Ion Formula	Mass (g)
Ca^{2+}	0.040
Mg^{2+}	0.013
Na^+	0.0033
SO_4^{2-}	0.0063
HCO_3^-	0.180

- 9 Based on Table F, write the formula of the ion in the bottled water table that would form the least soluble compound when combined with the sulfate ion.

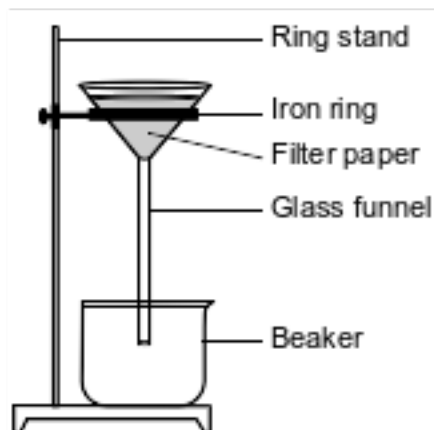
Base your answers to questions 10 on the information below and on your knowledge of chemistry.

At 23°C, 85.0 grams of $\text{NaNO}_3(\text{s})$ are dissolved in 100. grams of $\text{H}_2\text{O}(\ell)$.

- 10 Based on Table G, determine the additional mass of $\text{NaNO}_3(\text{s})$ that must be dissolved to saturate the solution at 23°C.

Base your answers to questions 11 on the information below and on your knowledge of chemistry.

In a laboratory investigation, a student is given a sample that is a mixture of 3.0 grams of NaCl(s) and 4.0 grams of sand, which is mostly $\text{SiO}_2\text{(s)}$. The purpose of the investigation is to separate and recover the compounds in the sample. In the first step, the student places the sample in a 250-mL flask. Then, 50. grams of distilled water are added to the flask, and the contents are thoroughly stirred. The mixture in the flask is then filtered, using the equipment represented by the diagram below.



- 11 Based on Table G, state evidence that all of the NaCl(s) in the flask would dissolve in the distilled water at $20.^{\circ}\text{C}$.

Base your answers to questions 12 on the information below and on your knowledge of chemistry.

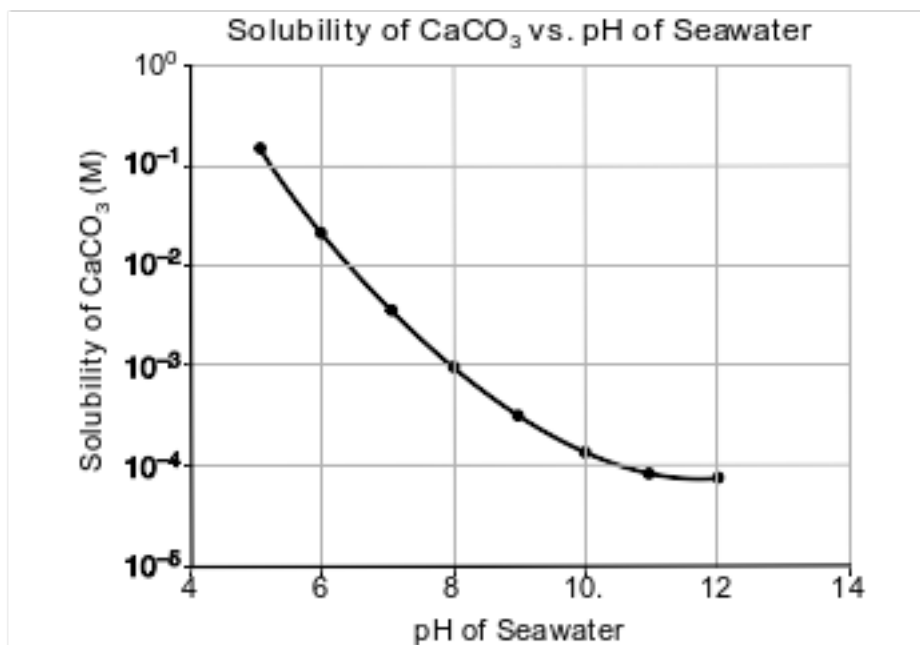
A saturated solution of sulfur dioxide is prepared by dissolving $\text{SO}_2\text{(g)}$ in 100. g of water at $10.^{\circ}\text{C}$ and standard pressure.

- 12 Based on Table G, state the general relationship between solubility and temperature of an aqueous SO_2 solution at standard pressure.

Base your answers to questions 13 on the information below and on your knowledge of chemistry.

Carbon dioxide is slightly soluble in seawater. As carbon dioxide levels in the atmosphere increase, more CO_2 dissolves in seawater, making the seawater more acidic because carbonic acid, $\text{H}_2\text{CO}_3(\text{aq})$, is formed.

Seawater also contains aqueous calcium carbonate, $\text{CaCO}_3(\text{aq})$, which is used by some marine organisms to make their hard exoskeletons. As the acidity of the sea water changes, the solubility of CaCO_3 also changes, as shown in the graph below.



13 State the trend in the solubility of CaCO_3 as seawater becomes more acidic.

Base your answers to questions 14 on the information below and on your knowledge of chemistry.

Some compounds of silver are listed with their chemical formulas in the table below.

Silver Compounds

Name	Chemical Formula
silver carbonate	Ag_2CO_3
silver chlorate	AgClO_3
silver chloride	AgCl
silver sulfate	Ag_2SO_4

14 Identify the silver compound in the table that is most soluble in water.

Base your answers to questions 15 on the information below and on your knowledge of chemistry.

A solution is made by dissolving 70.0 grams of $\text{KNO}_3(\text{s})$ in 100. grams of water at $50.^\circ\text{C}$ and standard pressure.

- 15 Determine the number of additional grams of KNO_3 that must dissolve to make this solution saturated.

Answer Keys

- 1 2
- 2 2
- 3 3
- 4 1
- 5 1
- 6 Allow 1 credit for any value from 28 kPa to 30. kPa, inclusive.
- 7 Allow 1 credit. Acceptable responses include, but are not limited to:
- As the water temperature increases, the solubility of sulfur dioxide decreases.
 - The solubility of SO_2 decreases.
 - The $\text{SO}_2(\text{g})$ becomes less soluble.
- 8 Allow 1 credit for any value from 20. g to 23 g, inclusive.
- 9 Allow 1 credit. Acceptable responses include, but are not limited to:
- Ca^{2+}
 - Ca^{+2}
 - Note: Do not allow credit for Ca or calcium.
- 10 Allow 1 credit for any value from 4.0 g to 6.0 g, inclusive.
- 11 Allow 1 credit. Acceptable responses include, but are not limited to:
- According to Table G, the salt solution is unsaturated.
 - The 3.0 g of salt dissolved in 50. g of H_2O has a concentration less than the solubility of NaCl on Table G at $20.^\circ\text{C}$.
 - Table G indicates that the solubility of NaCl is greater than the amount in the sample.
- 12 Allow 1 credit. Acceptable responses include, but are not limited to:
- The solubility at 1 atm increases as the temperature decreases.
 - As the temperature of the solution increases, the solubility of SO_2 decreases.
 - At lower temperatures, more SO_2 can dissolve.
- 13 Allow 1 credit. Acceptable responses include, but are not limited to:
- As the seawater becomes more acidic, the solubility of CaCO_3 increases.
 - As the pH of the seawater decreases, the solubility of calcium carbonate increases.
 - solubility increases
 - more soluble
- 14 Allow 1 credit for AgClO_3 or silver chlorate.
- 15 Allow 1 credit for any value from 12 g to 16 g, inclusive.