

- Which compound is insoluble in water?
 - calcium bromide
 - potassium bromide
 - silver bromide
 - sodium bromide
- Which barium salt is *insoluble* in water?

1) BaCO_3	3) $\text{Ba}(\text{ClO}_4)_2$
2) BaCl_2	4) $\text{Ba}(\text{NO}_3)_2$
- Which compound is insoluble in water?

1) BaSO_4	3) KClO_3
2) CaCrO_4	4) Na_2S
- Which ion, when combined with chloride ions, Cl^- , forms an insoluble substance in water?

1) Fe^{2+}	3) Pb^{2+}
2) Mg^{2+}	4) Zn^{2+}
- Which compound becomes *less* soluble in water as the temperature of the solution is increased?

1) HCl	3) NaCl
2) KCl	4) NH_4Cl
- Which compound is insoluble in water?

1) KOH	3) Na_3PO_4
2) NH_4Cl	4) PbSO_4
- Which compound is *least* soluble in water at $60.^\circ\text{C}$?

1) KClO_3	3) NaCl
2) KNO_3	4) NH_4Cl
- According to Table *F* which compound is soluble in water?
 - barium phosphate
 - calcium sulfate
 - silver iodide
 - sodium perchlorate
- The solubility of $\text{KCl}(\text{s})$ in water depends on the
 - pressure on the solution
 - rate of stirring
 - size of the KCl sample
 - temperature of the water
- Under which conditions of temperature and pressure is a gas most soluble in water?
 - high temperature and low pressure
 - high temperature and high pressure
 - low temperature and low pressure
 - low temperature and high pressure
- At room temperature, the solubility of which solute in water would be most affected by a change in pressure?

1) methanol	3) carbon dioxide
2) sugar	4) sodium nitrate
- As the pressure on a gas confined above a liquid increases, the solubility of the gas in the liquid

1) decreases	3) remains the same
2) increases	

13. A student prepares four aqueous solutions, each with a different solute. The mass of each dissolved solute is shown in the table below.

Mass of Dissolved Solute
for Four Aqueous Solutions

Solution Number	Solute	Mass of Dissolved Solute (per 100. g of H ₂ O at 20.°C)
1	KI	120. g
2	NaNO ₃	88 g
3	KCl	25 g
4	KClO ₃	5 g

Which solution is saturated?

- 1) 1 2) 2 3) 3 4) 4

14. A student adds solid KCl to water in a flask. The flask is sealed with a stopper and thoroughly shaken until no more solid KCl dissolves. Some solid KCl is still visible in the flask. The solution in the flask is

- 1) saturated and is at equilibrium with the solid KCl
2) saturated and is not at equilibrium with the solid KCl
3) unsaturated and is at equilibrium with the solid KCl
4) unsaturated and is not at equilibrium with the solid KCl

15. A solute is added to water and a portion of the solute remains undissolved. When equilibrium between the dissolved and undissolved solute is reached, the solution must be

- 1) dilute 3) unsaturated
2) saturated 4) supersaturated

16. When an equilibrium exists between the dissolved and the undissolved solute in a solution, the solution must be

- 1) diluted 3) supersaturated
2) saturated 4) unsaturated

17. What is the total mass of KNO₃ that must be dissolved in 50. grams of H₂O at 60.°C to make a saturated solution?

- 1) 32 g 3) 64 g
2) 53 g 4) 106 g

18. What is the mass of NH₄Cl that must dissolve in 200. grams of water at 50.°C to make a saturated solution?

- 1) 26 g 3) 84 g
2) 42 g 4) 104 g

19. Which unit can be used to express the concentration of a solution?

- 1) L/s 3) ppm
2) J/g 4) kPa

20. When 5 grams of KCl are dissolved in 50. grams of water at 25°C, the resulting mixture can be described as
- 1) heterogeneous and unsaturated
 - 2) heterogeneous and supersaturated
 - 3) homogeneous and unsaturated
 - 4) homogeneous and supersaturated
21. The molarity of an aqueous solution of NaCl is defined as the
- 1) grams of NaCl per liter of water
 - 2) grams of NaCl per liter of solution
 - 3) moles of NaCl per liter of water
 - 4) moles of NaCl per liter of solution
22. What is the molarity of 1.5 liters of an aqueous solution that contains 52. grams of lithium fluoride, LiF, (gram-formula mass = 26 grams/mole)?
- 1) 1.3 M
 - 2) 2.0 M
 - 3) 3.0 M
 - 4) 0.75 M
23. The data collected from a laboratory titration is used to calculate the
- 1) rate of a chemical reaction
 - 2) heat of a chemical reaction
 - 3) concentration of a solution
 - 4) boiling point of a solution
24. Which phrase describes the molarity of a solution?
- 1) liters of solute per mole of solution
 - 2) liters of solution per mole of solution
 - 3) moles of solute per liter of solution
 - 4) moles of solution per liter of solution
25. A student wants to prepare a 1.0-liter solution of a specific molarity. The student determines that the mass of the solute needs to be 30. grams. What is the proper procedure to follow?
- 1) Add 30. g of solute to 1.0 L of solvent.
 - 2) Add 30. g of solute to 970. mL of solvent to make 1.0 L of solution.
 - 3) Add 1000. g of solvent to 30. g of solute.
 - 4) Add enough solvent to 30. g of solute to make 1.0 L of solution.
26. What is the total number of grams of NaI(s) needed to make 1.0 liter of a 0.010 M solution?
- 1) 0.015
 - 2) 0.15
 - 3) 1.5
 - 4) 15
27. Based on your reference tables, which compound could form a concentrated solution?
- 1) AgBr
 - 2) AgCl
 - 3) Ag₂CO₃
 - 4) AgNO₃
28. Which solution is the most concentrated?
- 1) 1 mole of solute dissolved in 1 liter of solution
 - 2) 2 moles of solute dissolved in 3 liters of solution
 - 3) 6 moles of solute dissolved in 4 liters of solution
 - 4) 4 moles of solute dissolved in 8 liters of solution

29. What is the total mass of solute in 1000. grams of a solution having a concentration of 5.0% ?
- 1) 0.05g
 - 2) 0.5 g
 - 3) 5g
 - 4) 50 g
30. What is the total mass of solute in 1000. grams of a solution having a concentration of 5 parts per million?
- 1) 0.005 g
 - 2) 0.05g
 - 3) 0.5 g
 - 4) 5g
31. Which solution has the highest boiling point at standard pressure?
- 1) 0.10 M KCl(aq)
 - 2) 0.10 M K_2SO_4 (aq)
 - 3) 0.10 M K_3PO_4 (aq)
 - 4) 0.10 M KNO_3 (aq)
32. How do the boiling point and freezing point of a solution of water and calcium chloride at standard pressure compare to the boiling point and freezing point of water at standard pressure?
- 1) Both the freezing point and boiling point of the solution are higher.
 - 2) Both the freezing point and boiling point of the solution are lower.
 - 3) The freezing point of the solution is higher and the boiling point of the solution is lower.
 - 4) The freezing point of the solution is lower and the boiling point of the solution is higher.
33. Compared to the freezing point and boiling point of water at 1 atmosphere, a solution of a salt and water at 1 atmosphere has a
- 1) lower freezing point and a lower boiling point
 - 2) lower freezing point and a higher boiling point
 - 3) higher freezing point and a lower boiling point
 - 4) higher freezing point and a higher boiling point
34. Which aqueous solution of KI freezes at the lowest temperature?
- 1) 1 mol of KI in 500. g of water
 - 2) 2 mol of KI in 500. g of water
 - 3) 1 mol of KI in 1000. g of water
 - 4) 2 mol of KI in 1000. g of water
35. Which solution has the lowest freezing point?
- 1) 10. g of KI dissolved in 100. g of water
 - 2) 20. g of KI dissolved in 200. g of water
 - 3) 30. g of KI dissolved in 100. g of water
 - 4) 40. g of KI dissolved in 200. g of water

Base your answers to questions 36 and 37 on on the information below.

In an investigation, a dripless wax candle is massed and then lighted. As the candle burns, a small amount of liquid wax forms near the flame. After 10 minutes, the candle's flame is extinguished and the candle is allowed to cool. The cooled candle is massed.

36. State *one* observation that indicates a chemical change has occurred in this investigation.
37. Identify *one* physical change that takes place in this investigation.
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Base your answers to questions 38 through 40 on the information below.

In a laboratory, a student makes a solution by completely dissolving 80.0 grams of $\text{KNO}_3(\text{s})$ in 100.0 grams of hot water. The resulting solution has a temperature of 60°C . The room temperature in the laboratory is 22°C .

38. Describe a laboratory procedure that can be used to recover the solid solute from the aqueous solution.
39. Compare the boiling point of the solution at standard pressure to the boiling point of water at standard pressure.
40. Classify, in terms of saturation, the type of solution made by the student.
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Base your answers to questions 41 and 42 on the information below

An unsaturated solution is made by completely dissolving 20.0 grams of NaNO_3 in 100.0 grams of water at 20.0°C .

41. Identify one process that can be used to recover the NaNO_3 from the unsaturated solution.

42. Determine the minimum mass of NaNO_3 that must be added to this unsaturated solution to make a saturated solution at 20.0°C .

Base your answers to questions 43 and 44 on the information below.

A solution is made by completely dissolving 90. grams of $\text{KNO}_3(\text{s})$ in 100. grams of water in a beaker. The temperature of this solution is 65°C .

43. Describe the effect on the solubility of $\text{KNO}_3(\text{s})$ in this solution when the pressure on the solution increases.

44. Determine the total mass of $\text{KNO}_3(\text{s})$ that settles to the bottom of the beaker when the original solution is cooled to 15°C .

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

A 2.0-liter aqueous solution contains a total of 3.0 moles of dissolved NH_4Cl at 25°C and standard pressure.

Determine the molarity of the solution.