

Chemistry Spring Midterm

Name: _____

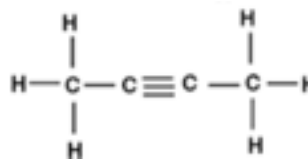
- The solubility of $\text{NaNO}_3(\text{s})$ in water increases as the:
 - temperature of the solution increases
 - temperature of the solution decreases
 - pressure on the solution increases
 - pressure on the solution decreases
- Which element has an atom with the greatest attraction for electrons in a chemical bond?
 - As
 - Bi
 - N
 - P
- Which formula represents a nonpolar molecule?
 - HCl
 - NaCl
 - H_2O
 - CH_4
- Which barium salt is *insoluble* in water?
 - BaSO_4
 - BaCl_2
 - $\text{Ba}(\text{ClO}_3)_2$
 - $\text{Ba}(\text{NO}_3)_2$
- Compared to 0.1 M aqueous solution of NaCl , a 0.8 M aqueous solution of NaCl has a
 - higher boiling and freezing point
 - higher boiling point and a lower freezing point
 - lower boiling point and a higher freezing point
 - lower boiling and freezing point
- Which compound is least soluble in water at 40°C ?
 - KClO_3
 - NaCl
 - KNO_3
 - NH_4Cl
- A solution contains 35 grams of KNO_3 dissolved in 100 grams of water at 40°C . How much *more* KNO_3 would have to be added to make it a saturated solution?
 - 29 g
 - 24 g
 - 12 g
 - 4 g
- Which solution is saturated at the given temperature with the solute listed?

Solution Number	Solute	Mass of Dissolved Solute (per 100. g of H_2O at 20°C)
1	KI	120. g
2	NaNO_3	88 g
3	KCl	25 g
4	KClO_3	5 g

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

- An aqueous solution of sodium chloride is best classified as a
 - homogeneous compound
 - homogeneous mixture
 - heterogeneous compound
 - heterogeneous mixture

- Given the formula of a substance:



What is the total number of shared electrons in a molecule of this substance?

- 6
 - 9
 - 11
 - 22
- Which **type of bond** results when one or more **valence electrons are shared equally between** two atoms?
 - A hydrogen bond
 - an ionic bond
 - a nonpolar covalent bond
 - a polar covalent bond
- A molecule of an **organic compound** contains at least one atom of
 - carbon
 - chlorine
 - nitrogen
 - oxygen
- Hydrocarbons** are compounds that contain
 - Carbon, only
 - Carbon and hydrogen, only
 - Carbon, hydrogen, and oxygen, only
 - Carbon, hydrogen, oxygen, and nitrogen, only
- A **carbon-carbon triple bond** is found in a molecule of
 - pentane
 - pentanone
 - pentene
 - pentyne
- Which substance is an Arrhenius base?
 - CH_3OH
 - CH_3Cl
 - LiOH
 - LiCl
- Which statement describes an alternate theory of acids and bases?
 - Acids and bases are both H^+ acceptors.
 - Acids and bases are both H^+ donors.
 - Acids are H^+ acceptors, and bases are H^+ donors
 - Acids are H^+ donors, and bases are H^+ acceptors
- $\text{H}_2\text{SO}_4(\text{aq})$ is considered:
 - An acid because it accepts a H^+
 - An acid because it donates a H^+
 - An base because it accepts a H^+
 - An base because it donates a H^+
- When tested, a solution turns red litmus to blue. This indicates that the solution contains:
 - An acid which has an increased H^+ concentration
 - A base which has increased the H^+ concentration
 - An acid which has an increased OH^- concentration
 - A base which has increased the OH^- concentration

Short Response Question:

19. Base your answer(s) to the following question(s) on the information below.

In a laboratory activity, 0.500 mole of NaOH(s) is completely dissolved in distilled water to form 400. milliliters of NaOH(aq). This solution is then used to titrate a solution of HNO₃(aq).

Identify the negative ion produced when the NaOH(s) is dissolved in distilled water.

20. Base your answer(s) to the following question(s) on the information below.

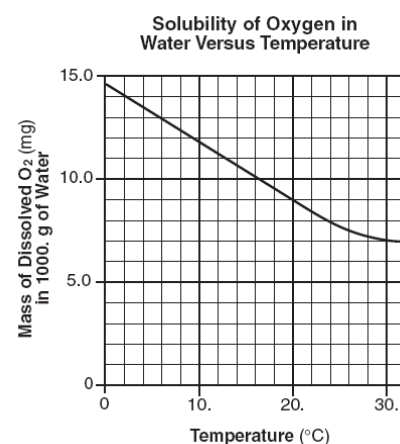
A student uses 200 grams of water at a temperature of 60° C to prepare a saturated solution of potassium chloride, KCl.

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?

21. Oil cannot be mixed with water. State, in terms of molecular polarity, why oil and water do not mix. Your response must include both oil and water for full credit.

Base your answer to question 22 and 23 on the information below.

Scientists who study aquatic ecosystems are often interested in the concentration of dissolved oxygen in water. Oxygen, O₂, has a very low solubility in water, and therefore its solubility is usually expressed in units of milligrams per 1000 grams of water. The graph below shows a solubility curve of oxygen in water.



22. Explain, in terms of molecular polarity, why oxygen gas has low solubility in water. Your response must include *both* oxygen and water.

23. Explain, based on the curve, what happens to the solubility of oxygen in water as the temperature is increased.

24. Fill in the following Chart:

Name	Structural Formula	Molecular Formula	Condensed Formula
Pentyne			
	$\begin{array}{c} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H}-\text{C} & = & \text{C}-\text{C}-\text{H} \\ & & \\ & & \text{H} \end{array}$		
		C₄H₁₀	
			CH₃CHCHCH₃