

Solutions, Acid/Base & Solubility Test Review

Know the definitions for the following:

Solvent – liquid (usually water) that dissolves the solute to make the solution

Solute – solid (usually) that is added to solvent and dissolves to make solution

Solution – homogeneous mixture of solvent and solute

Concentration – a measure of how much solute per volume of solvent

Molarity – concentration; moles of solute/liters of solvent

Arrhenius Acid and Base – acid donates H⁺ and base donates OH⁻

Bronsted Lowry Acid and Base – acid donates H⁺ and a base accepts H⁺

Neutralization – acid + base → salt + water

Titration – process used to determine concentration of an acid using neutralization

Solutions/Solubility:

What factors will increase the rate of solubility? Increasing temperature; breaking into pieces; stirring

Calculating Concentration (M = moles/liters)

What is the molarity of 50 grams of NaCl in a 100ml of water?

Convert grams → moles: **50 grams NaCl / 58.5 grams (from periodic table) = .85 moles** Divide moles by volume → **.85 moles / 0.1 L = 8.5 M**

Dilutions (M₁V₁ = M₂V₂)

If I have 500 mL of a 0.5M NaCl solution, what will the concentration be if the final volume of the solution is 600 mL? **(500ml)*(0.5M) = (600ml)(? M) = 0.42 M**

How many liters of 0.5M HCl stock solution would you need to prepare 2 liters of 0.25 M HCl solution? **(2 L)*(0.25 M) = (? L) * (0.5 M) = 1 M**

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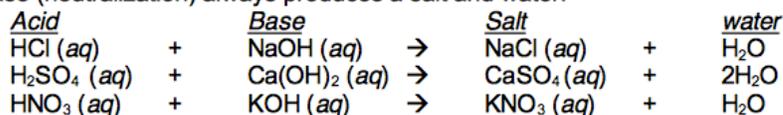
Acids and Bases:

Know the properties of acids and bases:

Acids	Bases
Taste sour	Taste Bitter
pH less than 7	pH greater than 7
Acids effect indicators: 1. Acids turn blue litmus to red 2. Acids turn methyl orange to red	Bases effect indicators: 1. Bases turn red litmus to blue 2. Bases turn methyl orange to yellow 3. Bases turn phenolphthalein to purple
Acids neutralize bases producing a salt and water	Bases neutralize acids producing a salt and water
Proton donors (Proton = H^+ = hydrogen ion)	Proton acceptors (Proton = H^+ = hydrogen ion)
Increase H^+ ion concentration in solution	Increase OH^- ion concentration in solution
Acids are electrolytes	Bases are electrolytes
Acids react with carbonates to produce a salt, water and CO_2	Bases feel slippery
Acids react with active metals to produce hydrogen	

1. Write definitions for, or explain the meaning of: Bronsted-Lowry acid and base, neutral, strong acid, strong base, weak acid, weak base, concentrated, dilute, ionization, dissociation
2. Know general acid base reactions:

Reaction of an acid with a base (neutralization) always produces a salt and water:



3. Be able to recognize acids, bases and salts from their chemical formulas.
4. What number do you get when you add up the pH and pOH of a solution?
 $pH + pOH = 14$
5. What is pH?
pH is a numerical scale used to express the acidity of a solution.
6. What is the range of pH for an acid? For a base? For a neutral compound?
0-7 is acidic, 7 is neutral, 7-14 is basic
7. What happens to pH of a solution as you increase the hydroxide (OH^-) ion concentration?
As you increase OH^- concentration, the pH of a solution will increase.

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8. What happens to the pH of a solution as you increase the hydronium (H⁺) ion concentration?
As you increase the H⁺ concentration of a solution, the pH will decrease.
9. Classify the following solutions from most acidic to least acidic based on their pH and then classify the solutions as most basic to most acidic based on their pH:
Most acidic to most basic: 2, 5, 8, 10, 13
Most basic to most acidic: 13, 10, 8, 5, 2
11. What do you use litmus (pH paper) for? If it turns red, what does it indicate about a solution? If it turns blue, what does it indicate about a solution?
You use litmus paper to measure the pH of solutions. If the litmus paper turns red it indicates it is a very acidic solution. If it turns blue, it indicates it is a very basic solution.
12. What is phenolphthalein used for? If you add phenolphthalein to a solution and it turns pink, what does that tell you? If it stays clear, what does that tell you?
Phenolphthalein is used to indicate whether a solution is acidic or basic. If you add a drop of phenolphthalein to a solution and it turns pink, it is basic. If you add a drop of phenolphthalein and it remains clear, it is acidic.
13. What is the formula we use to determine concentration of a solution?
Molarity = $\frac{\text{Mol}}{\text{L}}$
14. If you mix 3.4 mol of HCl with 4.6 L of water, what is the concentration of the solution? What is the pH? pOH?
pH = 0.13 pOH = 13.87
15. If you mix 1.48 mol of HF with 7.8 L of water, what is the concentration of the solution? What is the pH? pOH?
pH = 0.72 pOH = 13.28
16. If you mix 2.1 mol of NaOH with 5.6 L of water, what is the concentration of the solution? What is the pH of the solution? pOH?
pOH = 0.43 pH = 13.57 (Remember, NaOH is a base.)