

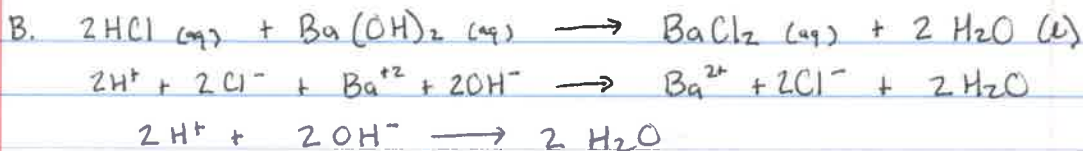
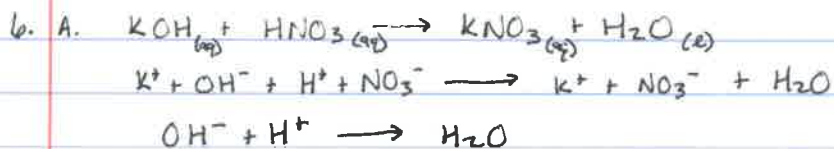
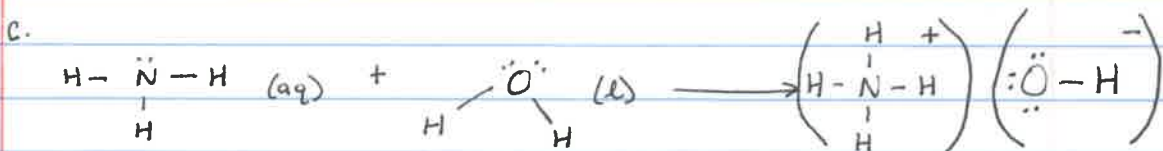
1. A. HI Hydroiodic acid
 HNO₃ Nitric acid
 H₂SO₄ Sulfuric acid
 HCl Hydrochloric acid
 H₂SO₃ Sulfurous acid

B. Acids can dissolve certain materials, such as marble or eggshell. They are sour in taste, change colors with indicators (such as from blue to pink with the litmus test), and lastly they are corrosive to metals (such as iron and aluminum). Have presence of H⁺.

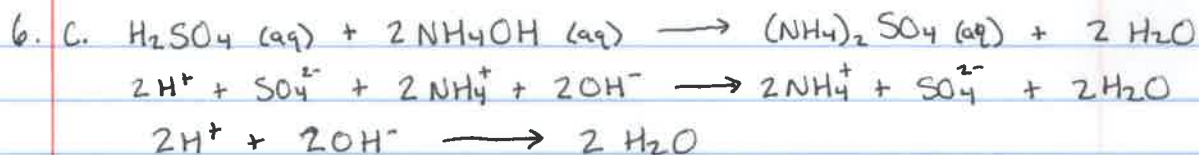


3. A. KOH Potassium hydroxide
 LiOH Lithium hydroxide
 Ca(OH)₂ Calcium hydroxide
 NaOH Sodium hydroxide
 NH₄OH Ammonium hydroxide

B. Bases generally taste bitter; when dissolved in water they have a slippery, soapy feel; are caustic to skin; turn litmus paper blue; and have OH⁻.



C. Cont'd on next page...



7. A. HI acidic
 B. NaCl neutral
 C. NH_4OH basic
 D. $\text{pH} = -\log [1 \times 10^{-8}] = 8$ basic
 E. $\text{pOH} = -\log [1 \times 10^{-2}] = 2$ $14 - 2 = 12$ basic
 F. $\text{pH} = -\log [5 \times 10^{-7}] = 6.3$ acidic
 G. $\text{pOH} = -\log [1 \times 10^{-12}] = 12$ $14 - 12 = 2$ acidic

8. D. $\frac{1 \times 10^{-14}}{1 \times 10^{-8}} = [\text{OH}^-] = 1 \times 10^{-6}$

E. $\frac{1 \times 10^{-14}}{1 \times 10^{-2}} = [\text{H}^+] = 1 \times 10^{-12}$

F. $\frac{1 \times 10^{-14}}{5 \times 10^{-7}} = [\text{OH}^-] = 2 \times 10^{-8}$

G. $\frac{1 \times 10^{-14}}{1 \times 10^{-12}} = [\text{H}^+] = 1 \times 10^{-2}$

9. D. $\text{pH} = -\log [1 \times 10^{-8}] = 8$

E. $\text{pH} = -\log [1 \times 10^{-12}] = 12$

F. $\text{pH} = -\log [5 \times 10^{-7}] = 6.30$

G. $\text{pH} = -\log [1 \times 10^{-2}] = 2$

12. A. Least Acid Precipitation : San Francisco

Most Acid Precipitation : Atlanta

B. Saint Peter is approximately 6.0-5.5.

San Francisco is approximately 6.2-5.4

Seattle is approximately 5.1

Chicago is approximately 4.7-4.8

Cont'd on Next Page...

12. B. Saint Peter is similar to San Francisco, making it one of the cities with the highest pH. The following cities approx. are listed on the previous page.

37. A. Coal-fired plants contribute to poor visibility because when they burn the coal there is some sulfur contained in it and results in sulfur dioxide emissions. Sulfur dioxide is then transformed, after a series of reactions, into sulfuric acid. Sulfuric acid is so stable that it can spread for miles and last several days, hindering visibility.

B. $\text{pH} \sim \text{natural rainfall (5-6)} = -\log [10^{-5.0} \text{ to } 10^{-6}]$

$$10 [10^{-5}] = 10^{-4} \quad 10 [10^{-6}] = 10^{-5}$$

$$\text{So, } -\log [10^{-5.0} \text{ to } 10^{-4}] = 4-5 \text{ pH}$$

The pH rainfall in the park should be between 4-5.



$$5(2) = 10 \quad 6(2) = 12 \quad 5 + 6 = 11$$

$$946 + 498 \longrightarrow 2(607)$$

$$1444 \longrightarrow 1214$$

$$1444 - 1214 = 230 \text{ kJ/mol}$$

This means that 2NO is less than $\text{N}_2 + \text{O}_2$. The reaction is endothermic, and requires 230 kJ of energy. The energy is absorbed.

55. A. Hanging your laundry saves energy. By hanging your laundry you are not using the drier that requires energy from a power plant. This power plant probably burns coal which adds to the amount of SO_x released into the air.
- B. By carpooling, or using alternative transportation that uses limited gasoline, you are decreasing the amount of combustion in engines. This causes the emissions of NO_x to decrease and would help contribute less NO_x emissions due to transportation (currently consisting of 56% of all NO_x emissions).
- C. This technique goes back to the saving energy idea in A. By doing fewer loads, you have are saving energy and using less coal. This switches the demand for coal production and causes decreased NO_x emissions.
- D. Added Insulation allows heaters and pipes to retain their heat or energy. This means less energy is needed to heat the water or house. As noted above, saving energy saves fuel combustion, which constitutes 86% of all SO_x emissions.
- E. Buying local foods means there is less demand for foods that require a lot of transportation. The less demand for transportation, the less transportation, and fewer NO_x emissions.
- F. Fertilizers use ammonia, which will break down and contribute to NO_x emissions. By using less fertilizers you are limiting the emissions of NO_x .

60. A. Depending on your location the nitrate in water can be from sewage disposal systems, livestock facilities, fertilized croplands, parks, golf courses, lawns, gardens, etc.

Most likely nitrate is from fertilizer runoff.

B. "Nitrate transforms into nitrite during the digestive system." This oxidizes the iron in red blood cells, and causes cells to lack the ability to carry significant oxygen, causing "the veins and skin to appear blue."

C. "The EPA has adopted the 10 mg/L standard as the maximum contaminant level for nitrate-nitrogen and 1 mg/L for nitrite-nitrogen for regulated public water systems."

D. Nitrite inhibits the hemoglobin, which, as explained above, stops cells from carrying sufficient oxygen to the body.

Citation:

<http://www.water-research.net/nitrate.htm>