Acid base reactions worksheet pdf

Acids and bases both have the ability to conduct electricity, and when both of them are dissolved in water they form ions that make the water more conductive. When disassociated in water, both acids and bases become neutralized. Acids and bases are two types of solutions that have different, distinct properties. Acids and bases can, in a sense, be thought of as opposites, because they can cancel each other out when one is added to the other. The acids and bases are quantified on a scale called the pH scale. On the pH scale, seven is neutral and any solution above seven is a base and any below seven is an acid. The further away from seven a solution is, the more acidic or basic it is.When placed on skin, acids tend to burn and create irritation, while bases just feel slippery. Naturally occurring acids taste sour, such as citrus fruit, and bases taste bitter. On an atomic level, acids like to give off protons, and bases like to receive protons.While the two types of solutions can be seen as opposites, they both share one very important and useful property. When acids and bases are dissociated in water, they form ions and make the water more conductive. When a drink claims it has electrolytes, this means that either an acid or a base was dissociated into that solution. The molecular formula of methanol is CH_3OH. It behaves as a very weak acid when compared to water, which is neutral. It is an industrial alcohol and not for consumption. Consumption of methanol can lead to blindness. The pKa value of CH_3OH is more than 15. This is a constant that measures the amount of acidic or basic ions in a solution. The weak acidity of methanol is due to the presence of the CH_3 functional group. The presence of the OH group can cause it to release OH negative ions in a solution of water. This gives it the properties of a base. Thus, CH_3OH is an alcohol that can have weak acidic and basic properties as well. Maartje van Caspel/E+/Getty Images Mixing a base with an acid results in a chemical reaction called neutralization. The result is a perfectly balanced solution of salt and water with a pH of 7 if the acid and base are balanced properly. Depending on the bases and acids used, it can be a dangerous experiment. Mixing an acid and a base results in neutralization, but the results are potentially dangerous. No matter which acid or base is used, the resulting solution is water and varying types of salt. The process of neutralization often involves the substances heating up when they come together. If the solution heats up too much or too fast, a violent explosion or the creation of harmful or flammable gases is a possibility. This occurs when the chemicals are mixed too quickly, the acid and base are too strong or if there is no available salt to be made in the solution. A mild example of this is when baking soda (a base) is mixed with vinegar (an acid). The solution bubbles out of control when the substances meet. Since acids and bases are often caustic and harmful to body tissues, the experiment is dangerous for people who are using unfamiliar chemicals. NH_3, also known as ammonia, is a weak base. It is basic because the molecule reacts with water to form negatively charged ions of OH. Strong bases completely dissociate in reaction to water, but NH_3 retains its original form. A base or alkali is any substance that forms negative OH ions in reaction to water. Acids, by contrast, create positively charged hydrogen ions in reaction to water. Acids and bases also are defined in terms of whether the substance is likely to take or donate electrons when reacting with other substances. Acids take electrons, while bases donate. Rarely, NH_3 may act as a weak acid. For example, ammonia has an acidic reaction with lithium, which forms lithium amide. Acids and bases are similar in that they both release ions into water, change the color of litmus paper, combine with one another to form salts and water, and corrode materials and burn human tissue when used in sufficient strength. They differ in which ions they release in water. Acids release hydrogen ions into water; bases release hydroxide ions into water. Their differing chemical properties are based on this: acids corrode metals when the hydrogen bonds with metal, while the hydroxide ions in bases destroy proteins. Another difference between acids and bases is their taste. Acids taste sour, while bases taste bitter. Because it is not safe to taste chemicals in a laboratory setting, this is not a recommended test to differentiate between acids and bases. Tasting bases is particularly hazardous due to their ability to destroy proteins in the human body. The relative strength of acids and bases is determined by the number of ions in solution, not by how concentrated they are. Differences in acid and base concentration are referred to as dilute or concentrated, not strong or weak. Common strong acids are sulfuric acid, nitric acid and hydrochloric acid; common strong bases are sodium hydroxide and potassium hydroxide. Strong acids and bases corrode materials more quickly due to the larger number of ions available for the reaction. Learn about acids, bases, and pH, including definitions and calculation. In chemistry and cooking, many substances dissolve in water to make it either acidic or basic/alkaline. A basic solution has a pH greater than 7, while an acidic solution has a pH of less than 7. Aqueous solutions with a pH of 7 are considered to be neutral. Acid-base indicators are substances used to determine roughly where a solution falls on the pH scale. An acid-base indicator is either a weak acid or weak base that exhibits a color change as the concentration of hydrogen (H^+) or hydroxide (OH^-) ions changes in an aqueous solution. Acid-base indicators are most often used in a titration to identify the endpoint of an acid-base reaction. They are also used to gauge pH values and for interesting color-change science demonstrations. Also Known As: pH indicator Perhaps the best-known pH indicator is litmus. Thymol Blue, Phenol Red, and Methyl Orange are all common acid-base indicators. Red cabbage can also be used as an acid-base indicator. If the indicator is a weak acid, the acid and its conjugate base are different colors. If the indicator is a weak base, the base, and its conjugate acid display different colors. For a weak acid indicator with the genera formula HIn, equilibrium is reached in the solution according to the chemical equation: $HIn(aq) + H_2O(l) \leftrightarrow In^-(aq) + H_3O^+(aq)$ HIn(aq) is the acid, which is a different color from the base $In^-(aq)$. When the pH is low, the concentration of the hydronium ion H_3O^+ is high and equilibrium is toward the left, producing the color A. At high pH, the concentration of H_3O^+ is low, so equilibrium tends toward the right side of the equation and color B is displayed. An example of a weak acid indicator is phenolphthalein, which is colorless as a weak acid but dissociates in water to form a magenta or red-purple anion. In an acidic solution, equilibrium is to the left, so the solution is colorless (too little magenta anion to be visible), but as pH increases, the equilibrium shifts to the right and the magenta color is visible. The equilibrium constant for the reaction may be determined using the equation: $K_{In} = [H_3O^+][In^-] / [HIn]$ where K_{In} is the indicator dissociation constant. The color change occurs at the point where the concentration of the acid and anion base are equal: $[HIn] = [In^-]$ which is the point where half of the indicator is in acid form and the other half is its conjugate base. A particular type of acid-base indicator is a universal indicator, which is a mixture of multiple indicators that gradually changes color over a wide pH range. The indicators are chosen so mixing a few drops with a solution will produce a color that can be associated with an approximate pH value. Several plants and household chemicals can be used as pH indicators, but in a lab setting, these are the most common chemicals used as indicators: Indicator Acid Color Base Color pH Range pKIn thymol blue (first change) red yellow 1.2 - 2.8 1.5 methyl orange red yellow 3.2 - 4.4 3.7 bromocresol green yellow blue 3.8 - 5.4 4.7 methyl red yellow red 4.8 - 6.0 5.1 bromothymol blue yellow blue 6.0 - 7.6 7.0 phenol red yellow red 6.8- 8.4 7.9 thymol blue (second change) yellow blue 8.0 - 9.6 8.9 phenolphthalein colorless magenta 8.2 -10.0 9.4 The "acid" and "base" colors are relative. Also, note some popular indicators display more than one color change as the weak acid or weak base dissociates more than once. Acid-base indicators are chemicals used to determine whether an aqueous solution is acidic, neutral, or alkaline. Because acidity and alkalinity relate to pH, they may also be known as pH indicators. Examples of acid-base indicators include litmus paper, phenolphthalein, and red cabbage juice. An acid-base indicator is a weak acid or weak base that dissociates in water to yield the weak acid and its conjugate base or else the weak base and its conjugate acid. The species and its conjugate have different colors. The point at which an indicator changes colors is different for each chemical. There is a pH range over which the indicator is useful. So, the indicator that might be good for one solution might be a poor choice to test another solution. Some indicators can't actually identify acids or bases, but can only tell you the approximate pH of an acid or a base. For example, methyl orange only works at an acidic pH. It would be the same color above a certain pH (acidic) and also at neutral and alkaline values. “pH and Water.” U.S. Geological Survey, U.S. Department of the Interior. Here are 10 facts about acids and bases to help you learn about acids, bases, and pH along with a chart for comparison. Any aqueous (water-based) liquid can be classified as an acid, base, or neutral. Oils and other non-aqueous liquids are not acids or bases. There are different definitions of acids and bases, but acids can accept an electron pair or donate a hydrogen ion or a proton in a chemical reaction, while bases can donate an electron pair or accept hydrogen or a proton. Acids and bases are characterized as strong or weak. A strong acid or strong base completely dissociates into its ions in water. If the compound does not completely dissociate, it's a weak acid or base. How corrosive an acid or a base is does not relate to its strength. The pH scale is a measure of the acidity or alkalinity (basicity) or a solution. The scale runs from 0 to 14, with acids having a pH less than 7, 7 being neutral, and bases having a pH higher than 7. Acids and bases react with each other in what is called a neutralization reaction. The reaction produces salt and water and leaves the solution closer to a neutral pH than before. One common test of whether an unknown is an acid or a base is to wet litmus paper with it. Litmus paper is a paper treated with an extract from a certain lichen that changes color according to pH. Acids turn litmus paper red, while bases turn litmus paper blue. A neutral chemical won't change the paper's color. Because they separate into ions in water, both acids and bases conduct electricity. While you can't tell whether a solution is an acid or a base by looking at it, taste and touch may be used to tell them apart. However, since both acids and bases can be corrosive, you shouldn't test chemicals by tasting or touching them! You can get a chemical burn from both acids and bases. Acids tend to taste sour and feel drying or astringent, while bases taste bitter and feel slippery or soapy. Examples of household acids and bases you can test are vinegar (weak acetic acid) and baking soda solution (diluted sodium bicarbonate -- a base). Acids and bases are important in the human body. For example, the stomach secretes hydrochloric acid, HCl, to digest food. The pancreas secretes a fluid rich in the base bicarbonate to neutralize stomach acid before it reaches the small intestine. Acids and bases react with metals. Acids release hydrogen gas when reacted with metals. Sometimes hydrogen gas is released when a base reacts with a metal, such as reacting sodium hydroxide (NaOH) and zinc. Another typical reaction between a base and a metal is a double displacement reaction, which may produce a precipitate metal hydroxide. Characteristic Acids Bases reactivity accept electron pairs or donate hydrogen ions or protons donate electron pairs or donate hydroxide ions or electrons pH less than 7 greater than 7 taste (don't test unknowns this way) sour soapy or bitter corrosivity may be corrosive may be corrosive touch (don't test unknowns) astringent slippery litmus test red blue conductivity in solution conduct electricity conduct electricity common examples vinegar, lemon juice, sulfuric acid, hydrochloric acid, nitric acid bleach, soap, ammonia, sodium hydroxide, detergent Chart Comparing Acids and Bases acid base reactions worksheet answers. acid base reactions worksheet pdf. acid base reactions worksheet organic chemistry. balancing acid base reactions worksheet. bronsted lowry acid base reactions worksheet. ap chemistry acid base reactions worksheet. predicting acid base reactions worksheet. acid-base neutralization reactions worksheet answers