

CHEMISTRY STUDY MATERIALS FOR CLASS 10

(NCERT Based notes of Chapter -02)

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ACIDS, BASES AND SALTS

DILUTION OF ACID AND BASE:

The concentration of hydrogen ion in an acid and hydroxide ion in a base; per unit volume; shows the concentration of acid or base.

By mixing of acid to water, the concentration of hydrogen ion per unit volume decreases. Similarly, by addition of base to water the concentration of hydroxide ion per unit volume decreases. This process of addition of acid or base to water is called dilution and the acid or base is called diluted.

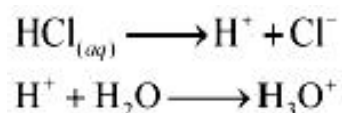
The dilution of acid or base is exothermic. Thus, acid or base is always added to water and water is never added to acid or base. If water is added to a concentrated acid or base a lot of heat is generated, which may cause splashing out of acid or base and may cause severe damage as concentrated acid and base are highly corrosive.

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Question 1: Why do HCl, HNO₃, etc., show acidic characters in aqueous solutions while solutions of compounds like alcohol and glucose do not show acidic character?

Answer : The dissociation of HCl or HNO₃ to form hydrogen ions always occurs in the presence of water. Hydrogen ions (H⁺) combine with H₂O to form hydronium ions (H₃O⁺).

The reaction is as follows:



Although aqueous solutions of glucose and alcohol contain hydrogen, these cannot dissociate in water to form hydrogen ions. Hence, they do not show acidic character.

Question 2: Why does an aqueous solution of an acid conduct electricity?

Answer : Acids dissociate in aqueous solutions to form ions. These ions are responsible for conduction of electricity.

Q 3: Why does dry HCl gas not change the colour of the dry litmus paper?

Answer : Colour of the litmus paper is changed by the hydrogen ions. Dry HCl gas does not contain H^+ ions. It is only in the aqueous solution that an acid dissociates to give ions. Since in this case, neither HCl is in the aqueous form nor the litmus paper is wet, therefore, the colour of the litmus paper does not change.

Question 4: While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid?

Answer : Since the process of dissolving an acid in water is exothermic, it is always recommended that acid should be added to water. If it is done the other way, then it is possible that because of the large amount of heat generated, the mixture splashes out and causes burns.

Question 5: How is the concentration of hydronium ions (H_3O^+) affected when a solution of an acid is diluted?

Answer : When an acid is diluted, the concentration of hydronium ions (H_3O^+) per unit volume decreases. This means that the strength of the acid decreases.

Question 6: How is the concentration of hydroxide ions (OH⁻) affected when excess base is dissolved in a solution of sodium hydroxide?

Answer : The concentration of hydroxide ions (OH⁻) would increase when excess base is dissolved in a solution of sodium hydroxide.

STRENGTH OF ACID AND BASE

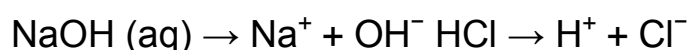
Acids in which complete dissociation of hydrogen ion takes place are called strong acid. Similarly, bases in which complete dissociation of hydroxide ion takes place are called strong base.

In mineral acids, such as hydrochloric acid, sulphuric acid, nitric acid, etc. hydrogen ion dissociates completely and hence they are considered as strong acid. Since, in organic acids hydrogen ions do not dissociate completely, so they are weak acid.

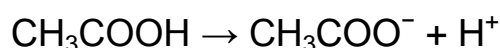
Alkalis are water soluble base, thus in alkali; complete dissociation of hydroxide ions takes place and they are considered as strong base.

The complete dissociation of hydrogen ions or hydroxide ions is shown by a single arrow. The incomplete dissociation of hydrogen ions or hydroxide ions is denoted by double arrow.

Example of complete dissociation:



Example of incomplete dissociation:



Although acetic acid being an organic acid is a weak acid, but concentrated acetic acid is corrosive and can damage the skin if poured over it.
