

CLASS X CASE STUDY BASED QUESTIONS**Case Study Questions****Acids Bases and Salts - 01**

Salt of a strong acid and strong base is neutral with a pH value of 7. NaCl common salt is formed by a combination of hydrochloride and sodium hydroxide solution. This is the salt that is used in food. Some salt is called rock salt, bed of rock salt was formed when seas of bygone ages dried up. The common salt thus obtained is an important raw material for various materials of daily use, such as sodium hydroxide, baking soda, washing soda, and bleaching powder.

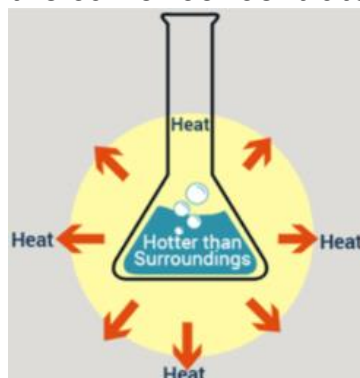
- If given acids are phosphoric acid, carbonic acid, hydrochloric acid and sulphuric acid, then which acid does not form an acidic salt?
- What is the formula of baking soda?
- Name the substance which on treatment with chlorine to obtain bleaching powder.
- Which salt is used for removing the permanent hardness of water?

Answer Key:

- Carbonic acid does not form an acidic salt.
- Sodium bicarbonate, commonly known as baking soda or bicarbonate of soda, is a chemical compound with the formula NaHCO_3 .
- Ca(OH)_2 treatment with chlorine to obtain bleaching powder.
$$\text{Ca(OH)}_2 + \text{Cl}_2 \rightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$$
- Washing soda is used for removing the permanent hardness of the water.

Case Study Questions**Acids Bases and Salts - 02**

The dissolving of an acid or a base in water is a highly exothermic reaction. Care must be taken while mixing concentrated nitric acid or sulphuric acid with water. The acid must always be added slowly to water with constant stirring. If water is added to a concentrated acid, the heat generated may cause the mixture to splash out and cause burns. The glass container may also break due to excessive local heating. Look out for the warning sign on the can of concentrated sulphuric acid and on the bottle of sodium hydroxide pellets.



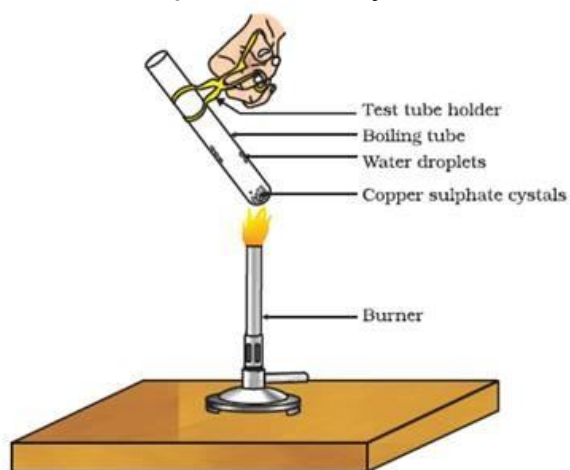
- i. What is the exothermic reaction?
- ii. Write an example of an exothermic reaction.
- iii. How will you obtain sulphuric acid from an acidic oxide?
- iv. While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid ?

Answer Key:

- i. An exothermic reaction is a chemical reaction that releases energy through light or heat.
- ii. Mixing of acid with water is a highly exothermic reaction.
- iii. When sulphur trioxide (acidic oxide) is dissolved in water, an exothermic reaction takes place with the formation of sulphuric acid.
$$\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$$
- iv. 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.

Case Study Questions**Acids Bases and Salts - 03**

Copper sulphate crystal contains water of crystallisation when the crystal is heated the water is removed and salt turns white. The crystal can be moistened again with water. The water of crystallisation is the fixed number of water molecules present in 1 formula unit of copper sulphate. On heating gypsum at 373K, it loses water molecules and became calcium sulphate hemihydrate.



- i. If the crystal is moistened with water, then which colour of the crystal reappears?
- ii. What is the commercial name of calcium sulphate hemihydrate?
- iii. How many water molecules are present in one formula unit of copper sulphate?
- iv. What is obtained when gypsum is heated at 373K?

Answer Key:

- i. If the crystal is moistened with water, then the blue colour of the crystal reappears.

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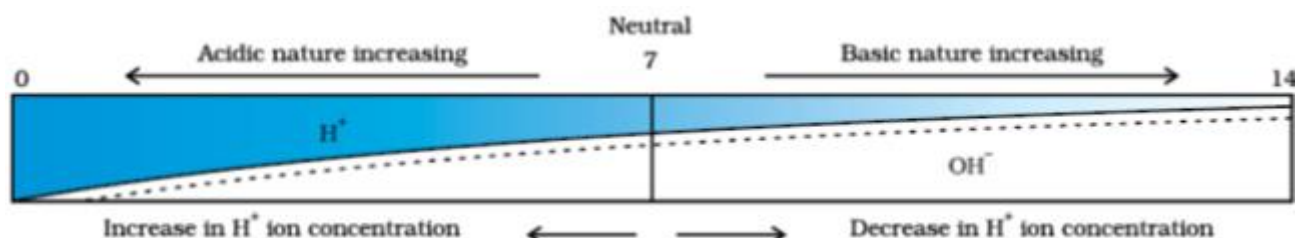
- ii. The commercial name of calcium sulphate hemihydrate is Plaster of Paris.
- iii. Five water molecules are present in one formula unit of copper sulphate.
- iv. $\text{CaSO}_4 \cdot 12\text{H}_2\text{O}$ is obtained when gypsum is heated at 373K.

Heating gypsum at 373K results in loss of water of crystallization, forming plaster of Paris as the product.

Case Study Questions

Acids Bases and Salts - 04

A scale for measuring hydronium ion in a solution is called the pH scale. The pH of a neutral solution is 7. A value of less than 7 on the pH scale represents an acidic solution. As the pH value, increases from 7 to 14 it represents OH^- ion concentration in solution i.e a basic solution.



- i. What is the pH range of the Human Body?
- ii. The strength of acid and bases depends on which factor?
- iii. If the pH of soil X is 7.5 while that of soil Y is 4.5, then which soil should be treated with powdered chalk to adjust its pH?
- iv. Tooth decay starts when the pH of the mouth is lower than which pH?

Answer Key:

- i. The pH range of the Human Body is 7 to 7.8.
- ii. The strength of acids and bases depends on the number of H^+ ions produced and the number of OH^- ions produced.
- iii. Soil Y is acidic. Hence, it should be treated with powdered chalk to reduce its acidity.
- iv. When the pH in the mouth falls below 5.5, tooth decay starts. Bacteria present in the mouth produce acid by degradation of sugar and food particles which remain in the mouth after eating.

Case Study Questions

Acids Bases and Salts - 05

The strength of acid and base depends on the number of H^+ and the number of OH^- respectively. If we take hydrochloric acid and acetic acid of the same concentration, say one molar, then these produce different amounts of hydrogen ions. Acids that give rise to more H^+ ions are said to be strong acids, and acids that give less H^+ ions are said to be

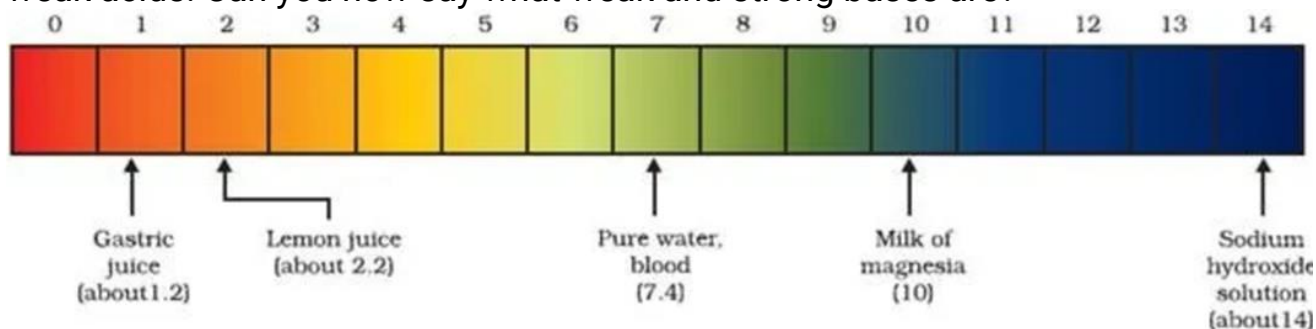
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weak acids. Can you now say what weak and strong bases are?



- Fresh milk has a pH of 6. How do you think the pH will change as it turns into curd?
- Is Gastric juice a weak acid?
- Milk of magnesia is an acid or base? For what purpose it can be used?
- What is the pH value of saliva after the meal?

Answer Key:

- The pH of milk is 6. As it changes to curd, the pH will reduce because curd is acidic in nature. The acids present in it decrease the pH.
- Yes, gastric juice is a weak acid.
- Milk of magnesia is a base and it can be used as an antacid.
- The pH value of saliva after the meal is 5.8.