

## Acids, Bases and Salts

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### Assertion & Reason Type Questions

**Directions:** Each of the following questions consists of two statements, one is Assertion (A) and the other is Reason (R). Give answer:

- a. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- b. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
- c. Assertion (A) is true but Reason (R) is false.
- d. Assertion (A) is false but Reason (R) is true.

**Q1. Assertion (A):** Bases change red litmus solution into blue litmus solution.

**Reason (R):** Bases give hydroxide ions in aqueous solution.

**Answer :** (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

**Q2. Assertion (A):** Clove oil is an olfactory indicator.

**Reason (R):** Smell of clove can be characterised in acidic medium, but it cannot be recognised in basic medium.

**Answer :** (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

**Q3. Assertion (A):** Non-metallic oxides react with bases to form salt and water.

**Reason (R):** Non-metallic oxides are acidic in nature.

**Answer :** (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

**Q4. Assertion (A):** Hydrochloric acid is a stronger acid than acetic acid.

**Reason (R):** On dissociation, hydrochloric acid yields lesser hydrogen ions for the same concentration as compared to acetic acid.

**Answer :** (c) Reason (R) is false because on dissociation, HCL yields more hydrogen ion for the same concentration as compared to acetic acid.



**Q5. Assertion (A):** Strength of acid or base decreases with dilution.

**Reason (R):** Ionisation of an acid or a base increase with dilution.

**Answer :** (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

**Q6. Assertion (A):** To dilute concentrated sulphuric acid, water is added to the acid slowly.

**Reason (R):** A lot of heat energy will be given out in the dilution of concentrated sulphuric acid.

**Answer :** (d) Assertion (A) is false because to dilute concentrated sulphuric acid, acid must always be added slowly to water with constant stirring.

**Q7. Assertion (A):** Sodium hydrogen carbonate is used as an ingredient in antacids.

**Reason (R):**  $\text{NaHCO}_3$  is a mild non-corrosive basic salt.

**Answer :** (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

**Q8. Assertion (A):** During electrolysis of concentrated aqueous solution of sodium chloride, chlorine gas is given off at the cathode and hydrogen gas at the anode.

**Reason (R):** Ions in electrolytes are attracted to the oppositely charged electrodes.

**Answer :** (d) Assertion is false because in this process, chlorine is given off at anode and hydrogen gas at cathode.

**Q9. Assertion (A):** Plaster of Paris should be stored in a moisture proof container.

**Reason (R):** Plaster of Paris is a powdery mass that absorbs water to form a hard solid, gypsum.

**Answer :** (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

**Q10. Assertion (A) :** The acid must always be added to water with constant stirring.

**Reason (R) :** Mixing of an acid with water decreases the concentration of  $\text{H}^+$  ions per unit volume.

**Answer :** (b)

**Q11. Assertion (A) :** Copper sulphate crystals are wet because it contains water of crystallisation.

**Reason (R) :** Water of crystallisation is the fixed number of molecules of water present in one formula unit of salt.

**Answer :** (d) The Assertion is false. Copper sulphate is not wet. It is an hydrated salt, as it contains water molecules.

**Q12. Assertion (A) :** The aqueous solutions of glucose and alcohol do not show acidic character.

**Reason (R) :** Aqueous solutions of glucose and alcohol do not give  $H^+$  ions.

**Answer :** (a)

**Q13. Assertion (A) :** HCl gas does not change the colour of dry blue litmus paper.

**Reason (R) :** HCl gas dissolves in the water present in wet litmus paper to form  $H^+$  ions.

**Answer :** (a)

**Q14. Assertion (A) :** Weak acids have low electrical conductivity.

**Reason (R) :** Strong acids and weak acids have equal concentration of hydrogen ions in their solutions.

**Answer :** (c)

**Q15. Assertion (A) :** Pure water is neither acidic nor basic.

**Reason (R) :** The pH of a solution is inversely proportional to the concentration of hydrogen ions in it.

**Answer :** (b)

**Q16. Assertion (A) :** During electrolysis of concentrated aqueous solution of sodium chloride, hydrogen is produced at anode and chlorine gas is produced at cathode.

**Reason (R) :** Ions get attracted to oppositely charged electrodes.

**Answer :** (d)



**Q17. Assertion (A) :** Baking powder is used in making cake instead of using only baking soda.

**Reason (R) :** Baking powder contains tartaric acid which reacts with sodium carbonate and removes bitter taste.

**Answer :** (a)

**Q18. Assertion (A) :** The chemical formula of bleaching powder is  $\text{CaOCl}$ .

**Reason (R) :** Calcium oxide reacts with chlorine to form bleaching powder.

**Answer :** (c)

**Q19. Assertion (A):** Plaster of Paris is stored in a moisture proof container.

**Reason (R) :** Plaster of Paris sets into a hard mass on wetting with water to form anhydrous calcium sulphate.

**Answer :** (c)

**Q20. Assertion (A):** The chemical name of bleaching powder is calcium oxychloride.

**Reason (R) :** Bleaching powder is used as an oxidising agent in chemical industries.

**Answer :** (b)

**Q21. Assertion:** The process of dissolving an acid or a base in water is highly exothermic reaction.

**Reason (R) :** Water must always be added slowly to acid with constant stirring.

**Answer : (c)** The process of dissolving an acid or a base in water is highly exothermic reaction. Acid must always be added slowly to water with constant stirring.

**Q22. Assertion (A) :** Phenolphthalein is an acid-base indicator.

**Reason (R) :** Phenolphthalein gives different colours in acidic and basic medium.

**Answer : (a)**

**Q23. Assertion:** Calcium sulphate hemihydrate,  $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$  is called plaster of Paris.

**Reason (R) :** Plaster of Paris is used for producing moulds for pottery and ceramics and casts of statues.

**Answer : (b)**

**Q24. Assertion (A) :**  $\text{pH} = 7$  signifies pure water.

**Reason (R) :**  $\text{pH}$  of acetic acid is greater than 7.

**Answer : (c)**  $\text{pH}$  of acetic acid is less than 7.

**Q25. Assertion (A) :**  $\text{HCl}$  is a stronger acid than acetic acid.

**Reason (R) :** On dissociation,  $\text{HCl}$  yields lesser hydrogen ions for the same concentration as compared to acetic acid.

**Answer : (c)** On dissociation,  $\text{HCl}$  yields more hydrogen ions for the same concentration as compared to acetic acid.

**Q26. Assertion (A) :**  $\text{pH}$  of ammonium nitrate solution is acidic.

**Reason (R) :** Solution of a salt of weak base and strong acid is acidic.

**Answer : (a)** Ammonium nitrate is a salt of ammonium hydroxide (weak base) and nitric acid (strong acid).

**Q27. Assertion (A) :** Phosphoric acid is a weak acid.

**Reason :** Phosphoric acid when dissolved in water dissociates partially and produces very little  $\text{H}^+$  ions.

**Answer : (a)**

**Q28. Assertion (A) :** Antacids neutralize the effect of extra acid produced in the stomach during indigestion and thus provide relief.

**Reason (R) :** Antacids are mild bases.

**Answer : (a)**



**Q29. Assertion (A) :** Acetic acid does not act as an acid in benzene solution.

**Reason (R) :** Benzene is non-polar.

**Answer : (a)** For ionization of an acid, polar solvents (like water) are required.

As ionization does not take place in non-polar solvents (like benzene) so acetic acid does not act as an acid.

**Q30. Assertion (A) :** Bleaching powder reacts with dilute acids to evolve chlorine.

**Reason (R) :** The chlorine liberated by the action of dilute acids on bleaching powder is called available chlorine.

**Answer : (b)**

**Q31. Assertion (A) :** Sodium carbonate pentahydrate is also known as washing soda.

**Reason (R) :** Chief raw materials for the manufacture of washing soda are  $\text{NH}_3$ ,  $\text{NaCl}$  and  $\text{CaCO}_3$ .

**Answer : (d)**

**Q32. Assertion (A) :** Common salt is used for the preparation of many chemicals such as sodium hydroxide, bleaching powder, baking soda, washing soda etc.

**Reason :** Main source of sodium chloride is sea water.

**Answer : (b)**

**Q33. Assertion (A) :**  $\text{AlCl}_3$  is a basic salt.

**Reason (R) :**  $\text{AlCl}_3$  is a salt of strong acid and a weak base.

**Answer : (d)**

**Q34. Assertion (A) :** Baking soda is prepared by chlor-alkali process.

**Reason (R) :** Brine decomposes to sodium hydroxide on passing electricity through it.

**Answer : (d)**



**Q35. Assertion (A) :** Salt of  $\text{KNO}_3$  is formed by strong base and weak acid.

**Reason (R) :** Salt of  $\text{NH}_4\text{Cl}$  is formed by weak base and strong acid.

**Answer :** (d)

**Q36. Assertion (A) :** Strength of the acid or base decreases with dilution.

**Reason (R) :** Ionization of an acid or a base increases with dilution.

**Answer :** (b)

**Q37. Assertion (A) :** Higher the  $\text{H}^+$  ion concentration, lower is the pH value.

**Reason (R) :** The pH of a neutral solution = 7, that of a basic solution  $< 7$  and that of an acidic solution  $> 7$ .

**Answer :** (c)

**Q38. Assertion (A) :**  $\text{CH}_3\text{COOH}$  is used as vinegar in cooking and food preservatives.

**Reason (R) :** Strong acids are those acids which ionise almost completely in aqueous solution and hence produce a large amount of  $\text{H}^+$  ions.

**Answer :** (b)

**Q39. Assertion (A) :** Tooth decay starts when the pH of the mouth is lower than 5.5.

**Reason (R) :** Enamel starts corroding below 5.5 pH.

**Answer :** (a)

