Class 10 Science · Chapter 2: Acids, Bases and Salts

Answer key and marking scheme · 20 marks · about 40 minutes · based on NCERT

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1. Which of the following is NOT a use of bleaching powder? [1]

(a) Supporting fractured bones in the right position
(b) Making drinking water free from germs
(c) Acting as an oxidising agent in chemical industries
(d) Bleaching cotton and linen in the textile industry

Answer: (a) Bleaching powder bleaches cotton and linen, disinfects drinking water and serves as an oxidising agent. Supporting fractured bones is a use of Plaster of Paris.

2. Litmus solution is added to a sample that is neither acidic nor basic. The colour of the litmus is [1]

(a) red
(b) blue
(c) purple
(d) colourless

Answer: (c) Litmus solution is purple when the solution is neither acidic nor basic; red and blue are its colours in acid and in base.

3. Carbon dioxide turns lime water milky. The milkiness is due to the formation of [1]

(a) calcium hydrogencarbonate
(b) calcium carbonate
(c) calcium oxide
(d) calcium chloride

Answer: (b) Carbon dioxide reacts with calcium hydroxide to form calcium carbonate, which is insoluble and makes the lime water milky. Calcium hydrogencarbonate is soluble.

4. Rain water collected in an industrial town has a pH of 4.8. Which statement about it is correct? [1]

(a) It is neutral rain because its pH is close to 7.
(b) It is acid rain, but it does not affect aquatic life.
(c) It is basic rain, and it makes river water alkaline.
(d) It is acid rain, and its flow into rivers lowers the pH of the river water.

Answer: (d) Rain water with a pH below 5.6 is acid rain. Flowing into rivers it lowers their pH and makes survival of aquatic life difficult, which rules out option (b).

5. Which of the following is a synthetic indicator? [1]

(a) Turmeric
(b) Red cabbage extract
(c) Methyl orange
(d) Litmus

Answer: (c) Methyl orange is made synthetically. Turmeric, red cabbage extract and litmus are obtained from natural sources.

6. Kabir is stung by a honeybee while gardening. What kind of substance does the sting inject, and why does applying baking soda to the spot give relief? [2]

The bee sting injects an acid, which causes pain and irritation. Baking soda is a mild base; it neutralises the acid, so the pain and irritation lessen.

- the sting injects an acid (1)
- baking soda is a mild base that neutralises the acid (1)

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7. Soil tests on a farm near Shillong show that the soil is too acidic. Why must the farmer correct it, and name two substances that can be added to do so. [2]

Plants need a specific pH range for healthy growth, so soil that is too acidic must be corrected. Adding a base neutralises the excess acid; quick lime (calcium oxide), slaked lime (calcium hydroxide) or chalk (calcium carbonate) can be used.

- plants grow well only within a specific pH range (1)
- names any two of quick lime, slaked lime, chalk (1)

8. Define water of crystallisation. Crystals of washing soda contain ten water molecules per formula unit, yet they feel dry. Why? [2]

Water of crystallisation is the fixed number of water molecules present in one formula unit of a salt. In $Na_2CO_3 \cdot 10H_2O$ this water is chemically combined within the crystal, not held as free liquid on its surface, so the crystals are dry to the touch.

- defines water of crystallisation as a fixed number of water molecules in one formula unit of a salt (1)
- the water is chemically combined in the crystal, not free liquid, so the crystals are dry (1)

9. (a) Name the acid produced in the stomach and state its role. (b) How does an antacid relieve indigestion? Name one antacid. (c) Why must the body's pH stay within a narrow range? [3]

(a) The stomach produces hydrochloric acid, which helps in the digestion of food. (b) During indigestion the stomach produces too much acid; an antacid is a mild base that neutralises the excess acid. Example: milk of magnesia, $Mg(OH)_2$, or baking soda. (c) The human body works within a narrow pH range of 7.0 to 7.8, and living organisms survive only within a narrow range of pH change.

- hydrochloric acid, helps digest food (1)
- antacid is a base that neutralises excess acid, with one example (1)
- body works within pH 7.0 to 7.8; organisms survive only in a narrow range (1)

10. (a) Write the balanced equation for the reaction of zinc with sodium hydroxide solution on warming, and name the salt formed. (b) Zinc oxide reacts with both hydrochloric acid and sodium hydroxide to give a salt and water. What is such an oxide called? Write the equation for its reaction with hydrochloric acid. [3]

(a) $Zn + 2NaOH \rightarrow Na_2ZnO_2 + H_2$; the salt is sodium zincate, and hydrogen gas is released. (b) An oxide that reacts with both acids and bases to give salt and water is an amphoteric oxide. $ZnO + 2HCl \rightarrow ZnCl_2 + H_2O$.

- balanced equation and names sodium zincate (1)
- amphoteric oxide (1)
- $ZnO + 2HCl \rightarrow ZnCl_2 + H_2O$ (1)

11. State whether the aqueous solution of each salt is acidic, basic or neutral, naming the acid and the base from which it is formed: (a) potassium sulphate (b) sodium acetate (c) sodium hydrogencarbonate. [3]

(a) Potassium sulphate: from sulphuric acid and potassium hydroxide, a strong acid and a strong base, so neutral. (b) Sodium acetate: from acetic acid, a weak acid (it gives far fewer hydrogen ions than hydrochloric acid of the same concentration), and sodium hydroxide, a strong base, so basic. (c) Sodium hydrogencarbonate: from carbonic acid, a weak acid, and sodium hydroxide, a strong base, so basic; it is a mild basic salt.

- potassium sulphate: H_2SO_4 and KOH, neutral (1)
- sodium acetate: CH_3COOH (weak acid) and NaOH (strong base), basic (1)
- sodium hydrogencarbonate: H_2CO_3 and NaOH, basic (1)

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