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Acids, Bases and Salts — CBSE Class 10 Science Chapter Test

FREE CHAPTER TEST · CLASS X · SCIENCE (086) · PATTERN OF THE CBSE SAMPLE QUESTION PAPER 2026-27

TIME ALLOWED	MAXIMUM MARKS	QUESTIONS	NAME / ROLL NO.
1½ hours	40	20 (A 10 · B 4 · C 3 · D 1 · E 2)	

GENERAL INSTRUCTIONS

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 20 questions. All questions are compulsory.
2. This question paper is divided into five sections: A, B, C, D and E.
3. In Section A, Questions 1 to 8 are multiple choice questions (MCQs) and Questions 9 and 10 are assertion-reason based questions of 1 mark each.
4. In Section B, Q11–14 are very short answer (VSA) type questions, carrying 2 marks each.
5. In Section C, Q15–17 are short answer (SA) type questions, carrying 3 marks each.
6. In Section D, Q18 is a long answer (LA) type question, carrying 5 marks.
7. In Section E, Q19–20 are case study based questions, carrying 4 marks each, with sub-parts of the values of 1, 1 and 2 marks.
8. There is no overall choice. However, an internal choice has been provided in 1 question of Section B, 1 question of Section C, 1 question of Section D and in the 2-mark sub-part of each question of Section E.
9. Use of calculators is not allowed.
10. This chapter test follows the section structure, question types and marks per question of the CBSE Class X Science (086) Sample Question Paper 2026-27, at about half the length of the 80-mark board paper: 40 marks in 1½ hours.
11. The answer key and the marking scheme are at the end of this booklet. Attempt the paper in 1½ hours before you look at them.

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Chapter: Acids, Bases and Salts · **Topics:** Acids and bases in water · Indicators · Reactions of acids and bases · Neutralisation · pH scale · Importance of pH · Salts and their solutions · Chlor-alkali process · Bleaching powder, baking soda, washing soda, plaster of Paris

SECTION A

This section comprises 10 questions of 1 mark each: 8 multiple choice questions (MCQs) and 2 assertion-reason based questions.

1. A few drops of phenolphthalein are added to dilute sodium hydroxide solution, and dilute hydrochloric acid is then added drop by drop until it is in excess. The colour of the solution changes from 1

(A) colourless to pink (B) pink to blue

(C) pink to colourless (D) yellow to red

2. Zinc granules react with dilute hydrochloric acid. The gas given off and its test are 1

(A) hydrogen; it burns with a pop sound (B) oxygen; it relights a glowing splinter

(C) carbon dioxide; it turns lime water milky (D) chlorine; it bleaches moist litmus

3. Four solutions P, Q, R and S have pH 2, 6, 9 and 12 respectively. The solution with the highest concentration of hydrogen ions is 1

(A) Q (B) R

(C) S (D) P

4. The chemical formula of plaster of Paris is 1

(A) $CaSO_4 \cdot 2H_2O$ (B) $CaSO_4 \cdot \frac{1}{2}H_2O$

(C) $CaSO_4$ (D) $CaOCl_2$

5. Tooth decay starts when the pH of the mouth falls below about 1

(A) 7.0 (B) 5.5

(C) 8.5 (D) 3.0

6. Which of the following salts gives a basic solution in water? 1

(A) Sodium chloride (B) Ammonium chloride

(C) Potassium sulphate (D) Sodium carbonate

7. When electricity is passed through an aqueous solution of sodium chloride (brine), the products are 1

(A) sodium hydroxide, chlorine and hydrogen (B) sodium, chlorine and oxygen

(C) sodium hydroxide, oxygen and hydrogen (D) sodium carbonate, chlorine and hydrogen

8. A bee sting injects an acid that causes pain and irritation. The best substance to apply to the stung area is 1

(A) vinegar (B) lemon juice

(C) baking soda solution (D) common salt solution

9. **Assertion (A):** A dilute acid is prepared by adding the concentrated acid slowly to water with constant stirring, and not water to the concentrated acid. 1

Reason (R): Dissolving an acid in water is a highly exothermic process.

(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.

10. **Assertion (A):** Dry hydrogen chloride gas does not change the colour of dry blue litmus paper. 1

Reason (R): Hydrogen chloride produces hydrogen ions even in the absence of water.

(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.

SECTION B

This section comprises 4 very short answer (VSA) type questions of 2 marks each.

11. (a) Write the balanced equation for the action of heat on sodium hydrogencarbonate (baking soda). Why does baking powder contain a mild edible acid such as tartaric acid besides baking soda? 2

OR

(b) How is washing soda obtained from sodium carbonate? Write the equation and give two uses of washing soda.

12. Write balanced equations for the reactions of dilute hydrochloric acid with (i) sodium carbonate and (ii) copper(II) oxide, and state what is observed in each. 2

13. Hydrochloric acid, glucose and alcohol all contain hydrogen. Why does a solution of hydrochloric acid conduct electricity while solutions of glucose and alcohol do not? Which ion is common to all acids in water? 2

14. Blue copper sulphate crystals are heated in a dry boiling tube. (i) What change in colour is seen, and why? (ii) What happens when a few drops of water are added to the cooled product? (iii) How many molecules of water of crystallisation are there in one formula unit of copper sulphate crystals and of gypsum? 2

SECTION C

This section comprises 3 short answer (SA) type questions of 3 marks each.

15. (a) (i) Write the balanced equation for the electrolysis of brine (the chlor-alkali process). (ii) Name the product formed at the anode and at the cathode. (iii) Give one use of each of the three products. 3

OR

(b) (i) How is bleaching powder made? Write the equation. (ii) Name the compound present in bleaching powder. (iii) Give two uses of bleaching powder.

16. Dilute hydrochloric acid is added to marble chips (calcium carbonate), and the gas formed is passed through lime water. (i) Write the equation for the reaction of the acid with marble. (ii) Write the equation that explains why the lime water turns milky. (iii) What happens if the gas is passed through for a long time? Write the equation. 3

17. Explain the importance of pH in each case: (i) a person suffering from indigestion takes milk of magnesia; (ii) farmers sometimes add quicklime or slaked lime to their fields; (iii) aquatic life in rivers is harmed when rain water has a pH below 5.6. 3

SECTION D

This section comprises 1 long answer (LA) type questions of 5 marks each.

18. (a) Five solutions P, Q, R, S and T were tested with universal indicator and showed pH values of 3, 13, 7, 9 and 5 respectively. 5

(i) Which solution is neutral?

(ii) Which is strongly alkaline and which is strongly acidic?

(iii) Which is weakly acidic and which is weakly alkaline?

(iv) Arrange the five in increasing order of hydrogen ion concentration.

(v) If solution P is diluted with water, will its pH increase or decrease? Give a reason.

OR

(b) (i) How is plaster of Paris prepared? Write the equation, with the temperature. (ii) What happens when it is mixed with water? Write the equation. (iii) Why must it be stored in a moisture-proof container? (iv) Give two uses.

SECTION E

This section comprises 2 case study based questions of 4 marks each, with sub-parts of 1, 1 and 2 marks.

19. A student tested four liquids — dilute hydrochloric acid, dilute sodium hydroxide, vinegar and soap solution — with litmus, phenolphthalein, methyl orange and turmeric. She also used finely chopped onion as an indicator.

(i) What colour does phenolphthalein show in dilute sodium hydroxide solution? [1]

(ii) What colour does methyl orange show in dilute hydrochloric acid? [1]

(iii) A cloth strip kept with chopped onion is dipped in dilute hydrochloric acid and another in dilute sodium hydroxide. What does she observe on smelling them? What name is given to such indicators? [2]

OR

(iii) A yellow stain of curry on a white cloth turns reddish-brown when soap is scrubbed on it. Explain why, and say what happens when the cloth is washed with plenty of water. [2]

20. Rohan often has a burning feeling in his stomach after a heavy meal. His doctor tells him that this is due to excess acid in the stomach and suggests an antacid tablet containing magnesium hydroxide.

(i) Name the acid produced in the human stomach. [1]

(ii) How does the antacid relieve the burning feeling? [1]

(iii) Write the balanced equation for the reaction of magnesium hydroxide with the stomach acid, and name the type of reaction. [2]

OR

(iii) Some antacids contain sodium hydrogencarbonate instead. Write the balanced equation for its reaction with the stomach acid, and name the gas formed. [2]

END OF THE QUESTION PAPER

ANSWER KEY — SECTION A

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
(C)	(A)	(D)	(B)	(B)	(D)	(A)	(C)	(A)	(C)

MARKING SCHEME AND WORKED SOLUTIONS

Marks for each step are shown in brackets, as in the CBSE marking scheme. Any correct alternative method earns full marks.

Q1. Answer (C). Phenolphthalein is pink in the base; once the acid has neutralised all the base and is in excess, it turns colourless.

Q2. Answer (A). $Zn + 2HCl \rightarrow ZnCl_2 + H_2$; hydrogen burns with a pop sound when a burning candle is brought near it.

Q3. Answer (D). The lower the pH, the higher the hydrogen ion concentration: P (pH 2).

Q4. Answer (B). Plaster of Paris is calcium sulphate hemihydrate, $CaSO_4 \cdot \frac{1}{2}H_2O$; $CaSO_4 \cdot 2H_2O$ is gypsum and $CaOCl_2$ is bleaching powder.

Q5. Answer (B). Below pH 5.5 the acid formed by bacteria from food particles starts to corrode tooth enamel.

Q6. Answer (D). Sodium carbonate comes from a strong base (NaOH) and a weak acid (carbonic acid), so its solution is basic. NaCl and K_2SO_4 are neutral and NH_4Cl is acidic.

Q7. Answer (A). $2NaCl + 2H_2O \rightarrow 2NaOH + Cl_2 + H_2$ (the chlor-alkali process): chlorine at the anode, hydrogen at the cathode, sodium hydroxide near the cathode.

Q8. Answer (C). The sting contains methanoic acid; a mild base such as baking soda neutralises it. Vinegar and lemon juice are acids; salt solution is neutral.

Q9. Answer (A). Both true; because so much heat is released, adding water to concentrated acid can make the mixture splash out and the glass crack. R explains A: answer (A).

Q10. Answer (C). A is true; R is false: HCl forms H^+ ions only in the presence of water, which is why the dry gas does not act as an acid. Answer (C).

Q11. (2 marks) Answer: (a) $2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$; the acid stops bitter sodium carbonate being left; (b) $Na_2CO_3 + 10H_2O \rightarrow Na_2CO_3 \cdot 10H_2O$; any two uses.
(a) $2NaHCO_3 \xrightarrow{\text{heat}} Na_2CO_3 + H_2O + CO_2$ [1]
On heating, baking soda alone leaves sodium carbonate, which gives the cake a bitter taste; the acid reacts with the baking soda to give carbon dioxide (which makes the cake soft and spongy) without leaving sodium carbonate. [1]
OR (b) Sodium carbonate is recrystallised (from its solution in water): $Na_2CO_3 + 10H_2O \rightarrow Na_2CO_3 \cdot 10H_2O$ [1]
Uses (any two): in the glass, soap and paper industries; for removing the permanent hardness of water; as a cleaning agent at home; for making borax. [1]

Q12. (2 marks) Answer: (i) $Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$, effervescence; (ii) $CuO + 2HCl \rightarrow CuCl_2 + H_2O$, blue-green solution.
(i) $Na_2CO_3(s) + 2HCl(aq) \rightarrow 2NaCl(aq) + H_2O(l) + CO_2(g)$; brisk effervescence (bubbles of carbon dioxide). [1]
(ii) $CuO(s) + 2HCl(aq) \rightarrow CuCl_2(aq) + H_2O(l)$; the black powder dissolves and the solution turns blue-green. [1]

Q13. (2 marks) Answer: Only HCl gives ions in water; H^+ (H_3O^+).
In water HCl separates into ions (H^+ and Cl^-), which carry the current; glucose and alcohol do not form ions in water, so their solutions do not conduct. [1]
All acids give hydrogen ions, H^+ (present as hydronium ions, H_3O^+). [1]

Q14. (2 marks) Answer: (i) blue to white, water lost; (ii) blue again; (iii) 5 and 2.
(i) They turn white, because the water of crystallisation is driven off. (ii) The blue colour comes back as the salt takes up water again. [1]
(iii) Copper sulphate $CuSO_4 \cdot 5H_2O$ has 5; gypsum $CaSO_4 \cdot 2H_2O$ has 2. [1]

Q15. (3 marks) Answer: (a) $2NaCl + 2H_2O \rightarrow 2NaOH + Cl_2 + H_2$; Cl_2 anode, H_2 cathode; one use each; (b) $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$; calcium oxychloride; two uses.
(a) (i) $2NaCl(aq) + 2H_2O(l) \rightarrow 2NaOH(aq) + Cl_2(g) + H_2(g)$ [1]
(ii) Chlorine gas at the anode; hydrogen gas at the cathode (sodium hydroxide solution forms near the cathode). [1]
(iii) Hydrogen: fuels, margarine, ammonia for fertilisers; chlorine: water treatment, PVC, pesticides; sodium hydroxide: soaps and detergents, paper making, de-greasing metals (one each). [1]
OR (b) (i) Chlorine is passed over dry slaked lime: $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$ [1]
(ii) Bleaching powder is calcium oxychloride, $CaOCl_2$. [1]
(iii) Uses (any two): bleaching cotton and linen in the textile industry and wood pulp in paper factories; bleaching washed clothes in laundry; as an oxidising agent in industry; disinfecting drinking water. [1]

Q16. (3 marks) Answer: (i) $CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$; (ii) $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$; (iii) clears, $CaCO_3 + H_2O + CO_2 \rightarrow Ca(HCO_3)_2$.
(i) $CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$ [1]
(ii) $Ca(OH)_2(aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l)$; the white precipitate of calcium carbonate makes it milky. [1]
(iii) The milkiness disappears, because calcium carbonate changes to soluble calcium hydrogencarbonate: $CaCO_3(s) + H_2O(l) + CO_2(g) \rightarrow Ca(HCO_3)_2(aq)$ [1]

Q17. (3 marks) Answer: (i) neutralises excess stomach acid; (ii) corrects acidic soil; (iii) acid rain lowers river pH.
(i) The stomach makes hydrochloric acid; too much causes pain and irritation. Milk of magnesia (magnesium hydroxide) is a mild base that neutralises the excess acid. [1]
(ii) Plants grow well only in a narrow range of pH; lime (a base) neutralises soil that is too acidic. [1]
(iii) Rain with pH below 5.6 is acid rain; it lowers the pH of river water, and aquatic animals survive only in a narrow pH range close to 7. [1]

Q18. (5 marks) Answer: (a) R; Q and P; T and S; Q < S < R < T < P; increases; (b) $CaSO_4 \cdot 2H_2O \rightarrow CaSO_4 \cdot \frac{1}{2}H_2O + 1\frac{1}{2}H_2O$ at 373 K; sets to gypsum with water; moisture would set it; two uses.
(a) (i) R (pH 7). [1]
(ii) Strongly alkaline Q (pH 13); strongly acidic P (pH 3). [1]
(iii) Weakly acidic T (pH 5); weakly alkaline S (pH 9). [1]
(iv) The higher the pH, the lower the H^+ concentration: Q < S < R < T < P. [1]
(v) It increases (towards 7): dilution lowers the concentration of hydrogen ions. [1]
OR (b) (i) Gypsum is heated at 373 K: $CaSO_4 \cdot 2H_2O \rightarrow CaSO_4 \cdot \frac{1}{2}H_2O + 1\frac{1}{2}H_2O$ [2]
(ii) It combines with water and sets into a hard solid mass of gypsum: $CaSO_4 \cdot \frac{1}{2}H_2O + 1\frac{1}{2}H_2O \rightarrow CaSO_4 \cdot 2H_2O$. [1]
(iii) Moisture would make it set (harden) in the container, so it must be kept in a moisture-proof container. [1]
(iv) Uses (any two): plastering fractured bones, making toys and decorative materials, making surfaces smooth. [1]

Q19. (4 marks) Answer: (i) pink; (ii) red; (iii)(a) smell stays in acid, not in base; olfactory indicators; (b) soap is basic and turmeric turns red-brown; yellow again.
(i) Pink. [1]
(ii) Red. [1]
(iii)(a) The onion smell remains in the acid but is not noticed in the base. [1]
Substances whose odour changes in acidic or basic media are olfactory indicators. [1]
OR (iii)(b) Curry contains turmeric, which is an indicator; soap solution is basic and turns turmeric reddish-brown. [1]
Washing with plenty of water removes the base, and the stain turns yellow again. [1]

Q20. (4 marks) Answer: (i) HCl; (ii) neutralises excess acid; (iii)(a) $Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + 2H_2O$, neutralisation; (b) $NaHCO_3 + HCl \rightarrow NaCl + H_2O + CO_2$, carbon dioxide.

(i) Hydrochloric acid. [1]

(ii) It is a mild base and neutralises the excess acid. [1]

(iii)(a) $Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + 2H_2O$ [1]

Neutralisation (an acid and a base give a salt and water). [1]

OR (iii)(b) $NaHCO_3 + HCl \rightarrow NaCl + H_2O + CO_2$ [1]

Carbon dioxide. [1]

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