

## Acids, Bases and Salts

**Q: 1** Adding which of the following to a colourless solution would give an indication that the solution could possibly be hydrochloric acid?

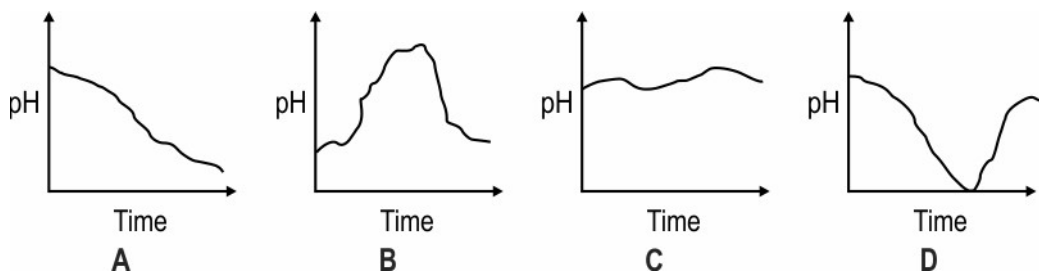
**1** copper metal strips

**2** silver metal strips

**3** calcium carbonate

**4** sodium chloride

**Q: 2** Which of these graphs shows how the pH of milk changes as it forms curd?



**Q: 3** The following table lists the pH values of some substances.

[1]

Solutions	pH
hydrochloric acid	1
milk	6
pure water	7
baking soda	9
sodium hydroxide	14

What would happen to the pH of an acid and a base when each is diluted (pure distilled water is added to it)?

**Q: 4** The pH of three solutions is given in the table. Answer the questions that follow.

[3]

Solution	pH
P	1
Q	7
R	14

(a) Which of these solutions could possibly react with zinc metal to produce hydrogen gas?

(b) Which of these solutions could be formed by the reaction of a metal oxide with water?

(c) Which of these solutions could be the raw material for the industrial manufacture of chlorine?



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**Q: 5** A remarkable property of acids is that they can 'dissolve' metals. When metals are added to an acid, they disintegrate and disappear into the acid. [5]

(a) State one other common observation when metals 'dissolve' in acids. Explain the reason for this observation.

(b) If the acid with the 'dissolved' metal is evaporated, can we get the metal back? Why or why not?

(c) In this question, the word 'dissolve' is used within quotes. This is because it is not actually an example of dissolving. What is the MAIN difference between a metal 'dissolving' in an acid and sugar dissolving in water?

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**Q: 6** Sunita carried out the following reactions in the laboratory: [3]  
(i) complete neutralisation of one mole of sodium carbonate with hydrochloric acid  
(ii) complete neutralisation of one mole of sodium bicarbonate with hydrochloric acid

She found that the amount of carbon dioxide formed in both the reactions was the same.

(a) Is her finding correct? Justify your answer.

(b) How does the amount of salt formed in case (i) compare with the amount of salt formed in case (ii)?

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**Q: 7** To prepare a salad dressing, Parag adds a solution of sodium chloride in distilled water to vinegar. [2]

State what change will occur in the following:

(i) the pH of the vinegar

(ii) the acidity of the vinegar

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Rajesh was given a substance and asked to identify it. He conducted three tests on the substance and recorded the results below. (P) It releases carbon dioxide, water and a sodium salt on heating with water. (Q) It turns universal indicator greenish-blue. (R) It can be prepared from ammonia as a raw material.

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**Q: 8** What substance was Rajesh given? [1]

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**Q: 9** Give ONE use of the substance based on the properties mentioned in P and Q. [1]

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**Q: 10** Rajesh later read that recrystallisation of the sodium salt formed in P gives another basic salt that is used in manufacture of borax. [1]

Identify the sodium salt formed in P.



**Q: 11** Aditi finds that a mixture of an acid and a base does not change the colour of either red or blue litmus paper. [1]

Compare the amounts of  $H^+$  and  $OH^-$  in the solution.

**Q: 12** pH is measured on a scale of 0 to 14, with lower values indicating high hydrogen ion concentration (more acidic) and higher values indicating low hydrogen ion concentration (less acidic). A pH of 7 is considered as neutral. Every whole unit in pH represents a ten-fold increase in or decrease in hydrogen ion concentration. [1]

What would the hydrogen ion concentration of a solution of pH 4 be compared to a solution of pH 8?

**Q: 13** pH is measured using a pH meter, which comprises a detecting unit consisting of a pH sensitive glass electrode and an indicating unit which indicates the pH as shown below. [2]



To measure the pH of a solution, the glass electrode is dipped into the solution and the pH is displayed on the screen of the indicating unit. Before measuring the pH of another solution, the glass electrode is rinsed with distilled water and dried carefully with tissue paper.

How is the pH reading of the second solution likely to be affected if the glass electrode is not dried with tissue paper in the following cases?

- (i) if the second solution being measured is acidic in nature
- (ii) if the second solution being measured is basic in nature

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**Q: 14** Dipti has three flasks containing dilute hydrochloric acid, dilute sulphuric acid and dilute sodium hydroxide respectively. The flasks are not labeled and she does not have any pH indicator. **[2]**

(a) Which of the solutions will she be able to identify just by making mixtures of pairs of the substances.

(b) What observation will help her to make this identification?



The table below gives the correct answer for each multiple-choice question in this test.

Q.No	Correct Answers
1	3
2	1



Q.No	Teacher should award marks if students have done the following:	Marks
3	<ul style="list-style-type: none"> <li>- The pH of an acid would increase. [0.5 marks]</li> <li>- The pH of a base would decrease. [0.5 marks]</li> </ul>	1
4	(a) 0.5 marks each for the following: <ul style="list-style-type: none"> <li>- solution P</li> <li>- solution R</li> </ul>	1
	(b) solution R	1
	(c) solution Q	1
5	(a) 1 mark each for observation and reason:  <b>Observation: Bubbling is seen.</b> <b>Reason: Because hydrogen is produced.</b>  <b>OR</b>  <b>Observation: The vessel becomes warm.</b> <b>Reason: Because it is an exothermic reaction.</b>	2
	(b) 1 mark each for stating yes/no and for reason:  <ul style="list-style-type: none"> <li>- No</li> <li>- The metal is present as a part of a salt solution.</li> </ul>	2
	(c) Metal dissolving in acid is a chemical change while sugar dissolving in water is a physical change.	1
6	(a) <ul style="list-style-type: none"> <li>- Yes, her finding is correct. [1 mark]</li> <li>- 1 mole of <math>\text{CO}_2</math> is produced in both the cases. [1 mark]</li> </ul> (Writing the balanced equations for both the cases should also be accepted as a justification.)	2
	(b) The amount of salt formed in case (i) is twice the amount of salt formed in case (ii).	1



Q.No	Teacher should award marks if students have done the following:	Marks
7	(i) The pH will increase.	1
	(ii) The acidity will decrease.	1
8	baking soda / sodium hydrogencarbonate / $\text{NaHCO}_3$	1
9	1 mark for any of the following: <ul style="list-style-type: none"> <li>- used in antacids</li> <li>- used in toothpaste</li> <li>- used as a first aid in acidic insect bites</li> </ul>	1
10	sodium carbonate / $\text{Na}_2\text{CO}_3$	1
11	The amount of $\text{H}^+$ is equal to the amount of $\text{OH}^-$ in the solution.	1
12	A solution of pH 4 would have 10,000 times higher concentration of hydrogen ions compared to a solution of pH 8.	1
13	(i) The pH meter will indicate a slightly higher pH reading than the actual pH of the solution if the second solution is acidic.	1
	(ii) The pH meter will indicate a slightly lower pH reading than the actual pH of the solution if the second solution is basic.	1
14	(a) the dilute sodium hydroxide	1
	(b) The flasks containing mixtures of sodium hydroxide with hydrochloric acid and with sulphuric acid will be warm to touch.	1

