Chapter 2 – Acids, Bases and salts

Case study-based questions

Question 1

Salt is an ionic compound that results from the neutralization reaction of an acid and a base.It is composed of related numbers of cations (positively charged ions) and anions (negative ions) so that the product is electrically neutral (without a net charge). They may be simple salts such as NaCl, KCl, and Na_2SO_4; acid salts like $NaHCO_3$ and NaH_2PO_4; or double salts like $KAl(SO_4)_2$.

1. **What happens when a solution of an acid is mixed with a solution of a base in a test tube?**
   (i) Temperature of the solution decreases
   (ii) Temperature of the solution increases
   (in) Temperature of the solution remains the same
   (iv) Salt formation takes place
   (a) (i) and (iv)
   (b) (i) and (iii)
   (c) (ii) only
   (d) (ii) and (iv)

2. **When hydrogen chloride gas is prepared on a humid day, the gas is usually passed through the guard tube containing calcium chloride. The role of calcium chloride taken in the guard tube is to**
   (a) absorb the evolved gas
   (b) moisten the gas
   (c) absorb moisture from the gas
   (d) absorb Cl^- ions from the evolved gas

3. **Which one of the following salts does not contain water of crystallization?**
   (a) Blue vitriol
   (b) Baking soda
   (c) Washing soda
   (d) Gypsum

4. **What is formed when zinc reacts with sodium hydroxide?**
   (a) Zinc hydroxide and sodium
   (b) Sodium zincate and hydrogen gas
   (c) Sodium zinc-oxide and hydrogen gas
   (d) Sodium zincate and water

5. **Sodium carbonate is a basic salt because it is a salt of a**
   (a) strong acid and strong base
   (b) weak acid and weak base

(c) strong acid and weak base
(d) weak acid and strong base

Question 2

There are so many important compounds known, which have some characteristic properties like Bleaching powder used as an disinfectant, POP used for joining fractured bones, Baking powder used for making dhoklas and baking cake, Sodium chloride as a table salt etc . These properties make these compounds very useful in our daily routine.

1. Bleaching powders chemical name is
(a) calcium hypo oxychloride
(b) calcium oxychloride
(c) calcium chloride
(d) calcium chloro oxide

2. The ratio of the water molecule in plaster of paris and gypsum is
(a) 3:1
(b) 1:3
(c) 1:4
(d) 4:3

3. Baking powder is
(a) sodium carbonate + sodium tartaric
(b) sodium bicarbonate + sodium tartaric
(c) sodium carbonate + tartaric acid
(d) sodium carbonate + sodium benzoate

4. Washing soda is prepared by:
(a) Solvay's process
(b) Hessen clever process
(c) Castner-kellner process
(d) None

5. The compound formed when POP combines with water:
(a) Quicklime
(b) Soda lime
(c) Gypsum
(d) Bleaching powder

Question 3

A pH meter is a scientific instrument that measures the hydrogen-ion activity in water-based solution water-based solutions, indicating its acidity or alkalinity. expressed as pH. The pH meter measures the difference in electrical potential between a pH electrode and a reference electrode, and so the pH meter is sometimes referred to as a "potentiometric pH meter". The difference in electrical potential relates to the acidity or pH of the solution. The pH meter is used in many applications ranging from laboratory experimentation to quality control.

1. **Which of the following statement is correct regarding pH Scale?**

(i) It is the negative logarithm of H+ ion concentration of a given solution.
(ii) It is the positive logarithm of H+ ion concentration of a given solution.
(iii) It is a 14 point scale.
(iv) pH is an example of an extrinsic property.
Correct Options are:
A. (i) and (iii)
B. (ii) and (iii)
C. (i), (iii) and (iv)
D. Only (ii)

2. **What is the neutral value of pH scale?**

A. Less than 5
B. Equal to 7
C. Less than 8
D. Less than 10

3. **In which of the following field pH scale is important for measurements?**

A. Medicine
B. Forestry
C. Food Science
D. All of the above

4. **What is the pH value of very strong acid solution?**

A. Less than 7
B. Less than 5
C. Less than 10
D. Less than 2

5. **Why we measure the pH of sea water?**

A. It helps in corrosion research.

B. It helps in agricultural activity.
C. It helps in fermentation.
D. It helps in sterilization.

Question 4

The pH is quite useful to us in a number of ways in daily life. Some of its applications are:Control of pH of the soil : Plants need a specific pH range for proper growth. The soil may be acidic, basic or neutral depending upon the relative concentration of H* and OH-. The pH of any soil can be determined by using pH paper. If the soil is too acidic, it can be corrected by adding lime to it. If the soil is too basic, it can be corrected by adding organic manure which contains acidic materials.

(i) When black copper oxide placed in a beaker is treated with dilute HCl, its colour changes to
(a) white

(b) dark red

(c) bluish green

(d) no change.

(ii) P is an aqueous solution of acid and Q is an aqueous solution of base. When these two are diluted separately, then

(a) pH of P increases while that of Q decreases till neutralisation.

(b) pH of P decreases while that of Q increases till neutralisation.

(C) pH of both P and Q decrease.

(d) pH of both P and Q increase.

(iii) Which of the following acids is present in bee sting?

(a) Formic acid

(b) Acetic acid

(c) Citric acid

(d) Hydrochloric acid

(iv) Sting of ant can be cured by rubbing the affected area with soap because

(a) it contains oxalic acid which neutralises the effect of formic acid

(b) it contains aluminium hydroxide which neutralises the effect of formic acid

(c) it contains sodium hydroxide which neutralises the effect of formic acid

(d) none of these

(v) The pH of soil X is 7.5 while that of soil Y is 4.5. Which of the two soils, should be treated with powdered chalk to adjust its pH?

(a) X only

(b) Y only

(c) Both X and Y

(d) none of these

Question 5

Chemically, plaster of paris (POP) is calcium sulphate hemihydrate, i.e., containing half molecule of water of crystallisation. It is represented by the formula, $CaSO_4.1/2H_2O$. Half molecule of water of crystallisation means that one water molecule is shared by two formula units of $CaSO_4$. Hence, we also represent its formula as $(CaSO_4)_2.H_2O$. The name, Plaster of paris, was given to thos compound because for the first time, it was made from gypsum which was mainly found in Paris.

1. The difference of water molecules in gypsum and plaster of Paris is
(a) 5/2
(b) 2
(c) 1/2
(d) 3/2

2. Plaster of Paris hardens by _____
(a) giving off CO_2
(b) changing into $CaCO_3$
(c) combining with water
(d) giving out water.

3. Which of the following statements is incorrect?
(a) Plaster of Paris is used to ornate designs on walls and ceilings
(b) On heating gypsum above 373 K, CaSO4 is obtained
(c) Dead burnt plaster is CaSO4 ·2H2O

(d) Setting of plaster is due to its hydration into gypsum

4. Select the incorrect statement with respect to gypsum

(a) It is slightly soluble in water

(b) It is also known as alabaster

(c) On heating gypsum at 373 K, it loses water molecules and becomes calcium sulphate hemihydrate

(d) Chemical formula of gypsum is $CaSO_4 \cdot 1/2H_2O$

5. Plaster of Paris is obtained by

(a) adding water to calcium sulphate.

(b) adding sulphuric acid to calcium hydroxide

(c) heating gypsum to a very high temperature

(d) heating gypsum to 100° C

Answer key

Question 1	Question 2	Question 3	Question 4	Question 5
1. (d)	1. (b)	1. (c)	1. (c)	1.(d)
2. (c)	2. (c)	2. (b)	2.(a)	2.(c)
3. (b)	3. (b)	3. (d)	3.(c)	3.(c)
4.(b)	4. (a)	4. (d)	4.(c)	4.(d)
5. (d)	5. (c)	5. (a)	5. (b)	5.(d)

All the best!

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