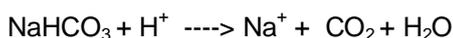


Question: How does baking powder differ from baking soda?

Answer: Baking soda is a single compound which has sodium hydrogen carbonate which is alkaline (basic) in nature

**Baking powder** is a mixture of sodium hydrogencarbonate and a mild edible(eatable) acid such as tartaric acid. When baking powder mixes with water, then the sodium hydrogencarbonate reacts with tartaric acid to evolve carbon dioxide gas which gets trapped in the wet dough and bubbles out slowly making the cake to rise and hence 'soft and spongy'. The equation which takes place can be shown as:



Question: What will happen if heating is not controlled while preparing Plaster of Paris from gypsum?

Answer: It may be noted that the temperature should be controlled carefully. It should not be allowed to rise above 152°C (425K) because, if whole of the water is lost then anhydrous calcium sulphate is produced, which is called dead burnt plaster and it does not have the properties of Plaster of Paris.

Question: Explain how pH change in the river water can endanger the lives of aquatic animals.

Answer: Living organisms can survive only in a narrow range of pH change. When pH of rain water is less than 5.6, it is called acid rain. When acid rain flows into the rivers, it lowers the pH of the river water. The survival of aquatic life in such rivers becomes difficult.

Question: What are the two main ways in which common salt (sodium chloride) occurs in nature? How is common salt obtained from sea water? Explain

Answer: Salt exists in two forms in nature i.e. in sea water and in the form of Halite a mineral rock of common salt. Common salt can be prepared by evaporation of sea water. Sea water is collected in division of land and it is allowed to evaporate under sunlight. Water is evaporated leaving behind mixtures of salt, from which common salt is separated by dissolving it in suitable reagent and then, recrystallizing salt from the solution.

Question: Why aqueous solution of sodium carbonate is basic in nature?

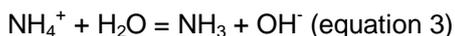
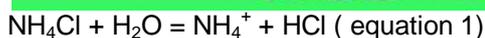
Answer: Sodium bicarbonate is an amphoteric compound. Aqueous solutions are mildly alkaline due to the formation of carbonic acid and hydroxide ion:



Question: Why is an aqueous solution of ammonium chloride acidic in nature?

Answer: A basic component is the one that produces hydroxide (OH<sup>-</sup>) ions when dissolved in water. In aqueous solution of ammonium chloride, ammonium ions (NH<sub>4</sub><sup>+</sup>) first associate with H<sub>2</sub>O and form ammonia and hydroxide ions.





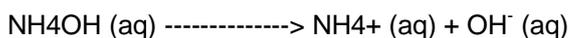
Since ammonium ions produce hydroxide ions,  $\text{NH}_4^+$  are considered to be the basic components.



**Question:** Dry ammonia has no action on litmus paper but a solution of ammonia in water turns red litmus paper blue.

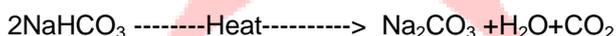
**Why is it so?**

**Answer:** In dry state Ammonia contains no hydroxyl ions. On dissolving in water, it forms  $\text{NH}_4\text{OH}$  which dissociates to give  $\text{NH}_4^+$  and  $\text{OH}^-$  ions. Thus solution becomes basic and turns red litmus paper blue.

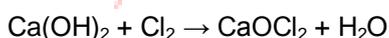


**Question:** What happens when (a) Solid sodium hydrogen carbonate is heated, (b) Chlorine gas is passed through dry slaked lime, (c) Gypsum is heated to a temperature of 373 K?

**Answer:** (a) When Solid sodium hydrogen carbonate is heated from sodium chloride  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  (washing soda).



(b) when Chlorine gas is passed through dry slaked lime, Bleaching powder is produced. Bleaching powder is represented as  $\text{CaOCl}_2$ , though the actual composition is quite complex.



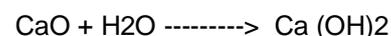
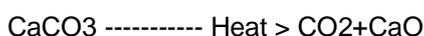
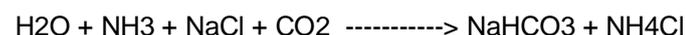
(c) if Gypsum is heated to a temperature of 373 K it forms plaster of Paris,  $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$



**Question:** Give the Names of Raw Materials that are required for the manufacture of washing soda by solvay process. Write the reactions involved in the process.

**Answer:** Common salt :  $\text{NaCl}$ . Sodium chloride. Ammonia :  $\text{NH}_3$ . Ammonia

Lime Stone :  $\text{CaCO}_3$ . Lime stone (Calcium carbonate)



**Question:** What is efflorescence? Name one compound which shows efflorescence? support your answer with reaction?

Answer: The processes of losing water of crystallization, when the substance is exposed to air for long time to form anhydrous or monohydrate substance is called as efflorescence.

$\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ , Sodium carbonate deca hydrate is one example.



Question: why is calcium sulphate hemihydrate called 'Plaster of Paris' ?

Answer: Plaster of Paris gets its name from large gypsum deposits in Montmartre in Paris. We know that plaster of Paris, which is chemically calcium sulphate hemihydrate is obtained by heating gypsum. So the origin of the name 'Plaster of Paris' is the fact that the source material gypsum is found in large deposits at Montmartre in Paris

Question: Plaster of Paris should be stored in a moisture-proof container. Explain why?

Answer: Plaster of Paris should be stored in moisture proof container because Plaster of Paris is powdered form of gypsum with less water of crystallization. But when we keep in open it will react with water to form hard solid mass Gypsum.



Question: Equal lengths of magnesium ribbons are taken in test tubes A and B. Hydrochloric acid (HCl) is added to test tube A, while acetic acid ( $\text{CH}_3\text{COOH}$ ) is added to test tube B. Amount and concentration taken for both the acids are same. In which test tube will the fizzing occur more vigorously and why?

Answer:-In test tube A fizzing occur more vigorously. Because HCl is stronger acid than acetic acid. Hence, HCl liberates hydrogen gas more vigorously, which causes fizzing more vigorously.

Question: What is aqua-regia ?

Answer : A mixture of concentrated nitric and hydrochloric acids. It is a highly corrosive liquid able to attack gold and other resistant substances.

Question: Why should curd and sour substances not be kept in brass and copper vessels?

Answer : Curd and sour substances contain acids. Acids react with metals to give salt and hydrogen gas. So, if such substances are kept in copper container, the acid will react and the container will be corroded.

Question: What is efflorescence?

Answer: Efflorescence is the loss of water (usually as evaporation to air) in an aqueous solution of salts, leaving behind crusts of solid salt crystals, and called efflorescent salts

Question: A farmer has found that the pH of soil in his fields is 4.2. Name any two chemical materials which he can mix with soil to adjust its pH.

Answer : Quick lime (calcium oxide) or slaked lime (calcium hydroxide) or chalk (calcium carbonate)

Question: Sweet tooth' may lead to tooth decay. Explain why? What is the role of tooth paste in preventing cavities?

Answer : Tooth decay starts when the pH of the mouth is lower than 5.5 as Tooth enamel, made up of calcium phosphate does not dissolve in water, but is corroded . The best way to prevent this is to clean the mouth after eating food using toothpastes, which are generally basic, for cleaning the teeth can neutralise the excess acid and prevent tooth decay.

Question: Why does a curry stain on washing turns red?

Answer : Turmeric is a natural indicator that turns red when treated with the base. Since soaps are basic in nature they convert the yellow colour of turmeric to red.

Question: Explain in detail the role of pH in our daily life.

Answer: **pH in plants and animals:**

Our body works within the pH range of 7.0 to 7.8. Living organisms can survive only in a narrow range of pH change. When pH of rain water is less than 5.6, it is called acid rain. When acid rain flows into the rivers, it lowers the pH of the river water. The survival of aquatic life in such rivers becomes difficult.



**pH in our digestive system:**

It is very interesting to note that our stomach produces hydrochloric acid. It helps in the digestion of food without harming the stomach. During indigestion the stomach produces too much acid and this causes pain and irritation. To get rid of this pain, people use bases called antacids. One such remedy must have been suggested by you at the beginning of this Chapter. These antacids neutralise the excess acid.

Magnesium hydroxide (Milk of magnesia), a mild base, is often used for this purpose.

**pH in our tooth!**

Tooth decay starts when the pH of the mouth is lower than 5.5. Tooth enamel, made up of calcium phosphate is the hardest substance in the body. It does not dissolve in water, but is corroded when the pH in the mouth is below 5.5. Bacteria present in the mouth produce acids by degradation of sugar and food particles remaining in the mouth after eating. The best way to prevent this is to clean the mouth after eating food. Using toothpastes, which are generally basic, for cleaning the teeth can neutralise the excess acid and prevent tooth decay.



**Self defense by animals and plants through chemical warfare**

Bee-sting leaves an acid which causes pain and irritation. Use of a mild base like baking soda on the stung area gives relief. Stinging hair of nettle leaves inject methanoic acid causing burning pain.

Question: Give the names and formulae of two (i) strong monobasic acids (ii) weak dibasic acids

Ans (i) Hydrochloric acid(HCl),nitric acid(HNO<sub>3</sub>)

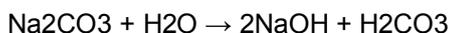
(ii) Carbonic acid (H<sub>2</sub>CO<sub>3</sub>),oxalic acid(C<sub>2</sub>H<sub>2</sub>O<sub>4</sub>)

Question: Why alkalis like sodium hydroxide and potassium hydroxide should not be left exposed to air?

Ans because they are hygroscopic in nature and absorb moisture from atmosphere in which they ultimately dissolve.

Question: State whether an aqueous solution of washing soda is acidic or alkaline.

Ans An aqueous solution of washing soda is alkaline (turns red litmus blue). On dissolving in water it forms strong base (NaOH) and weak acid (H<sub>2</sub>CO<sub>3</sub>)



Question: An old man complained of acute pain in the stomach. Doctor gave him a small antacid tablet and he got immediate relief. What actually happened?

Ans The old person was suffering from acute acidity. An antacid tablet contains sodium hydrogen carbonate (NaHCO<sub>3</sub>). It reacts with acid (HCl) formed because of acidity and neutralize its effect.

Question: An acidic solution always contains some OH<sup>-</sup> ions in it. Comment.

Ans The statement is correct. Actually, acids are dissolved in water to form the solution. Now water will also ionize to small extent as it is a weak electrolyte. The OH<sup>-</sup> ion released by water will remain in the solution. Therefore, an acidic solution always contains some OH<sup>-</sup> ions in it.

Question: A few drops of phenolphthalein indicator were added to an unknown solution A. It acquired pink color. Now another solution B was added to it drop wise and the solution ultimately became colorless. Predict the nature of the solution A and B.

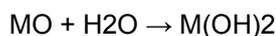
Ans: Sol 'A' is basic in nature as phenolphthalein has imparted pink colour to it. Sol 'B' is an acid it has made solution A colourless by neutralizing by its basic effect.

Q7 Does tartaric acid help in making cake or bread fluffy? Explain.

Ans No, tartaric acid does not evolve any carbon dioxide during baking. Its role is to react with sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>) formed when sodium hydrogen carbonate (NaHCO<sub>3</sub>) decomposes. If it is not done, Na<sub>2</sub>CO<sub>3</sub> will impart bitter taste to the cake.

Question: The oxide of a metal M was water soluble. When a blue litmus strip was dipped in this solution, it did not undergo any change in colour. Predict the nature of the oxide.

Ans The metal oxide is basic in nature. It mixes with water to form metal hydroxide as follows



Blue litmus does not change the colour in the basic medium.

Q9 Explain why?

(a) Common salt becomes sticky during the rainy season.

(b) Blue vitriol changes to white upon heating.

Ans (a) common salt contains impurity of magnesium chloride which is of deliquescent nature. When exposed to the atmosphere, it becomes moist. Therefore it becomes sticky during rainy season.

(b) Blue vitriol (CuSO<sub>4</sub>·5H<sub>2</sub>O) upon heating changes to anhydrous copper sulphate (CuSO<sub>4</sub>) which is white in colour.



**Question:** If bottle full of concentrated sulphuric acid is left open in the air by accident, the acid starts flowing out of the bottle of its own.

**Ans** Concentrated sulphuric acid is highly hygroscopic. It absorbs moisture from air and gets diluted. Since the volume increases, the acid starts flowing out of bottle.

**Question:** The pH of hydrochloric acid solution is 3. Does it mean that it has only hydronium ions? If not, how are OH<sup>-</sup> ions generated?

**Answer:** It is found that for any aqueous solution (neutral, acidic or basic), the product of H<sup>+</sup> ion concentration and OH<sup>-</sup> ion concentration is always constant and equal to 10<sup>-14</sup> at 25°C. This is called ionic product of water (K<sub>w</sub>)

$$K_w = [H^+][OH^-] = 10^{-14}$$

Here The pH of hydrochloric acid solution is 3. Let OH<sup>-</sup> ion concentration = p

$$[H^+][OH^-] = 10^{-14}$$

$$1.0 \times 10^{-3} \times p = 10^{-14}$$

$$p = [10^{-14}] \div [1.0 \times 10^{-3}] = 1.0 \times 10^{-11}$$

Thus for a solution if H<sup>+</sup> concentration is known, OH<sup>-</sup> ion concentration is fixed (because their product is always constant). Hence we express the acidic, basic or neutral character of any solution by expressing its H<sup>+</sup> ion concentration in terms of pH where p stands for potenz ie power.

**Question:** Compounds such as alcohols and glucose also contain hydrogen but are not categorized as acids. Describe an activity to prove it.

**Answer:** The nails are fitted in a cork and are kept in a 100 ml beaker. Then these are connected to the two terminals of a 6 volt battery along with a bulb and a switch. Now some dilute HCl is poured in the beaker and current is allowed to pass through the circuit. The same experiment is carried out using glucose and alcohol solutions separately in place of HCl.

#### Observations

The bulb glows in HCl solution only. The reason is that HCl solution dissociates into H<sup>+</sup> and Cl<sup>-</sup> ions which help to conduct electricity while glucose and alcohol solutions do not dissociate into ions and so, do not conduct electricity. That is why we find the bulb glowing in HCl solution only.

#### Conclusions

The above activity proves that all acids contain hydrogen but not all compounds containing hydrogen are acids. Due to this reason compounds such as alcohols and glucose although contain hydrogen, but they are not categorized as acids.

**Question:** A student heated a few crystals of copper sulphate in a dry boiling tube.

- (a) What will be the color of the copper sulphate after heating? (b) Will you notice water droplets in the boiling tube?  
(c) Where have these come from?

Answer: (a) White (b) Yes (c) Copper sulphate crystals which seem to be dry contain water of crystallization.

**Question:** What happens when bleaching powder is treated with HCl?

Answer: When bleaching powder is treated with an excess of dilute hydrochloric acid, all the chlorine present in it is liberated:  
 $\text{CaOCl}_2 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{Cl}_2 + \text{H}_2\text{O}$

**Question:** What happens to the crystals of washing soda when exposed to air?

Answer: The crystals of washing soda undergo efflorescence because it is hydrated salt containing 10 molecules of water of crystallization. When the crystals of washing soda are exposed to air, they lose water of crystallization and form white powder of sodium carbonate monohydrates.



The loss of water of crystallization of a substance when exposed to air is called efflorescence.

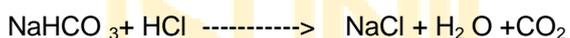
**Question:** What is the chemical name of washing soda? Name three raw materials used in making washing soda by Solvay process?

Answer: Chemical name – Sodium carbonate decahydrate  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

Raw materials – Brine, Lime stone, Ammonia

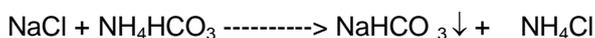
**Question:** Why is sodium hydrogen carbonate an essential ingredient in antacids? (

Answer: Sodium hydrogen carbonate is an essential ingredient in antacids because it neutralizes the effect of HCl which is released in the stomach. So it is called as an antacid.



**Question:** How is sodium hydrogen carbonate formed from a mixture of  $\text{NH}_4\text{Cl}$  and  $\text{NaHCO}_3$  in the manufacture of sodium carbonate by Solvay process?

Answer: Sodium hydrogen carbonate ( $\text{NaHCO}_3$ ) is sparingly soluble or less soluble in water and it gets separated as a precipitate while  $\text{NH}_4\text{Cl}$  remains in solution. This precipitate is removed by filtration.



**Question:** What will you observe when:

(i) Red litmus is introduced into a solution of sodium sulphate. (ii) Methyl orange is added to dil. HCl.

(iii) Blue litmus is introduced into a solution of ferric chloride

Answer: (i) Solution of  $\text{Na}_2\text{SO}_4$  is neutral, therefore, no colour change will be observed when red litmus paper is introduced in this solution.

(ii) The orange colour of methyl orange changes to red in dil. HCl.

(iii) The colourless solution changes to pink when a drop of phenolphthalein is added to a solution of lime water.

(iv) Solution of ferric chloride is acidic; therefore, blue litmus will change to red in this solution.

Question: (a) The PH of rain water collected from two cities A and B was found to be 6 and 5 respectively. Water of which city is more acidic? Find out the ratio of hydrogen ion concentration in the two samples of rain water?

(b) Arrange the following in order (ascending) of their P4 values. NaOH solution, Blood, lemon Juice.

Answer:

(a) pH of city A / H of city B =  $(10^{-6}) / (10^{-5}) = 1/10$

The ratio of hydrogen ion concentration in the two samples of rain water = 1:10

(b) Increasing order of PH values : Lemon juice < Blood < NaOH solution.



Question: Bleaching powder forms a milky solution in water. Explain.

Answer: When bleaching powder  $[CaOCl_2]$  gets dissolved in water, the solution turns milky due to the formation of  $Ca(OH)_2$



(Bleaching powder)

Question: A first aid manual suggests that vinegar should be used to treat wasp sting and baking soda for bee stings.

(a) What does this information tell you about the chemical name of the wasp sting?

(b) If there were no baking soda in the house, what other house hold substances would you use to treat as stings?

Answer: (a) The chemical present in the sting must be base because vinegar (acetic acid) is used to heal or neutralize the effect of wasp stings.

(b) Since bee stings are treated by baking soda which is a base it means they must contain some acid. If baking soda is not available in the house, solution of ammonium hydroxide  $NH_4OH$  can be used for the same purpose.

No, tartaric acid does not evolve any carbon dioxide during baking. Its role is to react with  $Na_2CO_3$  formed when  $NaHCO_3$  decomposes.

Question: Explain why?

(a) Common salt becomes sticky during the rainy season. (b) Blue vitriol change to white upon heating.

Answer: (a) Common salt contains impurity of magnesium chloride ( $MgCl_2$ ) which is of deliquescent nature. When exposed to atmosphere, it becomes moist. Therefore common salt becomes sticky during the rainy season.

(b) Blue vitriol ( $CuSO_4 \cdot 5H_2O$ ) during heating changes to anhydrous copper sulphate ( $CuSO_4$ ) which is white in colour.

Question: (a) Why does an aqueous solution of acid conduct electricity?

(b) How does the concentration of hydrogen ions  $[H_3O^+]$  changes when the solution of an acid is diluted with water?

(c) Which has higher pH. A concentrated or dilute solution of HCl?

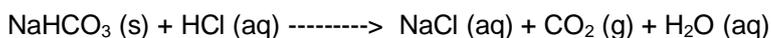
(d) What would you observe on adding dil HCL acid to (i) Sodium bicarbonate placed in a test tube. (ii) Zinc metal in a test tube.

(a) An aqueous solution of an acid conducts electricity because in water an acid (HCl) dissociates to give ions. Since the current is carried out by the movement of ions, an aqueous solution of acid conducts electricity.

(b) During dilution, more of acid dissociates into ions. Thus concentration of  $[H_3O^+]$  ions will increase on dilution.

(c) Even on increasing  $[H_3O^+]$  ions, the number of ions per unit volume decreases. Therefore ph will increases on dilution.

(d) (i)  $CO_2$  gas will evolves accompanied by brick effervescence.

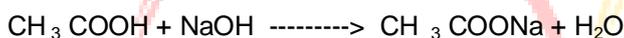


(ii)  $H_2$  gas will evolves accompanied by brick effervescence



Question: How will you show that acetic acid is monobasic acid

Answer: When acetic acid reacts with NaOH solution only one it atom of the acid gets replaced which shows acetic acid is a monobasic acid.



Question: Fresh milk has a pH of 6. What will be the PH value if milk changes into a curd Justify

When milk changes into a curd, its PH value decreases i.e. lactose gets converted into lactic acid. As more of acid is formed, its PH value decreases.

Question: Explain why-

(i) Anhydrous calcium chloride is used in desiccators

(ii) If bottle full of concentrated  $H_2SO_4$  is left open in the atmosphere by accident, the acid starts flowing out the bottle of its own.

Answer: (i) Anhydrous calcium chloride  $CaCl_2$  is highly hygroscopic in nature it readily absorbs moisture and is therefore used as drying agent.

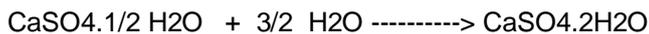
(ii) Concentrated sulphuric acid is highly hygroscopic it absorbs moisture from air and gets diluted. Since the volume increases, the acid starts flowing out of the bottle.

Question: How is plaster of Paris chemically different from gypsum? How may these be inter converted? Write one use of plaster of Paris?

Answer: Plaster of Paris is different from Gypsum in term of water of crystallization. Gypsom has 2 mole of water of crystallization where as Plaster of Paris has half mole of water of crystallization. Plaster of Paris is prepared from heating gypsum.



When plaster of Paris is mixed with water it gets converted into Gypsum



The uses of plaster of Paris are-

- It is used for making moulds or casts for toys, pottery, ceramics etc.
- In surgical bandages for setting fractured bones.

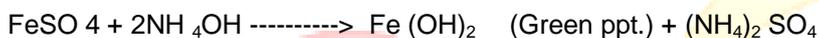


- Question: (a) What is the action of red litmus on (i) Dry ammonia gas (ii) Solution of ammonia gas in water?  
(b) State the observations you would make on adding ammonium hydroxide to aqueous solution of (i) ferrous sulphate (ii) Aluminium chloride?

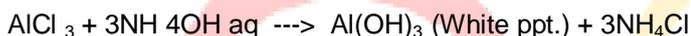
Answer: a) (i) Red Litmus has no action on dry ammonia gas. Because it does not release any hydroxyl ions ( $\text{OH}^-$ )

(ii) When it is passed through water ( $\text{NH}_3$ ) is converted to ammonia hydroxide ( $\text{NH}_4\text{OH}$ ). It dissociates to give hydroxyl ions ( $\text{OH}^-$ ) and the solution is basic in nature. Red litmus acquires a blue colour.

(b) (i) A green precipitate of ferrous hydroxide will be formed by double decomposition reaction.



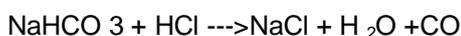
(ii) A white precipitate of aluminium hydroxide will be formed by double decomposition reaction



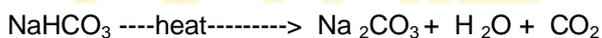
Question: State the chemical property in each case on which the following uses of baking soda are based

- As an antacid (ii) As a constituent of baking powder. Give the chemical for baking soda

Answer: (i) It is weakly alkaline in nature and neutralizes acid ( $\text{HCl}$ ) formed in the stomach.



(ii) It evolves  $\text{CO}_2$  in the form of bubbles when cake is made by baking. As a result, the cake becomes porous as well as fluffy.



The chemical formula of baking soda is  $\text{Na}_2\text{CO}_3$

Question: A road tanker carrying an acid was involved in an accident and its contents spilled on the road. At the side of the road iron drain covers began melting and fizzing as the acid ran over them. A specialist was called to see if the acid actually leaked into the nearby river.

- Explain why specialist could carry out sample test to see if the river water contains some acid or not
- Suggest a better report name for the word 'melting' (c) Explain why the drain covers began fizzing as the acid ran over them.

Answer: (a) It can be done by adding a strip of blue litmus paper into a tube containing a small amount of sample water. If the colour changes into red, this means that some acid has gone into the river.

(b) The acid has reacted chemically with the drain cover which is usually made of iron. The correct word is corrosion.

(c) Iron reacts with an acid  $\text{H}_2\text{SO}_4$  or  $\text{HCl}$  to evolve  $\text{H}_2$  gas. Since the gas is released immediately accompanied by a large number of bubbles, fizzing of drain covers is expected.