

Solution
WORKSHEET
Class 10 - Science

1. **(a)** orange, blue

Explanation:

The colour of pH paper is orange in acidic medium, i.e. in oxalic acid while it is blue in basic medium, i.e. in sodium carbonate solution.

- 2.

- (b)** Vanilla essence

Explanation:

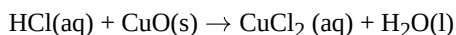
An acid-base indicator shows a colour change from red to blue or blue to red which is not recognisable by a visually impaired student. To detect this change, the olfactory indicator is required which gives a particular odour during this colour change. So vanilla essence is used because of its fruity smell.

- 3.

- (b)** solution turns blue - green

Explanation:

When HCl reacts with copper oxide, a blue-green solution of copper (II) chloride is formed. The reaction is as follows:



This is a double replacement reaction. The soluble Copper(II) Chloride is blue-green in colour and is responsible for the colour of the solution formed.

- 4.

- (d)** A, B, C and D

Explanation:

All the above salts contain water of crystallization and their chemical formulae are given below:

Gypsum - $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ - (2 molecules of water of crystallization)

Epsom salt - $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ - (7 molecules of water of crystallization)

Blue vitriol - $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ - (5 molecules of water of crystallization)

Glauber's salt - $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ - (10 molecules of water of crystallization)

- 5.

- (d)** pale yellow powder

Explanation:

It is a white solid, although commercial samples appear yellow.

6. **(a)** Limestone

Explanation:

Limestone (CaCO_3) decomposes on heating to produce quicklime (CaO) and CO_2 gas.

- 7.

- (d)** basic \rightarrow acidic \rightarrow basic

Explanation:

basic \rightarrow acidic \rightarrow basic

- 8.

- (c)** Tomato

Explanation:

Tomato

9.
(c) HCl
Explanation:
 Egg shells contains calcium carbonate. On reaction with HCl they liberate CO_2 gas which turns lime water to milky according to the following equation:

$$\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$$
10. **(a) An antacid**
Explanation:
 Yellowish orange colour on pH paper is shown by acidic substances hence to change the colour of pH paper to greenish blue (pH = 8), an antacid should be added since antacids are basic in nature.
11. **(c) Calcium hydroxide**
Explanation:
 Calcium hydroxide
12. **(b) neutral with pH - 7**
Explanation:
Salts that are from strong bases and strong acids do not hydrolyze. The **pH** will remain **neutral** at 7.
13. **(d) $\frac{3}{2}$**
Explanation:
 Gypsum is calcium sulphate containing 2 molecules of water of crystallization whereas Plaster of Paris has the only $\frac{1}{2}$ a molecule of water of crystallisation.
 So, difference = $2 - \frac{1}{2} = \frac{3}{2}$ molecules of water of crystallization.
14. **(a) Basic**
Explanation:
 Calcium phosphate is present in tooth enamel and it is known as hydroxyapatite which is basic in nature. It is present in bones also. It is the hardest known material in the whole body. It is present on the outside part of the crown area in a tooth.
15. **(c) 0.125694444444**
Explanation:
 Soda-lime is a mixture of calcium oxide and sodium hydroxide. Soda-lime is used in granular form in closed breathing environments, such as general anesthesia, submarines, rebreathers, and recompression chambers, to remove carbon dioxide from breathing gases, to prevent CO_2 retention and carbon dioxide poisoning.
16. **(d) I and II only**
Explanation:
 On adding water to the white residue, colour changes to blue due to rehydration of anhydrous copper sulphate.
17. **(d) $\text{C}_2\text{H}_5\text{COOH}$**
Explanation:
 $\text{C}_2\text{H}_5\text{COOH}$

18.

(d) Al_2O_3

Explanation:

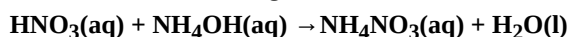
The oxide that can react with both HCl (hydrochloric acid) and KOH (potassium hydroxide) to form a salt and water is aluminum oxide (Al_2O_3), as it is considered an amphoteric oxide, meaning it can act as both a base and an acid depending on the reactant it encounters

19. Cu(II) possesses unpaired electrons having electronic configuration $[\text{Ar}] 3d^9$. The unpaired electrons excites to higher energy state (called d-d transition) absorbing the certain wavelength of light which lies in visible region. On de-excitation of this electron, we see the blue colour.

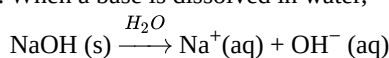
20. Since PO turns red litmus blue, the oxide PO must be basic, thus P is a metal because metal forms a basic oxide and as it does not react with dilute sulphuric acid, the metal will be below hydrogen in activity series.

21. A salt of a weak base (NH_4OH) and a strong acid (HNO_3) is NH_4NO_3 (ammonium nitrate).

The reaction involved is given below:



22. When a base is dissolved in water,

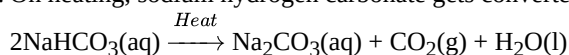


This is dissociation reaction.

23. i. As the soil solution turned universal indicator paper yellow, it indicates that the soil solution is acidic and contains a higher H^+ ion concentration.

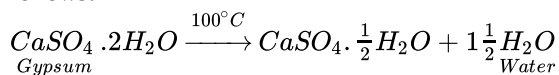
ii. The farmer should add some basic additives to soil such as slaked lime (calcium hydroxide) or quick lime (calcium oxide) to enhance the productivity of the soil.

24. On heating, sodium hydrogen carbonate gets converted into sodium carbonate with the evolution of carbon dioxide.



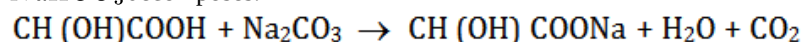
25. As soap is basic in nature, when turmeric stains come in contact with the soap it turns reddish brown. When we wash the cloth with plenty of water then again the reddish brown color turns to yellow.

26. The compound prepared from gypsum on heating it till 100°C , is known as Plaster of Paris. Its chemical formula is $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$. Hence, its chemical name is calcium sulphate hemihydrate. The chemical equation for its preparation is as follows:



Plaster of Paris is used in hospitals mainly as plaster for supporting fractured bones in the right position. In dentistry, it is used for making casts.

27. 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.



If this not happens, Na_2CO_3 will impart a bitter taste to the cake.

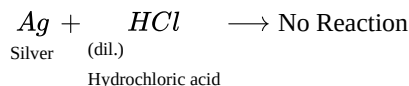
28. i. (i) Milk is made slightly alkaline through the addition of very small amount of baking soda so that it may not get sour easily due to the formation of lactic acid in it. Baking soda contains sodium bicarbonate (NaHCO_3) which neutralizes lactic acid ($\text{CH}_3\text{CH}(\text{OH})\text{COOH}$).



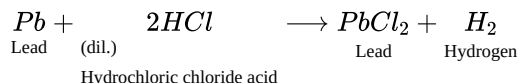
ii. The alkaline milk takes a longer time to set into curd because the lactic acid that is formed by lactobacillus bacteria has to first neutralise the alkali present in the milk.

iii. When milk is about to boil, there must be more effervescence due to the presence of baking soda.

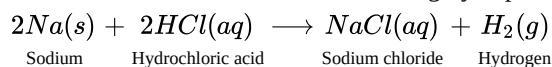
29. i. Silver is covered with a thin layer of silver chloride, so it does not react with dilute hydrochloric acid (no reaction occur).



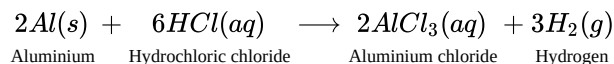
- ii. Bubbles of hydrogen gas are evolved when the lead(Pb) is reacted with the acid(HCl).



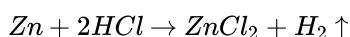
- iii. The reaction of sodium is found to be highly explosive because sodium is very reactive in nature.



- iv. The temperature of the reaction mixture rises when aluminium is added to the acid because the reaction is highly exothermic in nature.



30. When zinc reacts with a dilute solution of a strong acid, a salt is formed and **hydrogen** gas is evolved. Hydrogen is utilised in the hydrogenation of oil. The addition of hydrogen to an unsaturated hydrocarbon to obtain a saturated hydrocarbon is called hydrogenation. The chemical equation for reaction between zinc and a strong acid such as hydrochloric acid is as follows:-

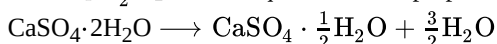


Test for the detection of hydrogen gas: When a burning splinter is brought near the mouth of the test tube, the gas burns with a pop sound. This indicates that the gas is hydrogen.

31.	Name of the solution	Colour change with phenolphthalein	Colour change with blue litmus
(a)	Sodium carbonate (Na ₂ CO ₃)	Turns pink	No change
(b)	Hydrochloric acid (HCl)	No change	Turns red
(c)	Sodium chloride (NaCl)	No change	No change

Sodium carbonate is basic in nature. Hydrochloric acid is acidic in nature. Sodium chloride is neutral and has no effect on the indicators.

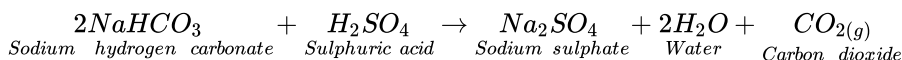
32. The chemical name of Plaster of Paris is Calcium sulphate hemihydrate (CaSO₄ · $\frac{1}{2}$ H₂O). Its chemical formula is CaSO₄ · $\frac{1}{2}$ H₂O. The equation for its preparation is



Plaster of Paris is stored in a dry place because, in the presence of water or moisture, it changes to a hard solid mass called gypsum (CaSO₄·2H₂O)

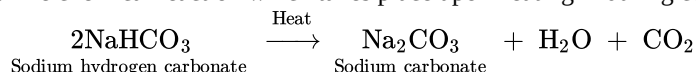
33. Soda-acid fire extinguisher contains sodium bicarbonate and sulphuric acid, which are present in separate containers inside the extinguisher. When the knob of the fire extinguisher is pressed, the sulphuric acid mixes with sodium bicarbonate solution and a lot of CO₂ gas is produced.

Carbon dioxide gas forms a blanket over the fire and cuts off the supply of air to the burning substance and the fire stops.



34. i. Compound X is sodium hydrogen carbonate, NaHCO₃ known as baking soda.

- ii. The chemical reaction which takes place upon heating X during cooking is:



- iii. NaHCO₃ is a mild non-corrosive base and can be used to neutralize the acid. Indigestion caused by increased acidity in the stomach can be reduced by consuming medicine containing NaHCO₃.

35. i. If the crystal is moistened with water, then the blue colour of the crystal reappears.

- ii. The commercial name of calcium sulphate hemihydrate is Plaster of Paris.

- iii. Five water molecules are present in one formula unit of copper sulphate.

OR

CaSO₄· $\frac{1}{2}$ H₂O is obtained when gypsum is heated at 373K.

Heating gypsum at 373K results in loss of water of crystallization, forming plaster of Paris as the product.

36. i. i. Groups A and B - less than 7
 ii. Group C - greater than 7
 ii. pH paper and universal indicator.
 iii. a. Copper vessel is tarnished due to formation of basic copper oxide.
 b. Lemon juice being acidic react with copper oxide and the salt formed is washed away.

OR

- a. An optimal pH is required for digestion.
 b. Change in pH can cause tooth decay.
 c. Animals and plants defend themselves through change in pH.
 d. Survival of aquatic life becomes difficult when pH of river water becomes low.
37. a. The Phenolphthalein in neutral solution is colourless. When it is added to a basic solution the colour changes to pink and it remains colourless in acidic solution.
 b. The colour of blue litmus paper will remain blue as a drop of dil. NaOH is a base and base will not change the color of blue litmus paper.
38. a. Reaction of metal carbonate with dilute acid gives salt, water and carbon dioxide thus, dilute hydrochloric acid with sodium carbonate, gives sodium chloride, carbon dioxide and water.

$$\text{Na}_2\text{CO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow 2\text{NaCl}(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$$

 b. Carbon dioxide gas is liberated above reaction, which, turns lime water milky. If we continue passing carbon dioxide gas through the milky lime water, the solution becomes clear again. This confirms the presence of carbon dioxide gas.
39. When zinc granules react with dil. NaOH then sodium zincate is formed with evolution of hydrogen gas.

$$\text{Zn}(\text{s}) + 2\text{NaOH}(\text{aq}) \rightarrow \text{Na}_2\text{ZnO}_2(\text{aq}) + \text{H}_2(\text{g})$$
40. i. HCl is a mineral acid and a strong acid, so we must take care while handling the acid.
 ii. The Zinc metal should be clean and a small amount must be added to avoid large production of Hydrogen gas.

41. **(a)** Both A and R are true and R is the correct explanation of A.

Explanation:

Plaster of Paris when mixed with water and applied around the fractured limbs, sets into a hard mass and keeps the bone joints in a fixed position. So, it is commonly used for setting fractured bones.

42. **(d)** A is false but R is true.
Explanation:
 It is crucial to add the acid to the water before adding the water to the mixture of acid and water. This is because acid and water react vigorously exothermically, producing heat and occasionally boiling the liquid.

43. **(a)** Both A and R are true and R is the correct explanation of A.

Explanation:

Curd and other sour substances should not be kept in brass and copper vessels as they contain acids. When these substances are kept in brass and copper vessels, the metal reacts with the acid to liberate hydrogen gas and harmful products are obtained due to which the food gets spoiled. Thus both assertion and reason are true and the reason is the correct explanation of the assertion.

44. **(a)** Both A and R are true and R is the correct explanation of A.

Explanation:

Both A and R are true and R is the correct explanation of A.

The aqueous solution of glucose and alcohol does not show acidic character. This is because, aqueous solutions of glucose and alcohol do not give H^+ ions.