

## ACIDS, BASES...Q & ANS.

Q.1. You have been provided with three test tubes. One of them contains distilled water and the other two contain an acidic solution and a basic solution respectively. If you are given only red litmus paper, how will you identify the contents of each test tube?

Ans: Take a small volume of all the three liquids in three test tubes. Dip red litmus paper strips separately in all the three. The tube, in which red litmus strip turns blue, contains basic solution. Now remove the blue litmus paper and dip it in one of the remaining test tubes. The tube, in which the colour of the blue litmus paper changes to red, contains the acidic solution. The tube, in which the colour remains unchanged, contains distilled water.

---

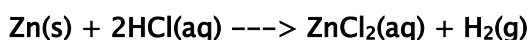
Q.2. Why should not curd and sour substances be kept in containers made up of brass or copper?

Ans: Both curd and sour substances contain some acids in them. They react with copper to form certain salts which are poisonous in nature.

---

Q.3. Which gas is usually liberated when an acid reacts with a metal? Illustrate with an example. How will you test for the presence of this gas?

Ans: Metals are highly reactive in nature. They react with dil. acids to form salt and liberate hydrogen gas.

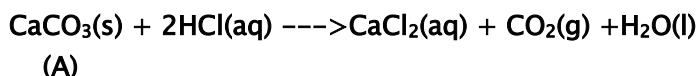


The gas burns with a pop sound when a burning candle is brought near it.

---

Q.4. Refer Text book Page no-

Ans: Since the gas is evolved with effervescence and extinguishes fire, it is expected to be CO<sub>2</sub> gas. As Calcium chloride is formed as one of the products, this means that the substance 'A' must be Calcium Carbonate.



Q.5. Refer text book Page no-

Ans: All the acids given here contain replaceable hydrogen atoms which they release in aqueous solution as H<sup>+</sup> ions. Therefore, they show acidic character. However, both ethyl alcohol (C<sub>2</sub>H<sub>5</sub>OH)

and glucose ( $C_6H_{12}O_6$ ) do not contain replaceable hydrogen atoms. They fail to evolve hydrogen gas and do not show any acidic character.

---

Q.6. Refer text book Page no-

Ans: Aqueous solution of an acid (HA) releases  $H^+$  ions and anions ( $A^-$ ) in solution. Since ions carry charge, the aqueous solution of an acid conducts electricity.

---

Q.7. Refer text book Page no-

Ans: Dry HCl gas fails to release any  $H^+$  ions which means that it is not acidic. It fails to change the colour of the dry litmus paper which has no moisture content.

---

Q.8. Refer text book Page no-

Ans: Acids particularly the mineral acids like  $H_2SO_4$ ,  $HNO_3$  and HCl etc., have strong affinity for water. The dilution process is highly exothermic in nature. The heat evolved may crack or break the container and may also convert the acid into fog which is likely to pollute the atmosphere. In order to control the heat evolved, it is advisable to add acid drop by drop to water. In case water is added to acid, then the entire acid will get itself involved in the exothermic process. It may not be possible to control the heat evolved.

---

Q.9. Refer text book page no-

Ans: An acid dissociates into hydronium ions ( $H_3O^+$ ) and anions when dissolved in water. Upon dilution, the volume of the solution increases and the number of ions per unit volume decreases.

---

Q.10. Refer text book page no-

Ans: Sodium hydroxide (NaOH) is a strong base. It immediately dissociates in solution to give  $OH^-$  ions and cations. Upon dissolving more of base in the solution, the concentration of  $OH^-$  ions will further increase.

---

Q.11. Compounds like alcohol and glucose also contain hydrogen but are not characterised as acids. Describe an activity to prove it.

Ans: Refer text book activity.

---

Q.12. Why does not distilled water conduct electricity whereas rain water does?

Ans: Pure water or distilled water is a weak electrolyte and does not dissociate into ions. Therefore, it does not conduct electricity. However, rain water contains some dissolved acids like carbonic acid and sulphurous acid. As a result, water becomes acidified and gets ionised easily. Therefore, rain water conducts electricity.

---

Q.13. Why does not an acid show any acidic behaviour in the absence of water?

Ans: An acid gets ionised only in aqueous solution i.e., in the presence of water. In other words, an acid releases H<sup>+</sup> ions or shows acidic behaviour only in the presence of water.

---

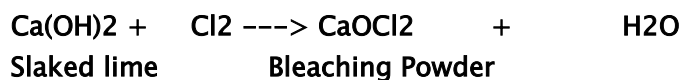
Q.14.

Ans: A soil usually becomes acidic when there is either iron minerals or some rotting vegetables are dumped in the soil. In order to reduce the acidic strength, 'liming of soil' is usually done.

---

Q.15.

Ans: Slaked lime is the substance which reacts with chlorine to give bleaching powder.



Q.16.

Ans: Washing soda or sodium carbonate. It is chemically Sodium carbonate decahydrate (Na<sub>2</sub>CO<sub>3</sub>·10H<sub>2</sub>O)

---

Q.17.

Ans: Carbon dioxide gas will evolve and Sodium carbonate will be left.



Q.18.

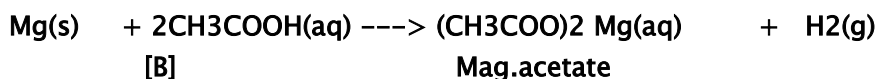
Ans:  $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O} + \frac{3}{2} \text{H}_2\text{O} \rightarrow \text{CaSO}_4 \cdot 2\text{H}_2\text{O}$   
Plaster of Paris                      Gypsum

Q.19. Why does not distilled water conduct electricity whereas rain water does?

Ans: Pure water or distilled water is a weak electrolyte and does not dissociate into ions. therefore, it does not conduct electricity. However, rain water contains some dissolved acids like carbonic acid ( $\text{H}_2\text{CO}_3$ ) and sulphurous acid ( $\text{H}_2\text{SO}_3$ ). As a result, water becomes acidified and gets ionised easily. Therefore, rain water conducts electricity.

Q.20. 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. In which case, fizzing occurs more vigorously and why?

Ans: Fizzing in the reaction is due to the evolution of hydrogen gas by the action of metal on the acid.



Since hydrochloric acid is a stronger acid than acetic acid, fizzing occurs more rapidly in tube A than in tube B. Actually hydrogen gas will evolve at more brisk speed in test tube A.

Q.21. Fresh milk has a PH of 6. How do you think the PH will change as it turns into curd? Explain your answer.

Ans: When milk changes into curd, the PH decreases. Actually lactose, a carbohydrate present in milk gets converted into lactic acid. As more of acid is formed, PH of the medium decreases.

Name of salt    Chemical formula    Base from which salt is obtained    Acid from which salt is obtained

Sodium Sulphate	Na <sub>2</sub> SO <sub>4</sub>	NaOH	H <sub>2</sub> SO <sub>4</sub>
Calcium Sulphate	CaSO <sub>4</sub>	Ca(OH) <sub>2</sub>	H <sub>2</sub> SO <sub>4</sub>
Copper Chloride	CuCl <sub>2</sub>	Cu(OH) <sub>2</sub>	HCl
Sodium Nitrate	NaNO <sub>3</sub>	NaOH	HNO <sub>3</sub>
Sodium Carbonate	Na <sub>2</sub> CO <sub>3</sub>	NaOH	H <sub>2</sub> CO <sub>3</sub>
Ammonium Chloride	NH <sub>4</sub> Cl	NH <sub>4</sub> OH	HCl

Neutral Salt NaCl, NaNO<sub>3</sub>, KCl, KNO<sub>3</sub>, K<sub>2</sub>SO<sub>4</sub>

Acidic Salt AlCl<sub>3</sub>, Cu(NO<sub>3</sub>)<sub>2</sub>, ZnSO<sub>4</sub>, CuSO<sub>4</sub>, FeSO<sub>4</sub>, FeCl<sub>2</sub>

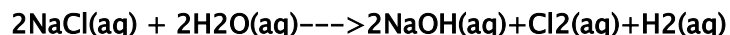
Basic Salt Na<sub>2</sub>CO<sub>3</sub>, NaHCO<sub>3</sub>, CH<sub>3</sub>COONa, Na<sub>2</sub>SO<sub>3</sub>

#### SOME IMPORTANT CHEMICAL COMPOUNDS

(1) Sodium hydroxide, NaOH, Caustic Soda

Preparation: By Chlor-alkali process

(Due to the formation of chlorine and sodium hydroxide)



Uses:

a) in the refining of petroleum, vegetable oils, cleaning agent for metals.

(2) Bleaching powder, CaOCl<sub>2</sub>, Calcium Oxy chloride

Preparation: By passing chlorine gas through dry slaked lime

Ca(OH)<sub>2</sub>



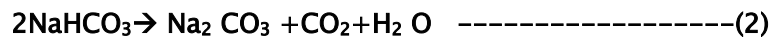
To bleach cotton and linen in textile industry

Used for sterilisation of water; used as an oxidising agent in the manufacture of many chemicals

(3) Washing Soda, Na<sub>2</sub>CO<sub>3</sub> · 10H<sub>2</sub>O, Sodium carbonate decahydrate

Prepared by passing CO<sub>2</sub> gas through a brine solution with ammonia.

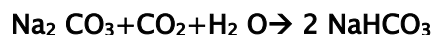




Manufacture of glass, soap; in paper, textile industry; softening hard water; washing purposes in laundry

(4) Baking Soda,  $\text{NaHCO}_3$ , Sodium Hydrogen Carbonate

By passing excess of  $\text{CO}_2$  gas through the saturated solution of Sodium Carbonate



a) Used in Baking Powder  
(Baking soda + Tartaric acid)

b) As antacid  
c) In fire extinguishers

(5) Plaster of Paris,  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ , Calcium sulphate hemi hydrate

By heating gypsum carefully at a temperature of 373K in a kiln.



a) for making casts, statues, roofs.  
b) in surgical bandages for setting fractured bones.

SALT	COMMERCIAL NAME	CHEMICAL FORMULA	COLOUR
SODIUM CARBONATE	WASHING SODA	$\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$	White
MAGNESIUM SULPHATE	EPSOM SALT	$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	White
CALCIUM SULPHATE	GYPSUM	$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$	White
COPPER SULPHATE	BLUE VITRIOL	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$	Blue
FERROUS SULPHATE	GREEN VITRIOL	$\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$	Green

SOLUTION	APPROX. PH	SOLUTION	APPROX. PH
1 M HCl	0	Human Saliva	6.5–7.5

Gastric Juices	1-3	Pure Water	7
Lemon Juices	2.2-2.4	Human Blood	7.36-7.42
Vinegar	3	Baking Soda Solution	8.4
Beer	4-5	Sea Water	8.5
Tomato Juice	4.1	Washing Soda Solution	9
Coffee	4.5-5.5	Lime Water	10.5
Acid Rain	5.6	Household Ammonia	12
Milk	6.5	1 M NaOH	14