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 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.

$Zn(s) + 2HCl(aq) \longrightarrow ZnCl_2(aq) + H_2(g)$

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 CO2 gas. As Calcium chloride is formed as one of the products, this means that the substance 'A' must be Calcium Carbonate.

$CaCO_3(s) + 2HCl(aq) \longrightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$

(A)

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+ ions. There fore, they show acidic character. However, both ethyl alcohol (C2H5OH)

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 carries 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 the 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+ 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.

$Ca(OH)_2 + Cl_2 \longrightarrow CaOCl_2 + H_2O$

Slaked lime Bleaching Powder

Q.16.

Ans: Washing soda or sodium carbonate. It is chemically Sodium carbonate decahydrate ($Na_2CO_3.10H_2O$)

Q.17.

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

$$2NaHCO_3 \xrightarrow{heat} Na_2CO_3 + CO_2 + H_2O$$

Q.18.

Ans: $CaSO_4 .1/2\ H_2O + 3/2\ H_2O \longrightarrow CaSO_4.2H_2O$

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 (H_2CO_3) and sulphurous acid(H_2SO_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(CH_3COOH) 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.

$$Mg(s) + 2HCl\ (aq) \longrightarrow \underset{\text{Mag.chloride}}{MgCl_2(aq)} + H_2(g)$$

[A]

$$Mg(s) + 2CH_3COOH(aq) \longrightarrow \underset{\text{Mag.acetate}}{(CH_3COO)_2\ Mg(aq)} + H_2(g)$$

[B]

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	Na2SO4	NaOH	H2SO4
Calcium Sulphate	CaSO4	Ca(OH)2	H2SO4
Copper Chloride	CuCl2	Cu(OH)2	HCl
Sodium Nitrate	NaNO3	NaOH	HNO3
Sodium Carbonate	Na2CO3	NaOH	H2CO3
Ammonium Chloride	NH4CL	NH4OH	HCl

Neutral Salt NaCl, NaNO3, KCl, KNO3, K2SO4
Acidic Salt AlCl3, Cu(NO3)2 , ZnSO4, CuSO4, FeSO4, FeCl2
Basic Salt Na2CO3, NaHCO3, CH3COONa, Na2SO3

SOME IMPORTANT CHEMICAL COMPOUNDS

(1) Sodium hydroxide, NaOH, Caustic Soda

Preparation: By Chlor-alkali process
(Due to the formation of chlorine and sodium hydroxide)

$2NaCl(aq) + 2H2O(aq) \rightarrow 2NaOH(aq) + Cl2(aq) + H2(aq)$

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

(2) Bleaching powder,$CaOCl_2$,Calcium Oxy chloride

Preparation: By passing chlorine gas through dry slaked lime $Ca(OH)_2$
$+ Cl_2 \rightarrow CaOCl_2 + H_2O$

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, $Na_2 CO_3 .10 H_2 O$, Sodium carbonate decahydrate

Prepared by passing CO2 gas through a brine solution with ammonia.
$NaCl + H_2 O + CO_2 + NH_3 \rightarrow NH_4 Cl + NaHCO_3$----------(1)

$2NaHCO_3 \rightarrow Na_2CO_3 + CO_2 + H_2O$ ----------(2)

$Na_2CO_3 + 10H_2O \rightarrow Na_2CO_3.10H_2O$-----(3)

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

(4)Baking Soda,NaHCO3,Sodium Hydrogen Carbonate

By passing excess of CO_2 gas through the saturated solution of Sodium Carbonate

$Na_2CO_3 + CO_2 + H_2O \rightarrow 2\ NaHCO_3$

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

b)As antacid
c)In fire extinguishers

(5) Plaster of Paris, CaSO4. ½H2O, Calcium sulphate hemi hydrate

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

CaSO4.2H2O---> CaSO4. ½ H2O + 1 ½ H2O

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

SALT	COMMERCIAL NAME	CHEMICAL FORMULA	COLOUR
SODIUM CARBONATE	WASHING SODA	Na2CO3.10H2O	White
MAGNESIUM SULPHATE	EPSOM SALT	MgSO4.7H2O	White
CALCIUM SULPHATE	GYPSUM	CaSO4.2H2O	White
COPPER SULPHATE	BLUE VITRIOL	CuSO4.5H2O	Blue
FERROUS SULPHATE	GREEN VITRIOL	FeSO4.7H2O	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