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UNIQUE STUDY POINT
TEST: CLASS X
ACID BASE AND SALT

1	What colour do the following indicators turn when added to a base or alkali (such as sodium hydroxide)? (a) methyl orange (b) litmus (c) red cabbage extract **ANSWER:** (a) Methyl orange: Methyl orange changes its colour to yellow when added to a base or an alkali. (b) Litmus paper: Red litmus paper turns blue, whereas blue litmus paper remains blue in a base or an alkali. (c) Red cabbage extract: Red cabbage extract turns greenish-yellow in basic solutions.
2	Fill in the blanks in the following sentences: (a) Acids have a .....taste and they turn.....litmus to..... (b) Substances do not show their acidic properties without..... (c) Acids produce..... ions on dissolving in water. (d) Those substances whose smell (or odour) changes in acidic or basic solution are called ..... indicators. (e) Onion and vanilla extract are.....indicators. **ANSWER:** (a) Acids have a sour taste and they turn blue litmus to red. (b) Substances do not show their acidic properties without water. (c) Acids produce hydronium ions on dissolving in water. (d) Those substances whose smell (or odour) changes in acidic or basic solution are called olfactory indicators. (e) Onion and vanilla extract are olfactory indicators.
3	When a piece of limestone reacts with dilute HCl, a gas X is produced. When gas X is passed through lime water then a white precipitate Y is formed. On passing excess of gas X, the white precipitate dissolves forming a soluble compound Z. (a) What are X, Y and Z? (b) Write equations for the reactions which take place: (i) when limestone reacts with dilute HCl (ii) when gas X reacts with lime water to form white precipitate Y (iii) when excess of gas X dissolves white precipitate Y to form a soluble compound Z **ANSWER:** (a) X is carbon dioxide gas (CO_2). Y is calcium carbonate ($CaCO_3$). Z is calcium hydrogen carbonate (calcium bicarbonate) [$Ca(HCO_3)_2$]. (b) (i) When a piece of limestone or calcium carbonate is treated with dilute hydrochloric acid, carbon dioxide gas (CO_2, here given as X) is produced.

	$CaCO_3(s) + 2HCl(aq) \rightarrow 2CaCl(aq) + H_2O(l) + CO_2(g)$ (ii) When carbon dioxide (X), liberated in the reaction is passed through lime water, the lime water turns milky or a white precipitate of calcium carbonate ($CaCO_3$, Here given as Y) is formed. $Ca(OH)_2(aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l)$ (iii) When excess of carbon dioxide is passed through lime water, a solution of calcium hydrogen carbonate [Z, $Ca(HCO_3)_2$] is formed. $CaCO_3(s) + H_2O(l) + CO_2(g) \rightarrow Ca(HCO_3)_2(aq)$
4	Fill in the following blanks with suitable words: (a) Acids have a pH.....than 7. (b) Alkalis have a pH..... than 7. (c) Neutral substances have a pH of ..... (d) The more acidic a solution, the ..... the pH. (e) The more alkaline a solution, the..... the pH. **ANSWER:** (a) Acids have a pH less than 7. (b) Alkalis have a pH greater than 7. (c) Neutral substances have a pH of 7. (d) The more acidic a solution, the lesser the pH. (e) The more alkaline a solution, the greater the pH.
5	Fill in the following blanks: (a) Common salt is obtained from sea-water by the process of..... (b) Rock salt is mined just like ..... (c) Chemical formula of washing soda is ..... (d) Sodium hydrogen carbonate is ..... soda whereas sodium carbonate is ..... soda. (e) The chemical formula of plaster of Paris is ..... **ANSWER:** (a) Common salt is obtained from sea-water by the process of evaporation. (b) Rock salt is mined just like coal. (c) Chemical formula of washing soda is $Na_2CO_3.10H_2O$. (d) Sodium hydrogen carbonate is baking soda whereas sodium carbonate is washing soda. (e) The chemical formula of plaster of Paris is $CaSO_4.1/2H_2O$.
6	(a) Name a sodium compound used for softening hard water. (b) Which compound of calcium is used for disinfecting drinking water supply? (c) Name a metal compound which has detergent properties (cleansing properties). (d) Name one compound of calcium which is used for removing the colour of a coloured cloth. (e) State a peculiar (or remarkable) property of plaster of Paris. (f) Name the substance obtained by the action of chlorine on solid (dry) slaked lime. **ANSWER:**

	(a) Sodium carbonate or washing soda (Na_2CO_3) is used for softening hard water. (b) Bleaching powder or calcium oxychloride ($CaOCl_2$) is used for disinfecting drinking water supply. (c) Sodium carbonate, or washing soda (Na_2CO_3), has a cleansing property. (d) Bleaching powder, or calcium oxychloride ($CaOCl_2$), is used for removing the colour of a coloured cloth. (e) Plaster of Paris has a remarkable property of setting into a hard mass on addition of water. (f) Bleaching powder, or calcium oxychloride ($CaOCl_2$), is obtained by the action of chlorine on solid (dry) slaked lime.
7	The metal salt A is blue in colour. When salt A is heated strongly over a burner, then a substance B is eliminated and a white powder C is left behind. When a few drops of a liquid D are added to powder C, it becomes blue again. What could be A, B, C and D? **ANSWER:** Copper sulphate crystals (A) are blue and have the chemical formula $CuSO_4.5H_2O$. When copper sulphate crystals are heated strongly, they lose all the water of crystallisation (B) and form anhydrous copper sulphate (C), which is white. A C B $CuSO_4.5H_2O \rightarrow CuSO_4 + 5H_2O$ Anhydrous copper sulphate turns blue on addition of a few drops of water (D) because it gets hydrated again. C D $CuSO_4 + 5H_2O \rightarrow CuSO_4.5H_2O$
8	Consider the following substances: NaCl, $Ca(OH)_2$, $NaHCO_3$, NH_3, Na_2CO_3, H_2O, Cl_2, CO_2, $CaSO_4.2H_2O$, $2CaSO_4.H_2O$, $CaOCl_2$ (a) Which two substance combine to form bleaching powder? (b) Which four substances are utilised in the production of washing soda? (c) Which compound represents plaster of Paris? (d) Which compound is a part of baking powder? (e) Which compound is used as an antacid? **ANSWER:** a) $Ca(OH)_2$ combines with Cl_2 to give bleaching powder ($CaOCl_2$). The chemical reaction involved is as follows. $2Ca(OH)_2 + CaCl_2 \rightarrow CaOCl_2 + 2H_2O$ b) NaCl, NH_3, H_2O, CO_2 are utilised in the production of washing soda. The chemical reaction involved can be shown in three steps: i) Production of sodium hydrogen carbonate: $NaCl + NH_3 + H_2O + CO_2 \rightarrow NaHCO_3 + NH_4Cl$ ii) Production of anhydrous sodium carbonate upon heating sodium hydrogen carbonate: $2NaHCO_3 \rightarrow Na_2CO_3 + CO_2 + H_2O$ iii) Production of hydrated sodium carbonate when anhydrous sodium carbonate is dissolved in water: $Na_2CO_3 + 10H_2O \rightarrow Na_2CO_3.10H_2O$ c) $2CaSO_4.H_2O$ represents plaster of Paris as its chemical formula is $CaSO_4.1/2H_2O$.

	d) $NaHCO_3$ is part of baking powder, as baking powder is a mixture of $NaHCO_3$ and tartaric acid. e) $NaHCO_3$ is used as an antacid, as it is alkaline, thus it neutralises excess acid in the stomach.
9	Consider the following salts: Na_2CO_3, NaCl, NH_4Cl, CH_3COONa, K_2SO_4, $(NH_4)_2SO_4$ Which of these salts will give: (a) acidic solutions? (b) neutral solutions? (c) basic solutions (or alkaline solutions)? **ANSWER:** (a) The salt solutions of NH_4Cl and $(NH_4)_2SO_4$ give acidic solutions, because these salts are each formed from a weak base and a strong acid. The ionisation of a weak base is not complete, whereas a strong acid ionises completely. Hence, there are more H^+ ions than OH^- ions, making the solutions acidic. (b) The salt solutions of NaCl and K_2SO_4 are neutral, because these salts are formed from a strong base and a strong acid, and on ionisation, there is an equal number of H^+ and OH^- ions, making the solutions neutral. (c) The salt solutions of CH_3COONa and Na_2CO_3 are basic, because these salts are each formed from a weak acid and a strong base. The ionisation of a weak acid is not complete, whereas a strong base ionises completely. Hence, there are more OH^- ions than H^+ ions, making the solutions basic.
10	Complete and balance the following chemical equations: (a) $NaCl\,(aq) + H_2O\,(l) \xrightarrow{\text{Electricity}}$ (b) $NaHCO_3 \xrightarrow{\text{Heat}}$ (c) $NaCl + NH_3 + H_2O + CO_2 \longrightarrow$ (d) $Ca(OH)_2 + Cl_2 \longrightarrow$ **ANSWER:** (a) $2NaCl(aq) + 2H_2O(l) \xrightarrow{\text{Electricity}} 2NaOH(aq) + Cl_2(g) + H_2(g)$ (b) $2NaHCO_3 \xrightarrow{\text{Heat}} Na_2CO_3 + CO_2 + H_2O$ (c) $NaCl + NH_3 + H_2O + CO_2 \rightarrow NaHCO_3 + NH_4Cl$ (d) $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$