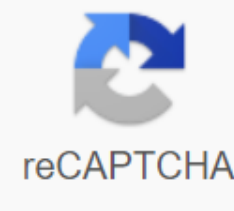




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Acids bases and salts notes o level pdf

Notes to the CIE O Level Chemistry module: 7. Chemistry and the use of acids, bases and salts. They are made in accordance with the specifications of 5070 (2017-2019) and cover all relevant topics for consideration in May-June. CIE O Level 7. Chemistry and Use of Acids, Base and Salt Notes: Acid Ammonia and its Use of Base Concentration and Strength Preparation Skilled Analysis Solubility Sulphuric Acid Types of Oxides Using Acid Use of Ammonia Use of BASE KOH (aq) but most required warming, this method is especially suitable for those metals that do not react with diluted acids. eg, copper metal has no reaction to diluted acids. If heated with diluted acids, forms salts. E.g. Reacting CuO with Acids: $\text{CuO (s)} + \text{H}_2\text{SO}_4 \text{ (aq)} \rightarrow \text{CuSO}_4 \text{ (aq)} + \text{H}_2\text{O (l)}$. Add excess copper oxide (II) to warm sulphuric acid, so that all acid is neutralized. Unedited oxide is then removed by filtration. The filter is a blue solution of copper sulfate (II). The crystals are produced by concentrating the solution by evaporating and then leaving it to cool. The crystals that are formed can be removed by filtering. Since copper sulfate crystals (II) contain crystallization water, it is important not to evaporate the solution to dryness. 4. Reacting metal carbonate with Acid: Similar to that including metal oxide and acid, but this time, no heat is required. Carbonate hisses and produces carbon dioxide. Excess carbonate needs to be added to make sure that all acid is neutralized. Indent then filtered to remove unedited carbonate and evaporates to concentrate the solution to crystallize. E.g. Reacting CaCO_3 with Acids: $\text{K}_2\text{CO}_3 \text{ (s)} + \text{H}_2\text{SO}_4 \text{ (aq)} \rightarrow \text{K}_2\text{SO}_4 \text{ (aq)} + \text{CO}_2 \text{ (g)} + \text{H}_2\text{O (l)}$. The same process is used as a reaction of acid with metal, only that carbon dioxide is produced. Carbon dioxide can be tested by ascending it into lime water, which will turn lime-free water colorless to milky. Produced from nitrogen reacted from hydrogen. For production: fertilizers, nitric acid, nylon, dyes, cleaning products and dry cells. Produce ammonia: Haber-Prok process: Nitrogen and hydrogen are mixed in a ratio of 1:3. Because the reaction is reversible, so H_2 and O_2 , reproduced from the decomposition produced by NH_3 , are transmitted through the catalyst again for the production of ammonia. Conditions for ammonia production have the high yield of ammonia we should have: Higher pressure temperature. While in practice, we use lower pressure of 200 atm and a higher temperature of 450°C . That's because: Using low temperatures too slowly to reach equilibrium. Using high pressure involves safety risks and higher costs. As fertilizer plants need like one of the component for growth and ammonium fertilizers contain nitrogen for this. % nitrogen content in ammonium fertilizer. E.g. Ammonium sulfate, $(\text{NH}_4)_2\text{SO}_4$, and urea, $(\text{NH}_2)_2\text{CO}$, are 2 types of fertilizer. The conclusion, in terms of nitrogen content, which of these fertilizers is best suited for plants. % mass (total mass of the element / total mass compound) $\times 100$. $(\text{NH}_4)_2\text{SO}_4$ ($28 / 132$) $\times 100 = 21.2\%$. $(\text{NH}_2)_2\text{CO}$ ($28 / 60$) $\times 100 = 46.7\%$. Urea is the best fertilizer because it contains more nitrogen. Problems with ammonia eutrophication are an increase in the organic water content of leaching fertilizers into the soil and washing out into rivers and streams. When excess fertilizers are washed away by rain, the nitrate ions in it enter the rivers and help aquatic plants, such as algae, grow rapidly. When there is too much algae, the water becomes dark and sunlight will not penetrate the water to help their growth, which in turn leads to the death of algae. The decay of this organic matter uses oxygen, therefore killing aquatic animals. Then even more algae die and even more animals die. Water pollution as a result of the runoff use of fertilizer, leaching from septic tanks, sewage and erosion of natural sediments. Nitrogen ions in the soil leach the soil into groundwater because of its servantry. Because groundwater is our source of drink, when people drink this water, they will be seriously ill and children may suffer from shortness of breath to death. 1. Which of the following gases cannot be removed from the exhaust of a gasoline car using a catalytic converter? carbon monoxide. Hydrocarbons. nitrogen dioxide. 2. The excess of diluted sulphuric acid reacts with both barium hydroxide and barium aquous chloride. How are these two reactions the same? insoluble salt is produced. The final pH is 7. d. water is produced. 3. In some experiments, excess sodium hydroxide or ammonia was gradually added to solution X. In both experiments, sediment was obtained, which dissolved in excess of the added reagent. What can contain X? a. copper (II) nitrate. iron (II) nitrate. iron (III) nitrates. zinc nitrate. 4. Which of the following properties is ethanol, but is not a feature of sulphuric acid? a. it reacts with copper (II) oxide. it reacts with sodium carbonate. it reacts with magnesium. it burns in the air. 5. What salt can be prepared by a method that includes crystallization as the final stage? a. sulfate. b. barium. calcium carbonate. silver chloride. sodium nitrate. 6. Element X forms hydroxide, which dissolves in both acids and lye. What could be X? a. aluminum. Calcium. Copper. iron. 7. Under the right conditions, the salt acid reacts to each of the following substances. What reaction does a colorless solution give only? Calcium. iron (II) hydroxide. hydroxide potassium. silver nitrate. 8. After the Post With diluted nitric acid, colorless solution X reacts with silver nitrate to give white sediment. What could be X? a. iodide. calcium. copper (II) chloride. lead (II) chloride. sodium chloride. 9. Two tests were conducted on colorless liquid X. X turned copper anhydrous anhydrous (II) sulfate from white to blue. X reacted with calcium, giving hydrogen. What could be X? 1. dilute the salt acid. 2. ethanol. 3. Water. 1 only. 1 and 2 only. 1 and 3 only. 1, 2 and 3. 10. Which of the following is a characteristic characteristic of lye in an aqueous solution? they release carbon dioxide from carbonates. they produce hydrogen with any metal. they turn the universal indicator into red. 11. Mineral X dissolves in diluted salt acid, producing gas that turns lime water into milk. When ammonia is added to the colorless solution, white sediment is formed. The sediment dissolves in excess of aqua ammonia to give a colorless solution. What is carbonate X? a. calcium carbonate. copper (II) carbonate. zinc carbonate. zinc sulfide. 12. Sodium hydroxide reacts with metal ion producing colored sediment. This precipitation changes color when standing. What is an ion? a. Cu^{2+} . Fe^{2+} . No^{2+} . 13. The bee sting is sour. Which household substance neutralizes the bee sting? a. moist

bicarbonate of soda pH 8b moist common salt pH 7c. lemon juice pH 5D. vinegar pH 414. Excess sodium hydroxide is added to the aqueous X salt solution and boiled. Ammonia gas is sucked out only after the aluminum foil has been added to the hot solution. What could be X?a. ammonium chloride. ammonium nitrate. sodium chloride. sodium nitrate15. Which ion reacts with aquier ammonia to give sediment, which dissolves in excess of ammonia?a. Al³⁺b. Fe²⁺c. Fe³⁺d. Non2¹⁶. The solid element conducts electricity. The element burns in the air to form a white solid. This white solid dissolves in water to give alkaline solution. What is an element? Calcium. carbon. copper17. What calcium compound does not increase the pH of acidic soils?a. calcium carbonateb.calcium hydroxidec. calcium oxide. calcium sulfate18. What is the concentration of hydrogen ions at 0.05 maul/dm³ of sulphuric acid?a. 0.025 g/dm³b. 0.05 g/dm³s. 0.10 g/dm³d. 2.0 g/dm³19. Solution X forms white sediment with diluted sulphuric acid, as well as with silver aquier. What may contain solution X?a. barium chloride. barium nitrate. magnesium chloride. magnesium sulfate20. Which of the following is the reaction of diluted salt acid?a. ammonium chloride reacts to give ammonia. Calcium carbonate reacts to give carbon dioxide. Copper reacts to give hydrogenated. The universal paper indicator turns blue21. What compound in the solution produces sediment with aqueous ammonia, which does not dissolve when excess ammonia copper (II) sulfatebe. iron (II) chlorideka. hydroxim potassium. zinc chloride22. The white compound produces a mixture of gases when heated. This mixture becomes a damp universal paper indicator red and relights the glowing tire. What does this mixture contain? acid gas and oxygen. alkaline gas and hydrogenated. alkaline gas and oxygen23. Which of the following describes a step in the preparation of insoluble barium sulfate from barium chloride aquitaine and dilution of sulphuric acid?a. add diluted sulfuric acid until more gas is produced. Add a methyl orange indicator. Collect the sediment of barium sulfate by filtering. evaporate the filter until it crystallizes.24 Solid R is gradually added to the aqueous solution S. Changes in pH are shown on the graphWhat is R and S? R S Einsoluble oxydehydrochloric acid is a binsoluble non-metallic hydroxyxide hydroxide of the dye metal oxide acid soluble non-metallic oxidide hydroxide25. The two solutions are mixed in a glass and the mass of the glass and the contents are then recorded at different times. The graph shows the results. What can these two solutions be? a. a. a. a. aqueous copper (II) sulfate and aqueous ammonia. aqueous sodium carbonate and dilute nitric acid. sodium hydroxide and zinc aquiose sulfate. dilute the salt acid and sodium sulfate quewata26. Element L burns in the air, giving a product that dissolves in water, producing an alkaline solution. What is the L?a. carbonb element. Iron. Sodium. sulfur27. As a result of the accident, nitric acid was spilled at the plant. What substance, when added in excess, neutralizes the acid without leaving an alkaline solution?a. a. aqueous ammoniab. aqueous sodium hydroxide. fizzy fizzy. Water28. Which statement does not describe the property of weak acid in the solution? It has a pH of 8 to 9c. it is only partially separated into ions. it reacts with sodium carbonate to release carbon dioxide.29 Aqueous sulfate solution is made of solid hydroxide, from metal M, by reaction: M(OH)₂ (s) H₂SO₄ (aq) ----> MSO₄ (aq) - 2H₂O (l)For which hydroxide will not work method?a. hydroxideeb. copper (II) hydroxide. iron (II) hydrochita. hydroxide magnesium30. During the experiment, sulfate 4.0 cm³ of 1.0 maul/dm³ of aquier copper (II) was mixed with 8 cm³ of 1.0 mil/dm³ of sodium aquiazo carbonate. CuSO₄ and Na₂CO₃ ----> Na₂SO₄ - CuCO₃What does the reaction vessel contain when the reaction has been completed?a. colorless solution onlyb. green sediment and blue solution. green sediment and colorless solution. white sediment and blue mortar31. Which of the following compounds dissolves in water to give the solution with pH more than 7?a. calcium carbonate. copper (II) hydroxide. sodium hydroxide. sulphur dioxide32. Wastewater it was found that the factory had a pH value of 2. What substance can be used to neutralize wastewater before it is released into the river? Limec. Oxygen. sulphur dioxide33. Which of the following gases will not turn a damp blue litmus test in red? Chlorine. hydrogen chloridi. nitrogen oxide34. Which of the following correctly describes the forming solution and the gas evolved when potassium reacts with water? Gasa's solution. alkaline neutral. sour neutral. alkaline acid. Neutral Neutral35. Which of the following compounds can be classified as regular salt?l. K₂SO₄II. Jun (OH)ClIII. NaHCO₃IV. CH₃COONaa. Me and II onlyb. II and IV onlyc. I, II and IIIId. Me and IV are only 36. What salt can be prepared by a method that includes crystallization as the final stage? a. sulfateb barium. calcium carbonate. silver chloridi. sodium nitrate37. Nitrates from fertilizers used on farmland can cause pollution. Why do nitrates pollute rivers? nitrates are very soluble in the water. nitrates contain oxygen. nitrate ions are negatively charged38. Farmers use potassium chloride on farmland. Why is it used?a. it removes excess acidity in the soilb. It kills harmful bacteria in soilc. It provides potassium, which is essential for healthy plant growth. it reacts with salts in the soil, releasing ammonia. a2. b (white sediment of barium sulfate produced in both cases)3. d4. d (ethanol acid is an organic compound that contains carbon atoms in its molecule that can burn in the air to form carbon dioxide)5 d (sodium nitrate is the only soluble salt. a (aluminium oxide is an oxide of amphoteric that reacts with both acids and alkaline)7. c 8. d (since X is a colorless solution, it does not contain transient metal ions. White ppt is likely to be AgCl) 9. c10. a11. c12. c13. 14. d (for ammonium nitrate, ammonium gas will also develop when it is boiled with sodium hydroxide. d16. c17. d18. c19. A20. b21. b22. b23. c (when 2 solutions are mixed, BaSO₄ sediment is formed. A25. b (the graph shows the loss of mass. hence the reaction is likely to be the one that emits the gas that comes out of the ship's reaction)26. c27. c28. b29. a (barium hydroxide dissolves in water and reacts with diluted sulphuric acid to form insoluble barium sulfate)30. c31. c32. b33. d34. A35. d36. d (sodium nitrate is the only soluble salt that can be obtained by crystallization)37. b38. c1a. Hydrogen chloride is dissolves in water to form a sour solution. explain why the dry hydrogen chloride gas is neutral. explain why hydrogen aqueous chloride is acidicii. describe how sodium carbonate can be used to confirm that an aqueous solution contains acid1b. The oxides of the elements can be acidic, basic or amfoteric. Name the name and formula of one example of each of these three types of oxide. Solution1ai. Hydrogen chloride is covalently associated with the exchange of electrons. Thus, the molecules do not charge because the ionization does not occur. When hydrogen chloride dissolves in water, the molecules are then ionized to form H and Cl-. Water is also ionized to form H and OH-. The amount of hydrogen ions is greater than hydroxide ions, so the solution becomes acidic. 1aiii. It reacts with sodium carbonate to release carbon dioxide.1b. sulphur dioxide, SO₂ - ACIDIC potassium hydroxide, KOH - BASIC zinc oxide, SNO - AMPHOTERIC2. The reaction between zinc pellets and diluted sulfuric acid at 25oC can be made to go faster by adding a small amount of copper powder. the experiment allows a reaction of 0.65 g of zinc pellets and 100 cm³ 0.2 maul/dm³ of sulphuric acid. calculate the number of zinc moles at 0.65 gi. calculate the number of moles of sulphuric acid in 100 cm³ 0.2 moles/dm³ solutioniii. give an equation, including state symbols, for reaction. explain why the reaction stops.b. Give another method of making a reaction between zinc pellets and diluted sulfuric acid go faster. Explain in terms of collisions between reacting particles, how the method you described speeds up the reaction. Solution2ai. Lol mole th th mass / Mr. 0.65/65 th 0.012aii. Lol moles of sulphuric acid and molarity x volume 0.2 x 0.1 and 0.022aa. Yong (s) - H₂SO₄ (aq) ----- All zinc reacted with H₂SO₄. Acid H₂SO₄ exceeds.2b. Use powdered zinc instead of pellets. With powdered zinc, more zinc particles are able to move and collide with acid particles. This increases the number of collisions and thus increases the reaction rate.3 It is about oxides. Use only the following oxides as answers.carbon dioxidecopper (II) oxySIDecarbonocarbon oxidation dioxidesulphur dioxidea. Which oxide has a macromolecular structure?b., which oxide is used to whiten wood cellulose in paper production?c. Which oxides are the main?d. What oxides are common atmospheric pollutants?e., which oxide is the main component of sand?f., which oxide gives a blue solution when heated with diluted sulfuric acid? Solution3a. Silicon dioxide3b. sulphur dioxide3c. copper (II) oxide and sodium oxide3d. carbon monoxide and sulphur dioxide3e. Dioxide copper (II) oxide4. Describe what is observed in each of the following reactions. sodium hydroxide is added to aquier sulfate iron (III). Dilute Dilute Dilute acid is added to solid sodium carbonate. Acacia barium chloride is added to dilute the sulfuric acedd. Aqueous silver nitrate is added to the aqueous sodium chlorideSolution4a. The orange-brown sediment is visible4b. solid dissolved and hissing seen (colorless and odorless gas developed)4c. white sediment seen4d. white sediment seen5a. Potassium nitrate is a salt that can be prepared by reacting to acid alkaline using the titration method. name acids and lye that react to make potassium nitrate. explain why the titrating method is suitable for the preparation of potassium nitrate5b. Lead (II) iodide is a salt that can be prepared by precipitation. name suitable reagents for lead (II) iodine. explain why the precipitation method is suitable for lead preparation (II) iodideSolution5ai. Acid: alkaline nitric acid: potassium hydroxide5aii. Since acid, alkaline and salt are soluble in water, KNO₃ cannot be prepared by other methods (such as precipitation). The exact quantities of each acid and lye are determined by the titrent, where the endpoint is the use of the indicator.5bi. lead nitrate and potassium iodide5bii. Because lead iodide is insoluble in water. Once formed, it is sucked out easily while KNO₃ salt remains soluble in water.6. Write the name of one example of each of the following. Green solid, which decomposes on heating to form carbon dioxide. gas that turns wet red litmus test bluec. acid, which forms white sediment when mixed with barium aquier nitrate. metal that is extracted bysolution6a electrolysis. copper (II) carbonate6b. ammonia6c. sulphuric acid6d. aluminium7a. For each of the following reactions, that is the comments you expect to make. name the product (s) reaction (s)iii. Explain the changes that occur1 Aqueous sodium hydroxide is added to the aqueous iron (II) sulfate and the mixture can stand2. Chlorine bubble in aqueous potassium iodide. A solid product is assembled and then heated.7b. Hydrogen can be manufactured using a reversible reaction between methane and steam. Hydrogen formation is endothermic.i. write an equation for this reactionii. explain why this reaction is best performed at high temperature, but at low pressure. Solution7ai. 1. A dirty green sediment of iron hydroxide (II) is formed, which becomes brown (iron (III) hydroxide. Fe²⁺ (aq) - 2OH⁻ (aq) ----> Fe (OH)₂ (s)4Fe (OH)₂ (s) - O₂ (g) - 2H₂O (l) ---> 4Fe (OH)₃ (s)2. The solution turned brown due to the formation of iodine. Iodide is oxidized by chlorine to give iodine. Cl₂ (g) - 2I⁻ (aq) ----> 2Cl⁻ (aq) - I₂ (aq)With a large iodine content formed, it finally precipitates like black solid. this black iodine iodine makes it sublime to form a purple vapor of iodine. Black iodine crystals will be seen in shape on a cooler surface. I₂ (s) ---> I₂ (g)7bi. CH₄ (g) - H₂O (l) (---) 3H₂ (g) - CO (g)7bii. High temperature accelerates the reaction rate. It also helps to push the balance to the right, as the forward reaction is endothermic. Because there are more gas products, reducing pressure will also help shift the reaction to the right. Thus, the yield will be higher.8a. Name two axial solutions that will respond to silver chloride sediment. AgCl8b. Write an ionic equation, including state symbols, for a.8c reaction. Describe how you get a clean dry sample of silver chloride sediment from the mixture in a.Solution8a. sodium chloride and silver nitrate8b. Age (aq) - Cl⁻ (aq) ----> AgCl (s)8c. Mix two solutions. Filter the mixture. AgCl turns out as a residue. Wash the residues with water and then dry the solid in the oven.9. The student adds sodium hydroxide from buretta to 25.0 cm³ of diluted sulphuric acid. The student measures the pH value of the mixture when adding sodium hydroxide. describe how the pH is changing. give an ionic equation to represent a neutralization reaction between sodium hydroxide and sulphuric acid. sulphuric acid is a strong acid.i. what is meant by the term acid?ii. what is the difference between strong acid and weak acid?d. diluted sulfuric acid reacts with magnesium to give hydrogen. Give an ionic equation for this reaction. Solution9a. pH increases from 1 to 149b. H⁺ (aq) - OH⁻ (aq) ----> H₂O (l)9ci. Acid is a compound that produces hydrogen ions, H, when it dissolves in water.9cii. The strong acid is completely dispersed in the water, while the weak acid partially disperses in the water to form hydrogen ions H⁺.9d. Mg (s) - 2H⁺ (aq) --> Mg²⁺ (aq) - H₂ (g)10a. For each salt, offer the name of the missing reagent and briefly describe how to get a solid product from the reaction.i. Salt to be made: lithium chlorideagent 1: dilute the syll acid 2: _____ I can get a solid lithium chloride: _____.ii. Salt to be made: barium sulfateheagen 1: aqueous potassium sulfateagent 2: _____ I can get solid crystals of barium sulfate by: _____.iii. Salt to be made: Blue copper (II) sulfate crystals 1: dilute sulphuric acid 2: _____ I can get blue copper (II) sulfate crystals by: _____.10b. Ammonium sulfate can be manufactured by an ammonia aquitaine reaction with diluted sulphuric acid.2NH₃ (aq) - H₂SO₄ (aq) ----> (NH₄)₂SO₄ (aq)Calculate the mass of ammonium sulfate, which can be made from 51 grams of ammonia. Solution10ai. reagent 2: aqueous lithium hydroxideEvaporating salt solution to dryness Chloride lithium crystals10aii. lithium10aii. 2: aqueous chloride bariumFiltration10aiii. reagent 2: solid copper (II) oxideCrystalization10b. Mr. NH₃ No 17Mr (NH₄)₂SO₄ - 132no. mole NH₃ - 51/17 - 3no. moles (NH₄)₂SO₄ - 1.5Mass (NH₄)₂SO₄ made 1.5 x 132 198 g11. The table shows the pH ranges of soil required by different crops for growth. Harvest pH range of peanuts 5.0 - 6.5 millet6.0 - 6.5 sunflower6.0 - 7.5 paprika7.0 - 8.5 mango5.5 - 6.0 a. Farmer plants peanuts and millet. Only the peanut crop grows well. Predict the pH of the soil. What other crop is likely to grow well in the same soilc. The farmer adds calcium hydroxide, Ca (OH)₂, and ammonium sulfate, (NH₄)₂SO₄, to the soil. Explain the purpose of each compound.d. The reaction occurs between calcium hydroxide and ammonium sulfate. complete the equation for this reaction. Ca (OH)₂ (NH₄)₂SO₄ ----> 2H₂O acids bases and salts notes o level pdf

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