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Review your learners understanding of key ideas, words and phrases relating to acids and bases. This resource features three different versions of a worksheet on acids and bases: scaffolded, partially scaffolded and unscaffolded. Use the worksheets to identify learners knowledge gaps and misconceptions once you have taught this part of the curriculum. Find out more about how to use this resource or download the worksheets below. Download the scaffolded, partially scaffolded and unscaffolded student worksheets. You will find model answers in the teacher guidance. These Acids and bases worksheets cover the following topics: the pH scale, the pH of acidic and alkaline solutions, common acids and alkalis, general word equations for the reactions of an acid with a metal, metal oxide, metal hydroxide and a metal carbonate, chemical formulas of common laboratory acids, types of salts produced from reactions with hydrochloric acid, sulfuric acid and nitric acid, universal and litmus indicators. If learners successfully answer questions on these topics, they can attempt the extension questions. These cover: word equations for the reactions between an acid and a metal, metal oxide, metal hydroxide or metal carbonate, symbol equations for the reactions between an acid and a metal, metal oxide, metal hydroxide or metal carbonate. The What do I understand? page is common to all worksheets. Learners are encouraged to develop independent learning skills and can use their reflection as a guide for revision. The feedback will also help you to identify areas where a whole class needs attention. Answers to the teacher guidance provides model answers for each worksheet, plus guidance on learners common misconceptions. Learners can use the model answers to self- or peer assess. More resources in this set of practice problems, we will work on examples correlating the acidity and basicity of a solution with pH, calculating the pH of strong and weak acids and bases, the pH and pOH relationship, and calculating the pH of salt solutions. The links to corresponding topics are given below:

1. Autoionization of Water and pH Arrange the following solutions in the order of increasing acidity (least acidic to most acidic): (a) pH = 9.8 (b) pH = 1.2 (c) pH = 4.7 (d) pH = 6.4 2. Arrange the following solutions in the order of increasing basicity (least basic to most basic): (a) pOH = 5.2 (b) pOH = 11.6 (c) pOH = 3.4 (d) pOH = 1.9 3. Calculate the pH for each of the following solutions at 25 °C: (a)  $[H_3O^+] = 1.3 \times 10^{-2} M$  (b)  $[H_3O^+] = 1.6 \times 10^{-3} M$  (c)  $[OH^-] = 1.8 \times 10^{-3} M$  (a) b) c) 4. Calculate the  $[OH^-]$  of each of the following solutions at 25 °C. Identify the solution as neutral, acidic, or basic. (a)  $[H^+] = 2.5 \times 10^{-6} M$  (b)  $[H^+] = 8.3 \times 10^{-4} M$  (c)  $[H^+] = 4.6 M$  (d)  $[H^+] = 3.9 \times 10^{-2} M$  (a) b) c) d) 5. Given the pH values, calculate  $[H_3O^+]$  and  $[OH^-]$  for each solution at 25 °C. Identify each solution as neutral, acidic, or basic. (a) pH = 7.2 (b) pH = 15.3 (c) pH = 4.6 (a) b) c) 6. The pH of Strong Acids and Bases Calculate the pH for each of the following solutions: (a) 0.15 M HCl (b) 0.60 M HClO<sub>4</sub> (c) 1.4 M KOH (a) b) c) 7. Calculate the pH of each of the following solutions: (a) 0.0025 M HI, (b) 0.84 M NaOH (a) b) 8. Calculate the pH of the solution prepared by dissolving 24.0 g of HCl in 662 mL of water. 9. How many grams of KOH is needed to prepare a 680.0 mL solution with a pH of 9.80? 10. Calculate the pH of the solution prepared by diluting 40.0 mL of 3.00 M HNO<sub>3</sub> with 210.0 mL of water. 11. The pH of Weak Acids Calculate the pH of a 0.45 M solution of HCN.  $K_a(HCN) = 4.9 \times 10^{-10}$  12. Calculate the pH of a 0.74 M solution of acetic acid.  $K_a(CH_3CO_2H) = 1.7 \times 10^{-5}$  13. 0.86 g benzoic acid (C<sub>6</sub>H<sub>5</sub>CO<sub>2</sub>H,  $K_a = 6.4 \times 10^{-5}$ ) was dissolved in enough water to make 1.0 L of solution. Calculate the pH and concentration of all species present in the solution. 14. Calculate the pH of a 2.0 M solution of hydrofluoric acid, HF.  $K_a(HF) = 6.6 \times 10^{-4}$  15. What is the acid ionization constant ( $K_a$ ) of a weak acid (HA) if its 0.246 M solution has a pH of 2.68? 16. A solution of nitrous acid (HNO<sub>2</sub>,  $K_a = 7.2 \times 10^{-4}$ ) has a pH of 3.1. What was the initial concentration of nitrous acid in the solution? 17. Calculate the pH of a 0.40 M H<sub>2</sub>S solution given that  $K_{a1} = 1.0 \times 10^{-7}$ ;  $K_{a2} = 1.0 \times 10^{-19}$ . 18. The pH of Weak Bases Explain why all of these are weak bases by writing the equations for their reaction with water and the corresponding expression for  $K_b$ . (a) NH<sub>3</sub> (b) HCO<sub>3</sub> (c) CN<sup>-</sup> (d) CH<sub>3</sub>NH<sub>2</sub> (e) C<sub>5</sub>H<sub>5</sub>N (f) F<sup>-</sup> (a) b) c) d) e) f) 19. Determine the pH of a 0.85 M solution of ammonia (NH<sub>3</sub>). 20. Triethylamine, (C<sub>2</sub>H<sub>5</sub>)<sub>3</sub>N is a common organic weak base with  $K_b$  of  $4.0 \times 10^{-4}$ . Calculate  $[OH^-]$ ,  $[H^+]$ , and the pH of 0.25 M solution of triethylamine. 21. Calculate  $[OH^-]$ ,  $[H^+]$ , and the pH of 0.40 M solution of caffeine ( $pK_b = 10.4$ ). 22. Calculate the percentage of ethyl amine (CH<sub>3</sub>CH<sub>2</sub>NH<sub>2</sub>) that is ionized by reacting with water in its 0.64 molar aqueous solution ( $K_b = 5.6 \times 10^{-4}$ ). 23. Morphine is among the most popular alkaloids that are used as pain killers. Like all the others, it contains a nitrogen atom which makes it a weak base. What is the  $K_b$  of morphine at a certain temperature if its 0.340 M solution has a pH of 10.9? 24. The Acid-Base Properties of Salts For each ion, determine if it acts as a weak base in an aqueous solution. For those that do, write an equation to show why they make the solution basic. a) Cl<sup>-</sup> b) Br<sup>-</sup> c) CN<sup>-</sup> d) ClO<sub>3</sub><sup>-</sup> e) CH<sub>3</sub>CO<sub>2</sub><sup>-</sup> f) I<sup>-</sup> g) NO<sub>2</sub><sup>-</sup> h) F<sup>-</sup> (a) b) c) d) e) f) g) h) 25. Predict whether the aqueous solutions of the following compounds are acidic, basic, or neutral: (a) KBr (b) FeCl<sub>2</sub> (c) Na<sub>2</sub>CO<sub>3</sub> (d) Al(NO<sub>3</sub>)<sub>3</sub> (e) KClO<sub>4</sub> (f) Na<sub>2</sub>SO<sub>3</sub> (g) NH<sub>4</sub>ClO<sub>3</sub> (a) b) c) d) e) f) g) 26. Which of the following salts would produce the most basic aqueous solution? (a) KF (b) NaBr (c) NH<sub>4</sub>Cl (d) MgCl<sub>2</sub> (e) Mg(NO<sub>3</sub>)<sub>2</sub> 27. Calculate the pH of a 0.74 M solution of NaOBr ( $K_a(HBrO) = 2.90 \times 10^{-9}$ ). 28. Calculate the pH of the 0.26 M solution of NH<sub>4</sub>ClO<sub>3</sub> ( $K_b(NH_3) = 1.8 \times 10^{-5}$ ). 29. Calculate the pH of a 0.35 M solution of KNO<sub>2</sub> ( $K_a = 4.0 \times 10^{-4}$ ). 30. Calculate the pH of a 1.0 M solution of sodium acetate (CH<sub>3</sub>CO<sub>2</sub>Na) considering that the  $K_a$  of acetic acid (CH<sub>3</sub>CO<sub>2</sub>H) is  $1.7 \times 10^{-5}$ . 0 ratings 0% found this document useful (0 votes) 244 views 3 pages This document contains a worksheet with answers for pH concept problems. There are 40 multi-part chemistry problems calculating pH, pOH, concentrations of H<sup>+</sup> and OH<sup>-</sup> ions, acid-base titration, enhanced title and description Save Save Work Sheet-pH-and-pOH-answers For Later 0% found this document useful, undefined ratings 0% found this document useful (0 votes) 244 views 3 pages This document contains a worksheet with answers for pH concept problems. 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