

Name:

Date:

Period:

Seat #:

Directions: Any worksheet that is labeled with an * means it is suggested extra practice. We do not always have time to assign every possible worksheet that would be good practice for you to do. You can do this worksheet when you have extra time, when you finish something early, or to help you study for a quiz or a test. If and when you choose to do this Extra Practice worksheet, please do the work on binder paper. You will include this paper stapled into your Rainbow Packet when you turn it in, even if you didn't do any of this. We want to make sure we keep it where it belongs so you can do it later if you want to (or need to). If you did the work on binder paper you can include that in your Rainbow Packet after this worksheet. If we end up with extra class time then portions of this may turn into required work. If that happens you will be told which problems are turned into required. Remember there is tons of other extra practice on the class website...and the entire internet! See me if you need help finding practice on a topic you are struggling with.

Show all work for each question, box your final answer

[1] Write the name and formula for the conjugate bases of the following:

| Name | Formula |
|---|---------|
| HNO ₂ | |
| H ₂ SO ₄ | |
| H ₂ PO ₄ ⁻ | |
| HF | |
| CH ₃ CO ₂ H | |

[2] Is the monohydrogenphosphate ion HPO₄²⁻ amphiprotic? If so, write the formulas of its conjugate acid and its conjugate base.

[3] Write net ionic acid-base reactions for:

- | | |
|---|---|
| a. The reaction of acetic acid with aqueous ammonia solution | d. The reaction of sodium bicarbonate with sulfuric acid |
| b. The reaction of hydrofluoric acid with sodium hydroxide | e. The reaction of chlorous acid with aqueous ammonia solution |
| c. The reaction of ammonium chloride with potassium hydroxide | f. The reaction of disodium hydrogen phosphate with acetic acid |

[4] List the following substances in order of increasing acid strength: (**Look up and/or determine the K_a's**)

H₂O H₂SO₃ HCN H₂PO₄⁻ NH₄⁺ [Cu(H₂O)₆]²⁺ NH₃ H₃O⁺ HCO₂H HCl

Answer:

[5] What is the pH of a solution that contains 2.60 grams of NaOH in 250 mL of aqueous solution? **13.4**

[6] A 0.12 M solution of an unknown weak acid has a pH of 4.26 at 25°C. What is the hydronium ion concentration in the solution and what is the value of its K_a? **K_a = 2.52E⁻⁸**

[7] Suppose you dissolved benzoic acid in water to make a 0.15 M solution. K_a for benzoic acid = 6.3 x 10⁻⁵ at 25°C

- | | |
|--|---|
| a. the concentration of benzoic acid? (0.147M) | b. the concentration of hydronium ion? (0.0031M) |
| c. the concentration of benzoate anion? (0.0031M) | d. the pH of the solution? (2.51) |

[8] For each of the following salts, predict whether an aqueous solution would be **acidic**, **basic**, or **neutral**

- sodium nitrate NaNO₃
- ammonium iodide NH₄I
- sodium bicarbonate NaHCO₃
- ammonium cyanide NH₄CN
- sodium hypochlorite NaOCl

f. potassium acetate KCH_3CO_2

[9a] What is the pH of a 0.80 M solution of sulfurous acid? 0.97

[b] What is the concentration of sulfite ion in a 0.80 M solution of sulfurous acid? (6.4E^{-8})

[c] What happens to the concentration of sulfite ion SO_3^{2-} if the concentration of sulfurous acid is halved?

[10] Calculate the pH of a 0.35 M solution of potassium cyanide. K_a for $\text{HCN} = 4.0 \times 10^{-10}$. [pH = 11.47]

[11a] Calculate the pH of a 0.20M solution of formic acid HCO_2H . 2.22

b. Now suppose sufficient sodium formate is added to make the solution 0.10M in formate ion (without changing the total volume). Would you expect the pH to increase or decrease?

c. Calculate the pH of the new solution. 3.44

d. What would the pH be if the concentration of formate ion was increased to 0.20M? 1.8E^{-4}

e. What do you notice about the pH of this solution? 3.74