pH of Salt Solutions – Reading Guide

*section 14.4 in OpenStax*

Acid and base reactions can result in acidic, basic, or neutral solutions depending if the **salt** reacts with water.

1. Strong acid + strong base 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_ solutions (*acidic, basic, or neutral*)

Example: HBr + NaOH 🡪 H­2O + \_\_\_\_\_\_\_\_\_\_\_

1. Strong acid + weak base 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_ solutions (*acidic, basic, or neutral*)

Example: HCl + NH3 🡪 \_\_\_\_\_\_\_\_\_\_\_\_

1. Weak acid + strong base 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_ solutions (*acidic, basic, or neutral*)

Example: HNO2 + NaOH 🡪 H2O + \_\_\_\_\_\_\_\_\_\_\_

Classify the following salts from above as acidic, basic, neutral. *Explain by showing the reaction with water*.

NaBr NH4Cl NaNO2

Specify if the following ions produce acidic or basic solutions. **Circle** the ions that are neutral. The first ion is done for you.

NH4+

F–

CO32–

Base

Acid

NO3–

PO43–

CH3CH2NH3+

Br–

What is the relationship between Ka and Kb relative to Kw?

Kw =

For salts of **weak** acids or bases, an ICE table must be used to determine the equilibrium concentrations. Follow Examples 14.15 and 14.16 to see how this is done. Create an ICE table for a 0.69 *M* solution of nitrite.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | NO2– (*aq)* + H2O (*l*) | | ⮀ | + | |
| I |  | -- |  |  |  |
| C |  | -- |  |  |  |
| E |  | -- |  |  |  |

The Ka for HNO2 is 4.6 x 10-4. What is the value of Kb for the reaction above?

(*ans. Kb for NO2- = 2.2 x 10-11)*

*Use your ICE table to calculate the pH for a 0.69 M solution of NO2-.*

*(ans. [OH-] = 3.87 x 10-6, pOH = 5.41, pH = 8.59)*

**End of Chapter 14 Practice Problems**

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For detailed solutions to these problems, go to the [OpenStax website](https://openstaxcollege.org/textbooks/chemistry/resources) and download the “Student Answer and Solution Guide.”