

How does acid rain form?

Gaseous pollutants contribute to the formation of acid rain. Nitrogen oxides (NO_x) become dissolved in water forming nitric and nitrous acids according to the reaction below. These acids stay dissolved in rainwater and are dispersed far from the pollution source, which causes immense damage to both architecture and the environment.



- A. Using the products from the equation above, write the resulting acid dissociation reactions.

Having trouble? Review questions from Chapter 14: 7, 8, 9 and 10.

- B. Which acid is stronger? Justify your answer with Lewis structures of the conjugate bases.

Having trouble? Review questions from Chapter 14: 40, 41, and 43.

- C. Below are equilibrium concentrations for the acid dissociation of 1 M nitrous and nitric acid. Would you expect to find K_a values in the data tables for each acid? Calculate a value for K_a for any reaction that should have one. Do these data agree with your argument for question 2?

Having trouble? Review questions from Chapter 14: 53 and 54.

Nitric Acid		Nitrous Acid	
Nitric Acid	$9.98 \times 10^{-25} \text{ M}$	Nitrous Acid	$9.4 \times 10^{-2} \text{ M}$
H_3O^+	0.999 M	H_3O^+	$6.5 \times 10^{-3} \text{ M}$

- D. In a sample of rainwater, the concentration of nitric acid is $3.0 \times 10^{-3} \text{ M}$ and the concentration of nitrous acid is $3.0 \times 10^{-3} \text{ M}$. What is the pH of the acid rainwater?

Having trouble? Review questions from Chapter 14: 71.

- E. Based on your answers to Parts B-D, which acid, nitric or nitrous, contributes more to the pH of acid rain? Use specifics from the previous parts to justify your answer.