

## Quiz 3

Enter your student number (not SSN)!

Circle final answers. All answers and calculations must be on question sheet.

You have 20 minutes. I'll review the answers at the end of that time.

$$\text{pH} = -\log_{10}[\text{H}^+]$$

$[\text{H}^+]$  = moles of hydrogen ion per liter of water

## Quiz 3 Solutions

1. What effect will 70% reduction in emissions of  $\text{SO}_2$  and  $\text{NO}_x$  have on the average pH of rainfall?

Let  $H_0 = [\text{H}^+]$  before the reductions:

$$\text{pH}_0 = -\log_{10}(H_0)$$

$$\begin{aligned}\text{pH} &= -\log_{10}(0.3 \cdot H_0) \\ &= -\log_{10}(0.3) - \log_{10}(H_0) \\ &= 0.52 - \log_{10}(H_0) \\ &= \text{pH}_0 + 0.5\end{aligned}$$

## Quiz 3 Solutions

2. If  $\text{pH} = 4.3$  before the reductions, what is pH after? What is the corresponding  $[\text{H}^+]$ ?

$$\text{pH} = \text{pH}_0 + 0.5 = 4.3 + 0.5 = 4.8$$

$$[\text{H}^+] = 10^{-\text{pH}} = 10^{-4.8} = 1.6 \cdot 10^{-5} \frac{\text{moles}_{\text{H}^+}}{\text{L}}$$