

## Review Questions

In its pure liquid form, ammonia ( $\text{NH}_3$ ) undergoes autoionization. Write an equation to show how ammonia autoionizes.

2. Complete the following table:

$[\text{H}_3\text{O}^+]$	$[\text{OH}^-]$	Acidic, Basic, or Neutral?
	6.0 M	
$3.2 \times 10^{-4}$ M		
	$9.2 \times 10^{-12}$ M	
2.5 M		
	$4.7 \times 10^{-5}$ M	

3. The autoionization of water has  $\Delta H = 57.1$  kJ/mol. Write the equation for the autoionization of water including the energy term. Explain how the value of  $K_w$  changes with temperature.

4. The  $K_w$  for water at  $1^\circ\text{C}$  is  $1.0 \times 10^{-15}$ . Calculate the  $[\text{H}_3\text{O}^+]$  and  $[\text{OH}^-]$  in 0.20 M HI at this temperature.

5. Human urine has a  $[\text{H}_3\text{O}^+] = 6.3 \times 10^{-7}$  M. What is the  $[\text{OH}^-]$ , and is urine acidic, basic, or neutral?

6. Complete the table:

Temperature	$K_w$	$[\text{H}_3\text{O}^+]$	$[\text{OH}^-]$	Acidic, Basic, or Neutral?
$50^\circ\text{C}$	$5.5 \times 10^{-14}$			
$100^\circ\text{C}$	$5.1 \times 10^{-13}$			