

Worksheet: Autoionization of Water



Q1: The ionization constant for water (K_w) is 9.311×10^{-14} at 60°C . To 4 significant figures, what is the value of $[\text{H}_3\text{O}^+]$ in pure water at this temperature?

A $4.656 \times 10^{-14} \text{ M}$

B $3.051 \times 10^{-7} \text{ M}$

C $4.096 \times 10^{-8} \text{ M}$

D $9.311 \times 10^{-14} \text{ M}$

E $2.273 \times 10^{-6} \text{ M}$

Q2: Why is a sample of pure water at 40°C neutral even though $[\text{H}_3\text{O}^+] = 1.7 \times 10^{-7} \text{ M}$? The self-ionization constant of water, K_w , is 2.9×10^{-14} at 40°C .

A The concentrations of H_3O^+ and OH^- ions are exactly equal.

B K_w is higher at 40°C than at 25°C .

C Water loses its acidity when heated.

D H_3O^+ molecules cannot be deprotonated.

E The concentration of OH^- ions is greater than that of H_3O^+ ions.

Q3: The ionic product of water at 80°C is 2.4×10^{-13} . What is the concentration of hydroxide ions in pure water at 80°C? Give your answer to two significant figures.

A 4.9×10^{-7} M

B 3.5×10^{-7} M

C 1.0×10^{-14} M

D 2.4×10^{-13} M

E 1.2×10^{-13} M