

**APPLICATION** *Health***Electrolyte Balance in the Body**

The elements of Group 1 are important to a person's diet and body maintenance because they form ionic compounds. These compounds are present in the body as solutions of the ions. All ions carry an electric charge, so they are electrolyte solutes. Two of the most important electrolyte solutes found in the body are  $K^+$  and  $Na^+$  ions. Both ions facilitate the transmission of nerve impulses and control the amount of water retained by cells.



*During situations where the body is losing water rapidly through intense sweating or diarrhea for a prolonged period (more than 5 hours), a sports drink can hydrate the body and restore electrolyte balance.*

**TABLE 1A Sodium-Potassium Concentration in Body Fluids**

Cation	Inside cells (mmol/L)	Outside cells or in plasma (mmol/L)
$Na^+$	12	145
$K^+$	140	4

The sodium and potassium ion concentrations in body fluids are shown in Table 1A. Sodium ions are found primarily in the fluid outside cells, while potassium ions are largely found in the fluid inside cells. Anions are present in the fluids to balance the electrical charge of the  $Na^+$  and  $K^+$  cations.

Abnormal electrolyte concentrations in blood serum can indicate the presence of disease. The ion concentrations that vary as a result of disease are  $Na^+$ ,  $K^+$ ,  $Cl^-$ , and  $HCO_3^-$ . Sodium ion concentration is a good indicator of the water balance between blood and tissue cells. Unusual potassium ion levels can indicate kidney or gastrointestinal problems. Chloride ion is the anion that balances the positive charge of the sodium ion in the fluid outside the cells. It also diffuses into a cell to maintain normal electrolyte balance when hydrogen carbonate ions diffuse out of the cell into the blood. Table 1B shows medical conditions associated with electrolyte imbalances.

**TABLE 1B Electrolyte Imbalances**

Electrolyte	Normal range (mmol/L)	Causes of imbalance	
		Excess	Deficiency
Sodium, $Na^+$	135–145	hypernatremia (increased urine excretion; excess water loss)	hyponatremia (dehydration; diabetes-related low blood pH; vomiting; diarrhea)
Potassium, $K^+$	3.5–5.0	hyperkalemia (renal failure; low blood pH)	hypokalemia (gastrointestinal conditions)
Hydrogen carbonate, $HCO_3^-$	24–30	hypercapnia (high blood pH; hypoventilation)	hypocapnia (low blood pH; hyperventilation; dehydration)
Chloride, $Cl^-$	100–106	hyperchloremia (anemia; heart conditions; dehydration)	hypochloremia (acute infection; burns; hypoventilation)