

Buffer systems prevent major changes in the pH of body fluids by removing or releasing H^+ ; they can act quickly to prevent excessive changes in H^+ concentration. Hydrogen ions are buffered by both intracellular and extracellular buffers. The body's major extracellular buffer system is the bicarbonate–carbonic acid buffer system, which is assessed when arterial blood gases are measured. Normally, there are 20 parts of bicarbonate (HCO_3^-) to one part of carbonic acid (H_2CO_3). If this ratio is altered, the pH will change. It is the ratio of HCO_3^- to H_2CO_3 that is important in maintaining pH, not absolute values. CO_2 is a potential acid; when dissolved in water, it becomes carbonic acid ($CO_2 + H_2O = H_2CO_3$). Therefore, when CO_2 is increased, the carbonic acid content is also increased, and vice versa. If either bicarbonate or carbonic acid is increased or decreased so that the 20:1 ratio is no longer maintained, acid–base imbalance results. Less important buer systems in the ECF include the inorganic phosphates and the plasma proteins. Intracellular buers include proteins, organic and inorganic phosphates, and, in red blood cells, hemoglobin