effective in decreasing rates of bronchopulmonary dysplasia or in improving survival rates in preterm infants (Keszler, 2012; Donohue, Gilmore, Cristofalo, et al, 2011).

ECMO may be used in the management of term infants with acute severe respiratory failure for the same conditions as those mentioned for INO. This therapy involves a modified heart–lung machine, although in ECMO the heart is not stopped and blood does not entirely bypass the lungs. Blood is shunted from a catheter in the right atrium or right internal jugular vein by gravity to a servo-regulated roller pump, pumped through a membrane lung where it is oxygenated and through a small heat exchanger and then returned to the systemic circulation via a major artery, such as the carotid artery, to the aortic arch. ECMO provides oxygen to the circulation; allows the lungs to "rest;" and decreases pulmonary hypertension and hypoxemia in such conditions as persistent pulmonary hypertension of the newborn, congenital diaphragmatic hernia, sepsis, meconium aspiration, and severe pneumonia.

Acid–Base Imbalance

Many respiratory and metabolic conditions in infants and children may cause an acid–base imbalance. Disease states such as diarrhea (see Chapter 22), RDS, bronchopulmonary dysplasia, and respiratory failure may interfere with the body's ability to regulate and maintain acid–base balance. Simply stated, **acidosis** (acidemia) results from either accumulation of acid or loss of base, and **alkalosis** (alkalemia) results from either accumulation of base or loss of acid. Several laboratory tests are used to assess the nature and extent of acid–base disturbances; these are outlined in Table 8-7. To determine the acid–base status, three variables—the respiratory component (PCO_2), the metabolic component (arterial bicarbonate or serum carbon dioxide [HCO_3^-]), and the serum pH—must be determined. In addition, the anion gap may be useful in determining the cause and extent of metabolic acidosis; therefore, serum chemistry is obtained as well. Measurement of any two variables (PCO_2, pH, HCO_3^-) allows computation of the third using the Henderson-Hasselbalch equation. A summary of relationships between these and other variables is outlined in Table 8-8.