43. ***REASONING*** The magnitude E of the electric field is the magnitude F of the electric force exerted on a small test charge divided by the magnitude of the charge: $E = F/|q|$. According to Newton's second law, Equation 4.2, the net force acting on an object is equal to its mass m times its acceleration a. Since there is only one force acting on the object, it is the net force. Thus, the magnitude of the electric field can be written as

$$E = \frac{F}{|q|} = \frac{ma}{|q|}$$

The acceleration is related to the initial and final velocities, v_0 and v, and the time t through Equation 2.4, as $a = \dfrac{v - v_0}{t}$. Substituting this expression for a into the one above for E gives

$$E = \frac{ma}{|q|} = \frac{m\left(\dfrac{v - v_0}{t}\right)}{|q|} = \frac{m(v - v_0)}{|q|t}$$

SOLUTION The magnitude E of the electric field is

$$E = \frac{m(v - v_0)}{|q|t} = \frac{(9.0 \times 10^{-5}\ \text{kg})(2.0 \times 10^{3}\ \text{m/s} - 0\ \text{m/s})}{(7.5 \times 10^{-6}\ \text{C})(0.96\ \text{s})} = \boxed{2.5 \times 10^{4}\ \text{N/C}}$$