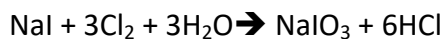


## Answer on Question #76951, Chemistry / General Chemistry

How many milliliters of  $\text{Cl}_2$  gas, measured at  $21.5^\circ\text{C}$  and  $763$  torr, are needed to react with  $16.0$  mL of  $0.242$  M  $\text{NaI}$  if the  $\text{I}^-$  is oxidized to  $\text{IO}_3^-$  and the  $\text{Cl}_2$  is reduced to  $\text{Cl}^-$ ?

### Solution



According to the equation reaction  $1$  mol of  $\text{NaI}$  requires  $3$  mols of  $\text{Cl}_2$ . Find the amount of  $\text{NaI}$ :

$$v_{\text{NaI}} = 0.242 \times 0.016 = 0.003872 \text{ (mol)}$$

$$v_{\text{Cl}_2} = 0.003872 \times 3 = 0.011616 \text{ (mol)}$$

Find the volume of chlorine:

$$V = \frac{vRT}{P}; T = 294.5 \text{ K}; R = 62.363 \text{ L}\cdot\text{torr}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$$

$$V = \frac{0.011616 \times 62.363 \times 294.5}{763} = 0.2796 \text{ (L)} = \mathbf{279.6 \text{ (ml)}}$$

### Answer

**279.6 ml** of  $\text{Cl}_2$  gas, measured at  $21.5^\circ\text{C}$  and  $763$  torr, are needed to react with  $16.0$  mL of  $0.242$  M  $\text{NaI}$ .