

### Answer on Question #54643-Engineering-Chemical Engineering

Into a barrel containing 33.2 bbl (US) of water containing 0.0012 mol/L of a blue dye you pour  $V_2$  yd<sup>3</sup> of water containing 8.91 M of the dye. The final concentration of the dye in the barrel is 7.91 mol/m<sup>3</sup> after it's well-mixed. What is  $V_2$  is yd<sup>3</sup>?

#### Solution

The final concentration of the dye in the barrel is

$$\frac{v}{V} = \frac{v_1 + v_2}{V_1 + V_2} \rightarrow \frac{v}{V} V_1 + \frac{v}{V} V_2 = \frac{v_1}{V_1} V_1 + \frac{v_2}{V_2} V_2.$$

$$V_2 = \frac{\frac{v}{V} - \frac{v_1}{V_1}}{\frac{v_2}{V_2} - \frac{v}{V}} V_1 = \frac{7.91 \cdot 0.001 \frac{\text{mol}}{\text{L}} - 0.0012 \frac{\text{mol}}{\text{L}}}{8.91 \frac{\text{mol}}{\text{L}} - 7.91 \cdot 0.001 \frac{\text{mol}}{\text{L}}} 33.2 \cdot 0.155961 \text{yd}^3 = 0.0039 \text{yd}^3.$$

**Answer: 0.0039 yd<sup>3</sup>.**