

# Xenon Volume Calculation

50-320  
RES/PAS

$Xe-133$   $1.7(10^8) Li$   $T_{1/2} = 5.28 \text{ days}$   $\lambda = \frac{0.693}{T_{1/2}} = 0.13 \text{ day}^{-1}$   
 $Xe-135$   $0.34(10^8) Li$   $T_{1/2} = 0.384 \text{ d}$

Acc. - 2 AM - WED

22 hr	W
24	T
20	F
<hr/>	
66 hr	

$Xe-133$   $1.7(10^8) e^{-\lambda t} = \frac{1.18}{1.7}(10^8) Li$

$\lambda N = 1.18(10^8) \times 3.7(10^{10}) \text{ d/sec}$

$\lambda = \frac{\ln 2}{5.28 \text{ day}} \times \frac{1}{24 \text{ hr}} \times \frac{1}{3600 \text{ sec}} = 1.52(10^{-6})$

$N = \frac{1.18(10^8) \times 3.7(10^{10})}{1.52(10^{-6})} = 2.87(10^{24})$

$= \frac{2.87(10^{24})}{6.022(10^{23})} = 4.77 \text{ moles}$

$1 \text{ mole STP} = 22.4 \text{ L} \times 4.77 \text{ m} = 106.8 \text{ L STP}$

$Xe-135$   $3.4(10^7) e^{-\left(\frac{0.693}{0.384} \times 2.75\right)} = 2.4(10^5)$

$\lambda = \frac{\ln 2}{0.384 \text{ d}} \times \frac{1}{24} \times \frac{1}{3600} = 2.09(10^{-5})$

$N = \frac{2.4(10^5) \times (3.7 \times 10^{10})}{2.09(10^{-5})} = \frac{4.2(10^{20})}{6.022(10^{23})} = 6.9(10^{-4}) \text{ m}$

$106.8 \text{ L} \times 10^{-3} \frac{\text{m}^3}{\text{L}} \times \left( \frac{1}{3048} \right)^3 \frac{\text{ft}^3}{\text{m}^3} = 3.8 \text{ ft}^3 \text{ STP}$

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