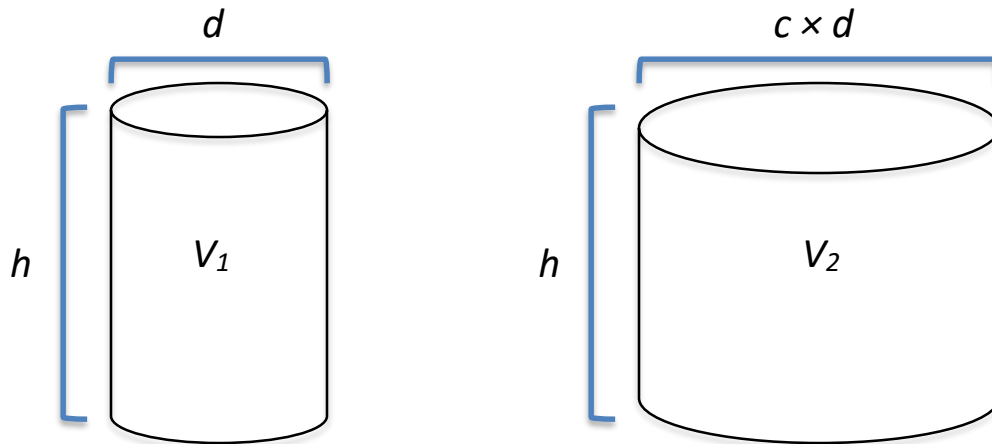


Appendix 1. Comparison of percent diameter change versus the associated volume change.



Volume 1: $V_1 = \left(\pi \times \frac{d}{2}\right)^2 \times h$

Volume 2: $V_2 = \left(\pi \times \frac{cd}{2}\right)^2 \times h$

Percent volume change:

$$\begin{aligned} \frac{(V_2 - V_1)}{V_1} &= \frac{\left(\pi \times \left(\frac{cd}{2}\right)^2 \times h\right) - \left(\pi \times \left(\frac{d}{2}\right)^2 \times h\right)}{\pi \times \left(\frac{d}{2}\right)^2 \times h} \\ &= \frac{\left(\pi \times \left(\frac{d}{2}\right)^2 \times h\right) (c^2 - 1)}{\left(\pi \times \left(\frac{d}{2}\right)^2 \times h\right)} \\ &= (c^2 - 1) \end{aligned}$$

Percent diameter Change:

$$\begin{aligned} &= \frac{(c \times d) - d}{d} \\ &= \frac{d(c - 1)}{d} \\ &= (c - 1) \end{aligned}$$