

decay of pressure from cylindrical region

$$P = P_0 \left[1 - e^{-\frac{r_0^2 \beta}{4kt}} \right]$$

at $x = 1 - e^{-\frac{r_0^2 \beta}{4kt}}$

then $t = -\frac{B}{4 \log(1-x)} \frac{r_0^2}{K}$; $K = \frac{k}{\rho_w g n}$

$$t = \frac{\beta \rho_w g n}{4 (-\log(1-x))} \frac{r_0^2}{K}$$

$$\frac{\text{cm}^2 \frac{\text{sec}}{\text{cm}}}{\text{cm}} = \frac{\text{sec}}{\text{cm}}$$

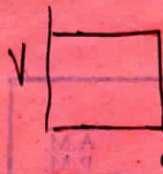
- $\beta = 4.0 \times 10^{-11} \frac{\text{sec}^2 \text{cm}}{\text{gm}}$
- $\rho_w = 1.004 \frac{\text{gm}}{\text{cm}^3}$
- $g = 981 \frac{\text{cm}}{\text{sec}^2}$
- $n = 0.8$

units of $\frac{\text{sec}^2 \text{cm} \frac{\text{gm}}{\text{cm}^3} \frac{\text{cm}}{\text{sec}^2}}{\text{gm}} = \frac{1}{\text{cm}}$

$-4 \log(1-0.1) = 0.421$

$$t = c \frac{r_0^2}{K} \quad c = \frac{(4.00 \times 10^{-11})(1.004)(981)(0.8)}{0.421} = 7.486 \times 10^{-8} \frac{1}{\text{cm}}$$

Pressure diffusion away from cylindrical
volume



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WHILE YOU WERE OUT ^{Kappa}

$$V(1 - e^{-a^2/4Kt})$$

$$K = \frac{k}{\rho c} \quad \rho c \frac{\partial T}{\partial t} = k \nabla^2 T$$

Conduction of Heat in Solids

H S Carslaw & J C Jaeger

Oxford Univer Press

London 1959

$$c = 7.486 \times 10^{-8} \frac{\text{cm}}{\text{cm}}$$

$$t = c \frac{r_0^2}{K}$$

times (in sec) for various K's

	$r_0 = 3.675$	$r_0 = 5 \text{ cm}$	$r_0 = 10 \text{ cm}$	$r_0 = 25 \text{ cm}$	$r_0 = 50$
$K = 10^{-5} \text{ cm/sec}$	1×10^{-1}	1.87×10^{-1}	7.49×10^{-1}	4.68×10^0	1.87×10^1
$K = 10^{-6} \text{ cm/sec}$	1×10^0	1.87×10^0	7.49×10^0	4.68×10^1	1.87×10^2
$K = 10^{-7} \text{ cm/sec}$	1×10^1	1.87×10^1	7.49×10^1	4.68×10^2	1.87×10^3
$K = 10^{-8} \text{ cm/sec}$	1×10^2	1.87×10^2	7.49×10^2	4.68×10^3	1.87×10^4
$K = 10^{-9} \text{ cm/sec}$	1×10^3	1.87×10^3	7.49×10^3	4.68×10^4	1.87×10^5
$K = 10^{-10} \text{ cm/sec}$	1×10^4	1.87×10^4	7.49×10^4	4.68×10^5	1.87×10^6

$$15 \text{ minutes} = 9 \times 10^2$$

Decades	10^{-5}	10^{-6}	10^{-7}	10^{-8}
	10^0	10^1	10^2	10^3