Linearization of Log Data Solution

μ	$\log(\mu)$	T	$\log(T)$
1.35	0.13033	26.67	1.42602
0.085	-1.0706	93.33	1.97002
0.012	-1.9208	148.89	2.1729
0.00075	-3.1249	315.56	2.4991

$\log \mu = \log \alpha + \beta \log T$ (1)

$Y = ZA$ $\quad Y = \begin{bmatrix} \log \mu_1 \\ \vdots \\ \log \mu_n \end{bmatrix}$ $\quad Z = \begin{bmatrix} 1 & \log T_1 \\ \vdots & \vdots \\ 1 & \log T_n \end{bmatrix}$ $\quad A = \begin{bmatrix} \log \alpha \\ \beta \end{bmatrix}$

$A = [Z^T Z]^{-1} [Z^T Y]$ $\quad A = \begin{bmatrix} 4.5806 \\ -3.013 \end{bmatrix} \begin{matrix} \rightarrow \log \alpha \\ \rightarrow \beta \end{matrix}$ plug into equation (1)

$\boxed{\log \mu = 4.5806 - 3.013 \log T}$ we can now find r^2 value

$r^2 = \frac{S_t - S_r}{S_t}$ where $S_r = \Sigma e_i^2$, $S_t = \Sigma (y_i - \bar{y})^2$

$S_r = (0.13033 - 0.284)^2 + (-1.0706 - (-1.355))^2 + (-1.9208 - (-1.966))^2 + (-3.1241 - (-2.949))^2 = 0.1375$

$S_t = (0.13033 + 1.4965)^2 + (-1.0706 + 1.4965)^2 + (-1.9208 + 1.4965)^2 + (-3.1249 + 1.4965)^2 = 5.66$

where $\bar{y} = -1.4965$

$r^2 = \frac{5.66 - 0.1375}{5.66} = \boxed{.9757}$

Back to $\log \mu = \log \alpha + \beta \log T$ $\quad \beta = -3.013$ $\quad \log \alpha = 4.5806$ so

$\alpha = 10^{4.58006} = 38,071.5$

$\log \mu = \log \alpha + \beta \log T \Rightarrow \log \mu = \log \alpha T^{\beta}$ $\quad \mu = \alpha T^{\beta}$

$$\boxed{\mu = 38,071.5\ T^{-3.013}}$$

$\mu(5) = (38,071.5)(5)^{-3.013} = \boxed{298.3\ N \cdot s/m^2}$

No, it is not a good idea because 5°C is too far outside of our original temperature range. (26.67°C - 315.56°C)