PAGE NO.:
DATE: / /

> $\delta_M = e^{-E/kT}$

> $\log \delta_M = \frac{-E}{kT} = \left(\frac{-1}{kT}\right) E$

>>> Estimate it using linear regression of

$$\log \delta_M = \left(\frac{-1}{kT}\right) E \qquad y \equiv \log \delta_M$$

$$y = a_1 x \qquad x \equiv E$$

>>> Error becomes

$\cancel{dy =}$ $y = \log \delta_m$

$$\frac{dy}{d\delta_m} = \frac{1}{\delta_m} \Rightarrow \boxed{dy = \frac{d\delta_m}{\delta_m}}$$

~~So~~ similarly for δ_t also

$$\log \delta_t = -\frac{b}{\sqrt{E}}$$

$$[\log(\delta_t)]^2 = \frac{b^2}{E}$$

$$\Rightarrow \frac{1}{[\log \delta_t]^2} = \frac{1}{b^2} E \Rightarrow y = a_2 x$$

$$\frac{dy}{d\delta} \quad y \equiv \frac{1}{[\log \delta_t]^2}, \quad a_2 \equiv \frac{1}{b^2}, \quad x \equiv E.$$

$$\frac{dy}{d\delta_t} = \frac{-2}{(\log \delta_t)^3} \times \frac{1}{\delta_t}$$

$$\Rightarrow \boxed{dy = \frac{-2}{\delta_t (\log \delta_t)^3} \cdot d\delta_t}$$

PAGE NO.:
DATE: / /

Now $a_1 = -\frac{1}{kT}$ $\Rightarrow$ $\boxed{T = -\frac{1}{a_1 k}}$

and $\frac{dT}{da} = -\frac{1}{k} \cdot \frac{-1}{a_1^2} = \frac{1}{ka_1^2}$

$\Rightarrow$ $\boxed{dT = \frac{1}{ka_1^2} da_1}$

and $a_2 = \frac{1}{b^2}$ $\Rightarrow$ $b = \frac{1}{\sqrt{a_2}} = (a_2)^{-1/2}$

$\Rightarrow db = \left(\frac{-1}{2}\right)(a_2)^{-1/2-1} \cdot da$

$\boxed{db = \left(\frac{-1}{2}\right) a^{-(3/2)} da}$

Results : $\rightarrow$

$T = 14870723.1 \pm 65285.16$ K

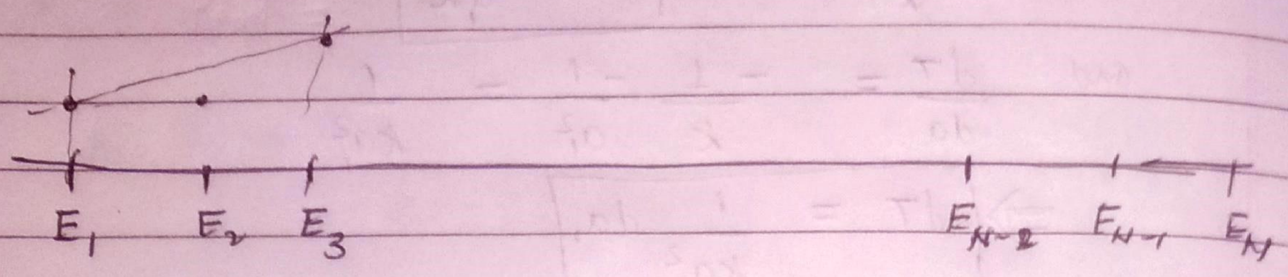
$= 1.487 \times 10^7 K \pm 0.006 \times 10^7 K$

$T = (1.487 \pm 0.0065) \times 10^7 K$.

$b = 2.89365 \times 10^{-7}$ (J)

$\sigma_b = -1.9926 \times 10^{-9}$ (J)

iii) $P_{rad} = f_m \times f_t$



$$E_i \Rightarrow \left.\frac{d P_{rad}}{dE}\right|_{E_i} = \frac{P_{rad}[i+1] - P_{rad}[i-1]}{(E(i+1) - E(i-1))}$$

$e_{n-d} = [E_2, E_3 \ldots E_{N-1}]$

end-points chopped.

> derivatives not calculated at end-points

iv) ~~d^2P > Result~~

Result. Plotted derivative w.r.t. e_n

Zero occurs for

$E = 9.613 \times 10^{-16}$ J

PAGE NO.:

DATE: / /

iv) $$\frac{d^2 P_{rad}}{dE^2} = \frac{P_{rad}[i+1] - 2P_{rad}[i] + P_{rad}[i-1]}{\left(\frac{E_m[i+1] - E_m[i-1]}{2}\right)^2}$$

~~Prod of~~ ⇒ ~~Derivative~~ at

Result. ≫ 2nd derivative at

the point where derivative is
0 is
$> -7.09 \times 10^{+24}$

$$\frac{d^2 P_{rad}}{dE^2} < 0 \quad \text{and} \quad \frac{d^2 P_{rad}}{dE^2} = 0$$

⇒ at $E = 9.613 \times 10^{-16}$ J
we have maxima

PAGE NO.:
DATE: / /

~~Product~~
~~Prod~~ =

Integral of Product of ~~Pm~~ P_t and P_{om} from observed data
$= 7.47 \times 10^{-22}$

→ ~~Int~~ Area under curve using theoretical model calculated from parameters estimated
$= 7.452 \times 10^{-22}$.