Dreamy Matsu

r_1 | r_1, a

Hotel Durant
Berkeley

Out House
Hotel Carlton

$r \quad r \quad r$ smaller

B/1 hyp + X
hyp Card

500/000
250
2 000

f(1,5)

B/hi⁻ (W > 4)

his⁺ → his⁺
$V_{1,5}^{S} \rightarrow V_{1,5}^{R}$ } N-Control

B/1 hyp⁻ his⁻

r/m

1.6
1.7·10⁻⁹ r/m

0.1 0.3 k
0.8 0.5

a

(l)

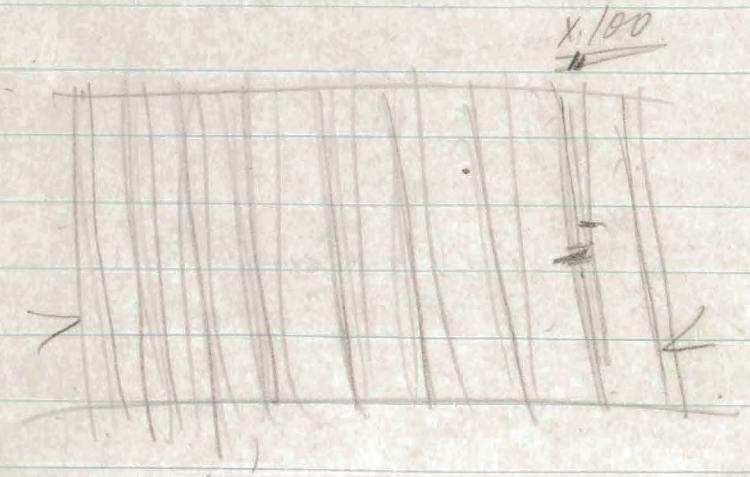
$n^* << n$

$$\frac{dn^*}{dt} = \alpha^* n^* + \alpha n - \alpha n^*$$

$$0 = \alpha^* \frac{n^*}{n} + \alpha - \underset{\frac{W}{V}}{\alpha} \frac{n^*}{n}$$

$$(\alpha^* - \alpha) \frac{n^*}{n} = \alpha$$

Dr. Fritz Kaudewitz Max Planck Inst
Tübingen



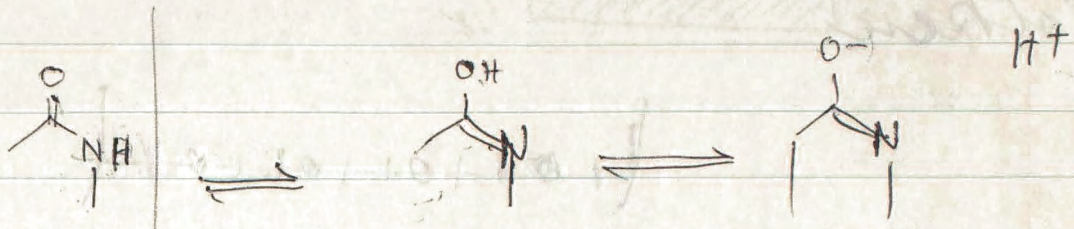
100

$\frac{2^{30}}{8}$

Baricelli

$2^x = 100$

Matthew Meselson
at Tech



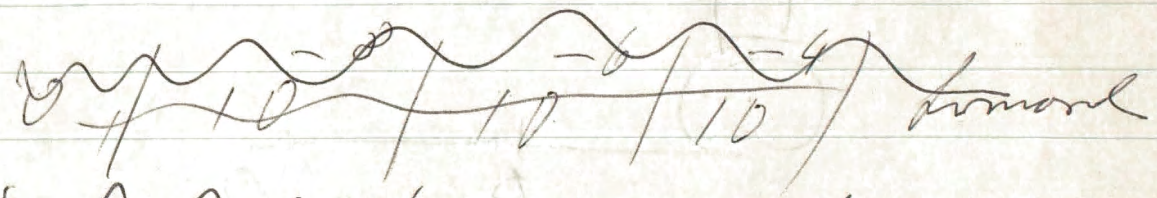
Kirschner (Cold Spring Harbor)
Mr Burgi (with Zelle?)
Mr Baylor (Ann Arbor)

$h' \times h^+$ gives h ?

GS from h/6 yet gives recombinants

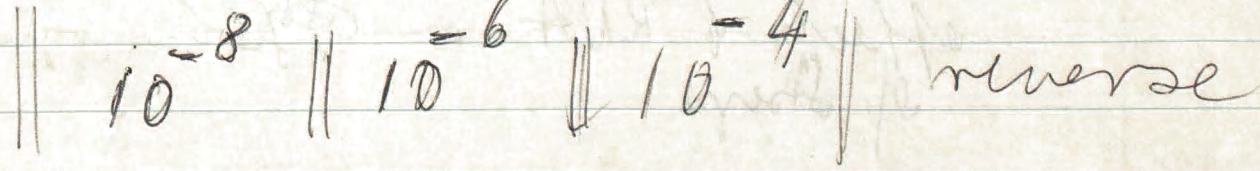
Benzer (Benzer)

2 adjacent nucleotide pairs in



10^{-4} ~~back rate~~ forward rate

c) 100 units

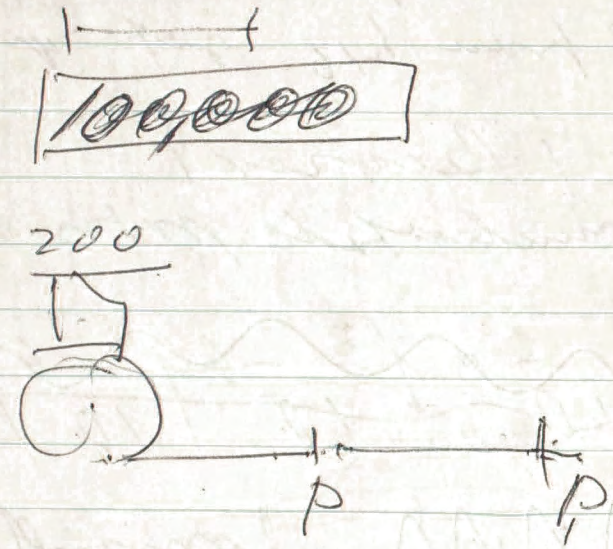


bra

Volkin

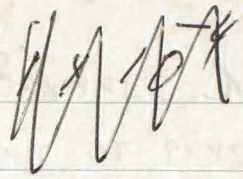
Brown Wrest → T_2

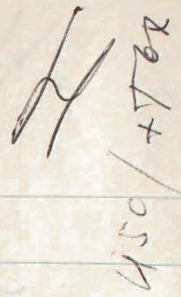
Thymidr



Bonheimer N.Y. (Hopkins)
effect of RNA on Glycin synthesis
of Strep.

$1 \times 10^{-4} \rightarrow 0.1\,a$

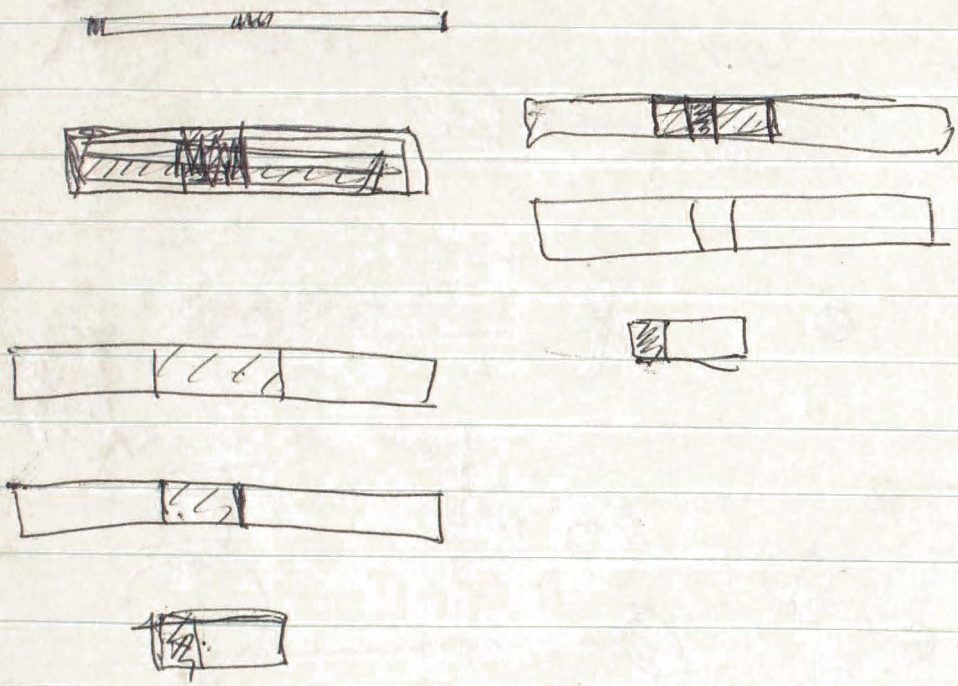




100 units

45 cents + Tax

Wedgle and Broad.
both Bact and viruses
high numbers of broad. of
virus. Proc. Nat. Ac. 1953



4.

SYDNEY BRENNER,
DEPARTMENT OF PHYSIOLOGY,
MEDICAL SCHOOL,
UNIVERSITY OF THE WITWATERSRAND,
JOHANNESBURG,
SOUTH AFRICA.

from December 16th 1954

Cambridge: Crick, Gale,
Markham, John Kendrew with Crick,
Hugh Huxley muscle, Hodgkin (nano
phys.) Sanger (protein);
London:
Hayes Hammersmith Hospital phab react.
Stocker Lister Inst.
Neville Symonds ~~London~~ School of Trop. Med
W. Atkins (~~[illegible]~~ Maurice) King's Coll
Biophys. Lab. (Structure)
Pollock Mill Hill
Beal with Washington Edinburgh
Pontecorvo, Glasgow
Oxford Woods; Brachem with Keeley
Burton;

$$\cancel{\log \frac{f(x)}{f_0(x)}} \approx$$

$$\cancel{\left[y \log x - x\right]_{x_0}^{x_1}}$$

$$\frac{y - x + 1}{x+1} = \frac{N - 2x + 1}{x+1}$$

$$\approx \int_{x_0}^{x_1} \left(\frac{N}{x} - 2\right) dx = \left[N \log x - 2x\right]_{x_0}^{x_1}$$

$$N \log x_1 - 2x_1$$

$$\cancel{\left\{N \log x_0 - N\right\}}$$

$$N - 2x_1$$

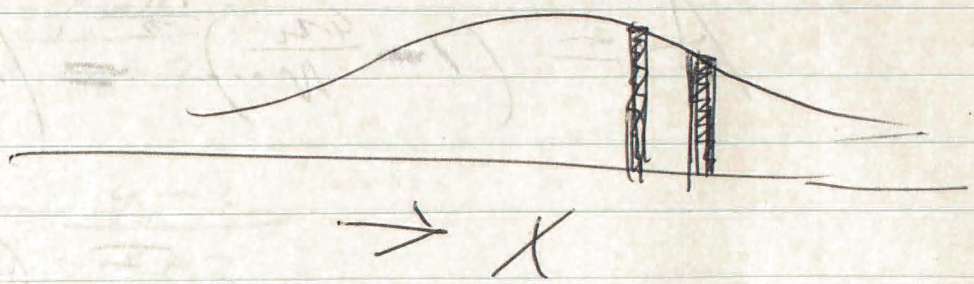
$$\frac{f(x_1)}{f(x_0)} = \cancel{N \log \frac{x_1}{x_0}} \times e^{N - 2x_1}$$

$$\cancel{N \log \frac{x_1}{x_0}} \left(\frac{x_1}{x_0}\right)^N e^{N - 2x_1}$$

$$\cancel{\frac{f(x+1)}{f(x)} =}$$

~~KLM~~ BOAC TWA PANAM

x number of Atlantics
y " " Pacifics



$$py(1-xp)f(x) = p(x+1)(1-p(y-1))f(x+1)$$

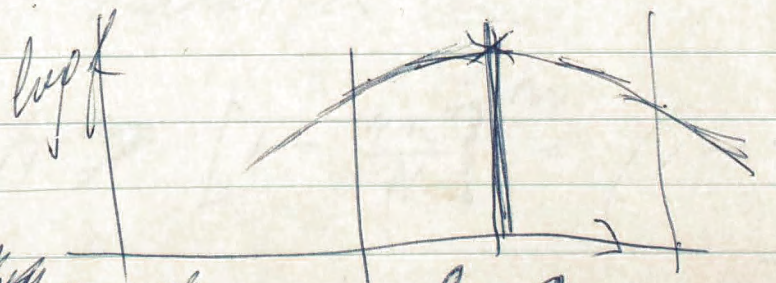
$$x+y = N$$

$$\frac{f'(x)}{f(x)} \approx \frac{y-x}{x} = \frac{y-(x+1)}{x+1}$$

approximate

Correct

$$\frac{d}{dx}\log f(x) \approx \frac{y-x}{x} = \frac{N-2x}{x}$$



$$\frac{1}{\sigma^2} = \frac{y-x}{x}$$

$$1 = \frac{\sigma^2}{x}$$

$$\frac{y-x}{2x^2}$$

$$(1.x) \times (1+nA) = 1+nA$$
$$(1+A) \times (1+(n-1)A) = 1+A+n-1A$$

$$A = \left(1-\frac{4n}{N}\right)^{\frac{n}{2}} = \left(1-\frac{4n}{N}\right)^{\frac{N}{4n}\frac{2n^2}{N}}$$

$$= e^{-\frac{2n^2}{N}}$$

O.K.

4

$$\frac{f(x_0+1)}{f(x_0)} = \frac{y_0}{x_0+1}$$

$$\frac{f(x+2)}{f(x+1)} = \frac{y_0-1}{x_0+2}$$

$$\frac{f(x+3)}{f(x+2)} = \frac{y_0-2}{x_0+3}$$

$$\therefore \frac{f(x_0+n)}{f x_0} = \frac{(y_0-[n-1])(y_0-(n-2))\cdots y_0}{(x_0+n)(x_0+(n-1))\cdots x_0}$$

$$\approx \frac{y_0-n}{x_0+n} \text{ etc.}$$

$$\approx \frac{1-\frac{n}{x_0}}{1+\frac{n}{x_0}} = 1-\frac{2n}{x_0}$$

$$1-\frac{4n}{N}$$

$$\cancel{1\times(1-4\frac{n}{N})}$$

$$\cancel{y_0}\ A = 1\times\left(1-\frac{4}{N}\right)\left(1-\frac{4\times 2}{N}\right)\left(1-\frac{4\times 3}{N}\right)\cdots\left(1-\frac{4n}{N}\right)$$

subst $\frac{n}{N}$

$$A \to \left[1-\frac{4n}{N}\right]^n = \left(1-\frac{4n}{N}\right)^{\frac{4n}{4n}\,\frac{4n^2}{N}}$$

$$= e^{-\frac{4n^2}{N}}$$

$$\frac{f(x+n)}{f(x_0)} = \left(1 - \frac{4}{N} n\right)^{\frac{n}{2}}$$

$$\frac{n}{2} = \frac{N}{4n} \frac{2n^2}{N}$$

$$\left(\left(1 - \frac{4n}{N}\right)^{\frac{N}{4n}}\right)^{\frac{2n^2}{N}} = e^{-\frac{2n^2}{N}}$$

$$e^{-1}$$

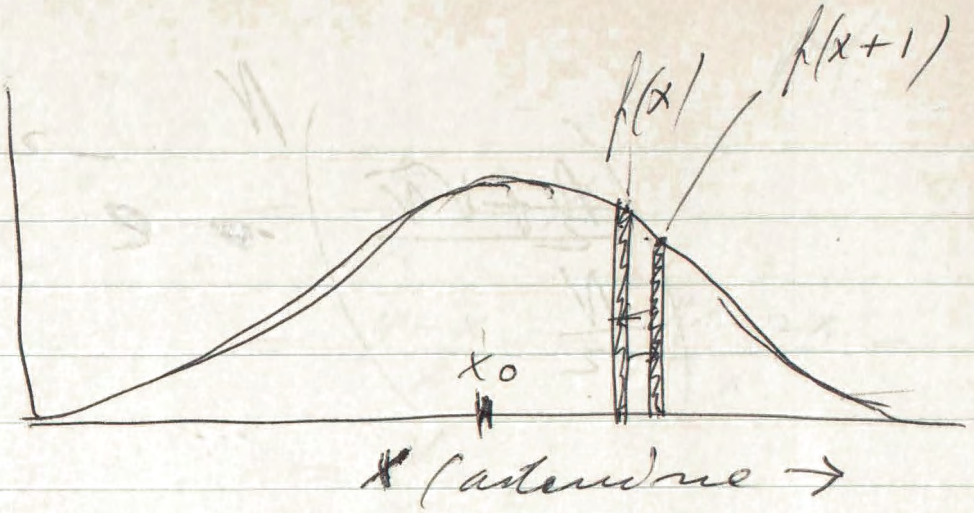
$$\left(1 - \frac{1}{1000}\right)^{1000}$$

$$\frac{\cancel{10^5 \times 300}}{\cancel{30}}$$

$$\frac{300}{10^5}$$

$$(1-\Delta)(1-(n-1)\Delta)$$

$$(1-\Delta)(1+\Delta-n\Delta)$$



x adenine y guani $x+y=N$

$$f(x)\,p\,y\,(1-xp) = f(x+1)\,p(x+1)\,(1-(y-1)p)$$

$$\frac{f(x+1)}{f(x)} \approx \frac{\cancel{p}\,y\,(1-xp)}{\cancel{p}\,x\,(1-yp)} = \frac{y}{x} = \frac{N-x}{x}$$

$$\cancel{f(x_0}$$

$$\frac{f(x+n)}{f(x_0)} = \frac{y_0}{x_0}\;\frac{y_0-1}{x_0+1}\;\frac{y_0-2}{x_0+2}\cdots\frac{y_0-n}{x_0+n}$$

$$\cancel{1-\frac{x_0-2}{x_0}}$$

$$\frac{f(x_0+3)}{f(x_0+2)} = \frac{y_0-3}{x_0+3} \quad 1 \quad 1-\frac{2}{x_0} \quad 1-\frac{4}{x_0} \quad 1-\frac{2n}{x_0}$$

$$\frac{f(x_0+2)}{f(x_0+1)} = \frac{y_0-2}{x_0+2} \quad 1 \times (1-4)\,(1-2\Delta)\,(1-(n-1)\Delta)\,(1-n\Delta)$$

$$\frac{f(x_0+1)}{f(x_0)} = \frac{y_0-1}{x_0+1} \quad \frac{n}{2} \quad 1-n\Delta$$

$$(1-n\Delta)^{\frac{n}{2}}$$

$$\frac{1}{1+\frac{1}{x_0}} \approx 1-\frac{1}{x_0} \qquad \frac{1-\frac{1}{x_0}}{1+1/x_0} = 1-2/x_0$$

$$\left(\frac{\frac{N}{2}+\sqrt{N}}{\frac{N}{2}}\right)^{N} \cdot e^{-2\sqrt{N}}$$

---

150 to 200 Å diameter
plugs 1/13 /
10 million Molecule weight

Yura (Kioto)

$$\frac{f(x+1)}{f(x)} - 1 = \frac{y}{x} - 1$$

$$= \frac{y-x}{x} = \frac{N-2x}{x} =$$

$$\frac{f(x+1) - f(x)}{f(x)} = \frac{N}{x} - 2$$

$$\frac{f'}{f} = \frac{N}{x} - 2$$

$$\cancel{f(x+1) - f(x) = 2f'}$$

$$\frac{d}{dx} \log f = \frac{N}{x} - 2 \qquad \int_{x_0}^{x_1} dx$$

$$\log f(x_1) - \log f(x_0)$$

$$= \log \frac{f(x_1)}{f(x_0)} = N \log x_1 - N \log x_0 - \left[2x_1 - 2x_0\right]$$

$$= N \log \frac{x_1}{x_0} - 2x_1 + 2x_0$$

$$\frac{f(x_1)}{f(x_0)} = \frac{e^{a+bx+c}}{} = e^{a}$$

$$\left(\frac{x_1}{x_0}\right)^N \underbrace{e^{-2x_1} \cdot e^{+2x_0}}_{e^{-2(x_1 - x_0)}}$$

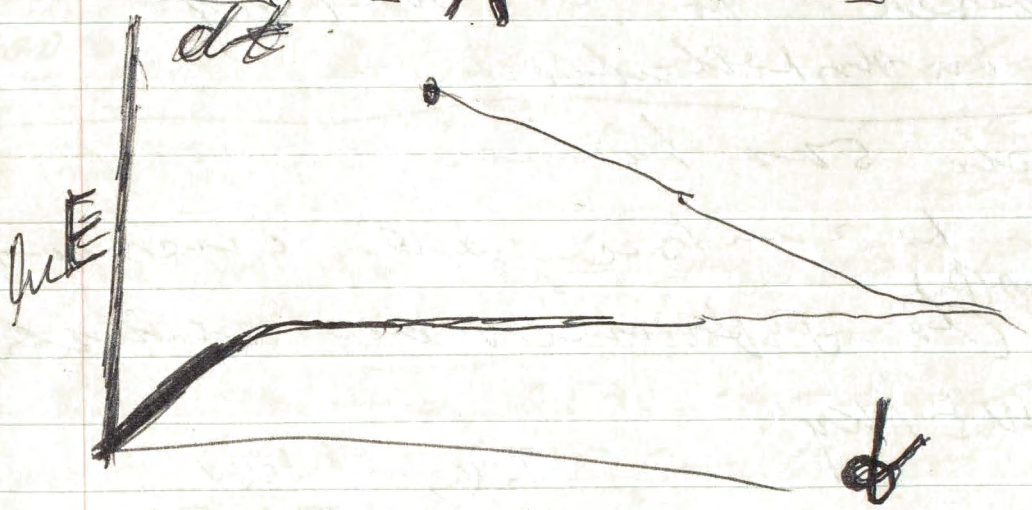
$=$

Adaptive enzymes

RNA theory in chemostat

$$\frac{dn}{dt} = a + b(c)n - \alpha n$$

$$\frac{dE}{dt} = Kn - \alpha E$$



f curve of inducer

slope = f(f) of increase

plateau = g(f)

~~or 4.4 × 10^3 cycles per $\frac{1}{8}$ out/kg~~

~~compared with~~

or for 250 cycles

$$\frac{250}{8} = 0.3 \text{ WE/kg}$$

compared to 3.3 WE/kg invested in distillation

If we cycle 500 times then we go to 2 m/sec and increase pumping work by 8 times as much or 2.4 WE/kg

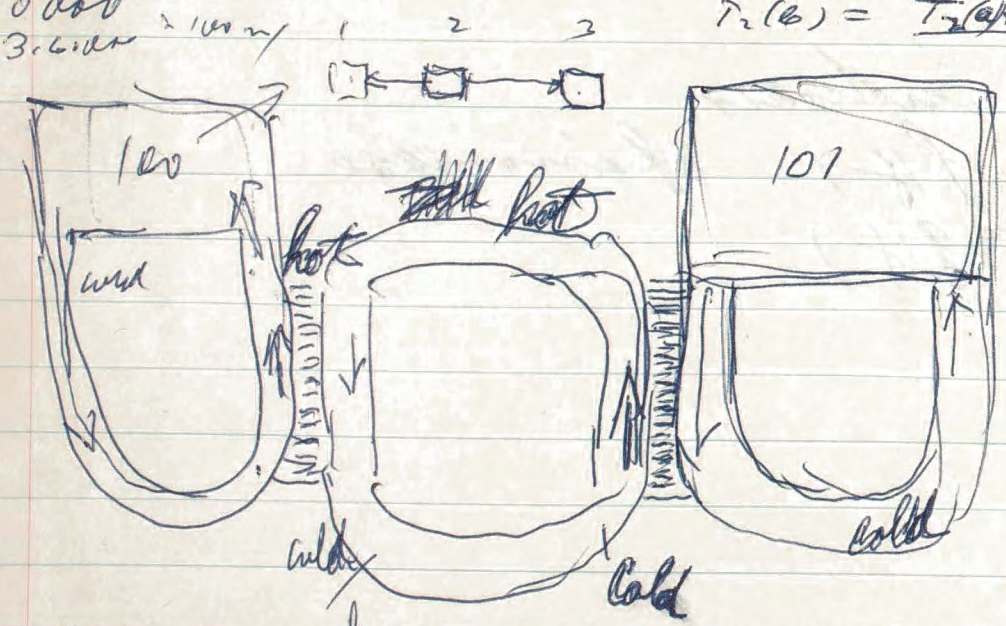
$T_2(a)$ $T_3(a)$

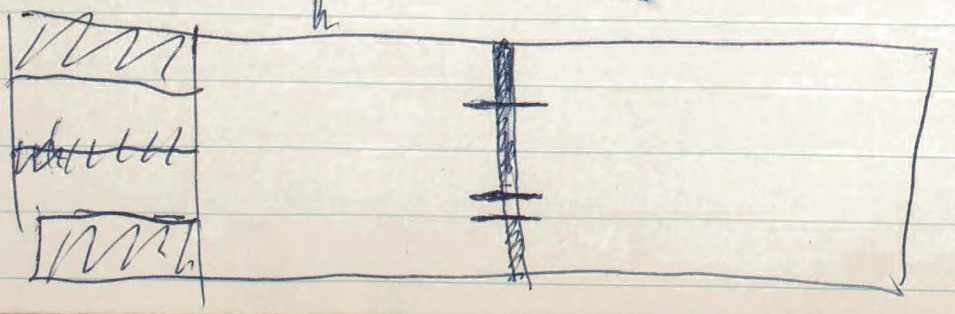
$$T_2(b) = \frac{T_2(a) + T_3(a)}{2}$$

$$\frac{T_2(b) + T_1(a)}{2} = T_2(a)$$

~~$T_2(b) = T$~~

360 000
3.6 kW





Heat exchanger

1 ton per hour

simple distillation would
invest 500 WE / kg Heat

Compressor distillation would invest
$\frac{600}{18}$ WE for $\frac{p_1}{p_2} = 2$ or about 10 to
≈ 33 WE 12°C difference
across condenser

We want to invest $\frac{1}{5}$ or 3.3 WE / kg which
is about 2°C ~~diff~~ and
this means 250 cyclings per hour
or 250 000 liter per hour through
exchanger.
assuming cross section of exchanger
for water 10×10^2 cm² $\frac{m}{sec} = \frac{250\,000\,000}{3.600 \times 10\,000\,100}$

$\frac{250\,000}{3.6\,000}$ liter/sec $\approx \frac{25}{36}\,\frac{10^4}{10^2}$ m/sec $= \frac{250 \quad 10^6}{360 \quad 10^6}$

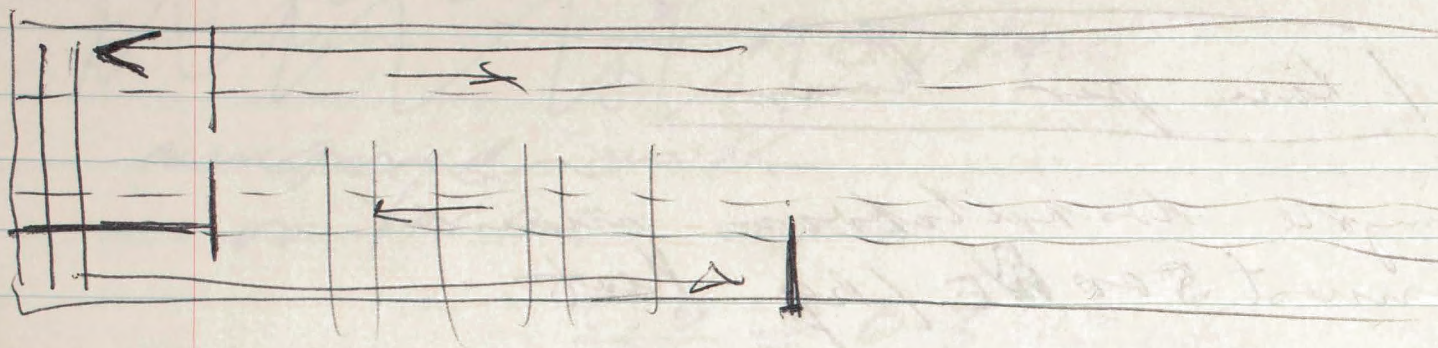
$\approx \frac{25}{36} \times 100$ liter/sec

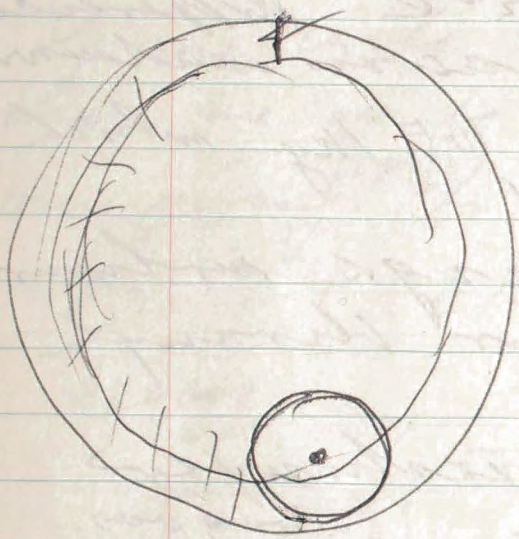
or less than 1 m/sec for 10 10^2 cm² cross section

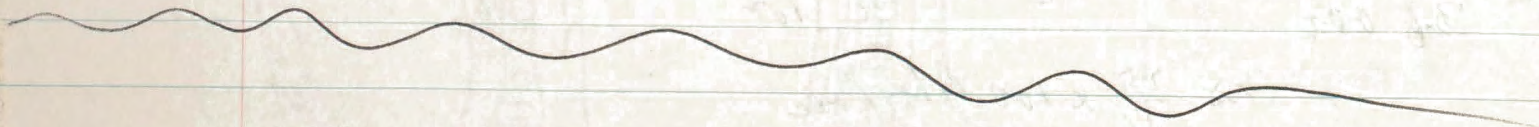
---

1 m/sec velocity represents per ~~kg/sec~~ kg

$\frac{100^2}{2}\, 10^3$ ~~erg~~ $= \frac{10^7}{2}$ kg $= \frac{1}{2}$ ~~kg~~ joule per kg

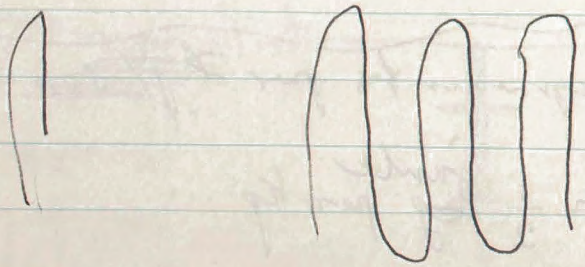






wrap

cond I cond II



$$T_2(b) = \frac{T_2(b) + T_1(a)}{4} + \frac{T_3(a)}{2}$$

$$T_2(b) - \frac{T_2(b)}{4}$$

$$\frac{3}{4} T_2(b) = \frac{T_1(a)}{4} + \frac{T_3(a)}{2}$$

$$3\, T_2(b) = T_1(a) + 2\, T_3(a)$$

$$T_2(b) = \frac{T_1(a) + 2\, T_3(a)}{3}$$

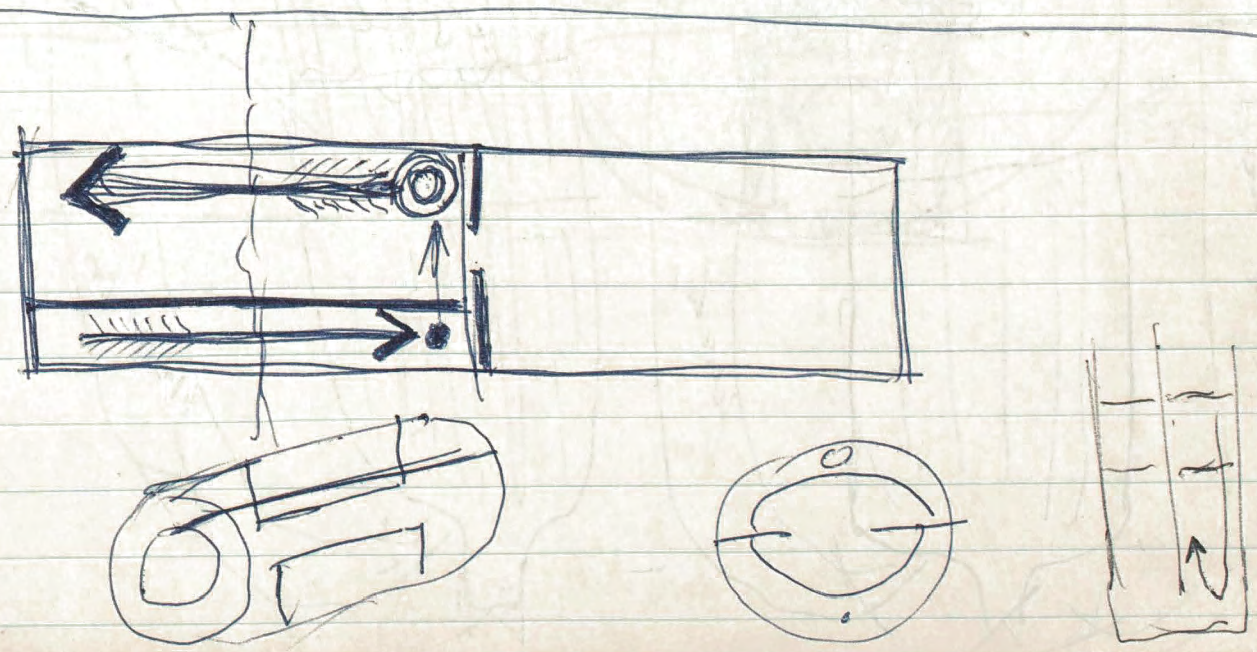
$$T_2(a) = \frac{T_2(a)}{4} + \frac{T_3(a)}{4} + \frac{T_1(a)}{2}$$

$$\frac{3}{4} T_2(a) = T_3(a) + 2\, T_1(a)$$

$$3\, T_2(a) = T_3(a) + 2\, T_1(a)$$

$$T_2(a) = \frac{T_3(a) + 2\, T_1(a)}{3}$$

$$T_2(a) - T_2(b) = \frac{T_3(a) - T_1(a)}{3}$$



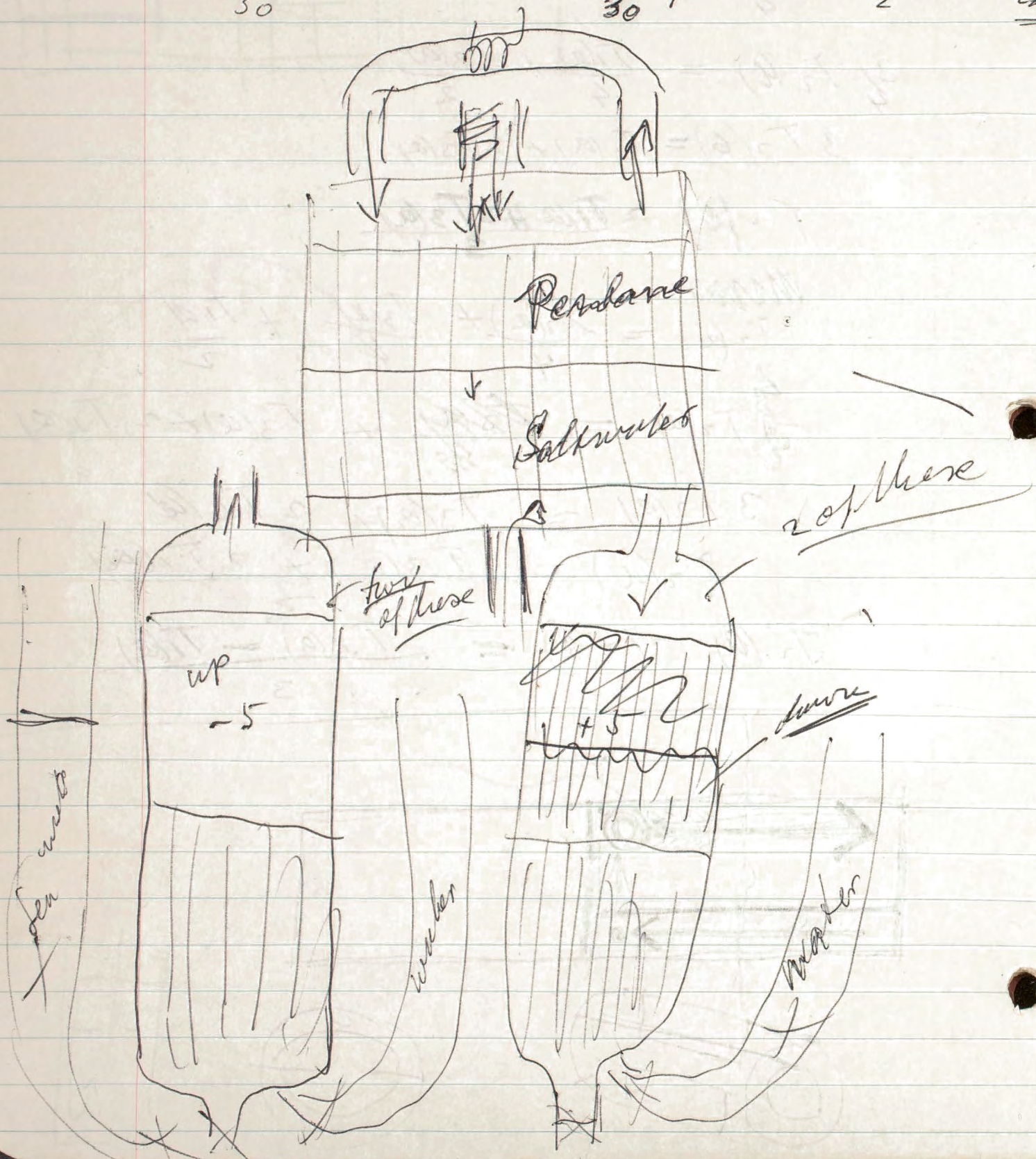
22)

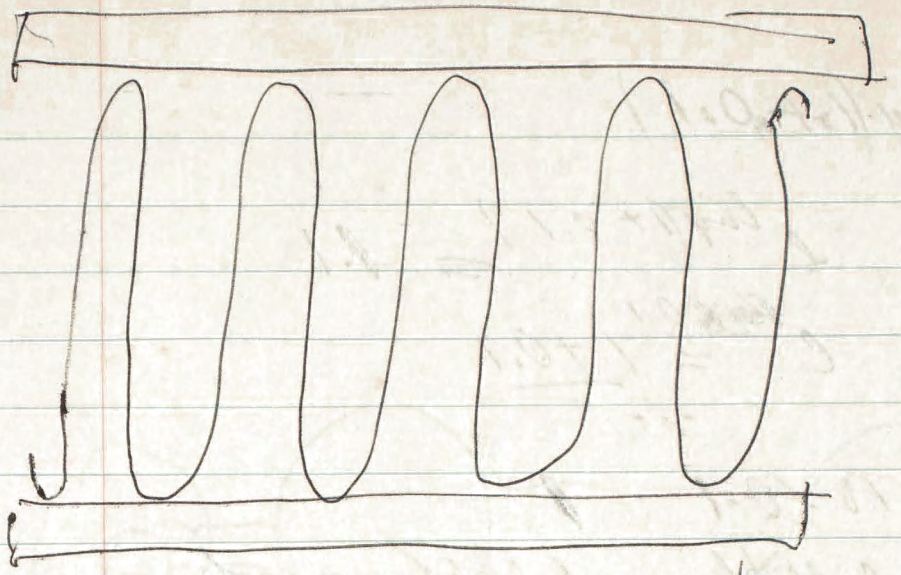
25°, Water air $25 \times \frac{5}{2} R$ cal

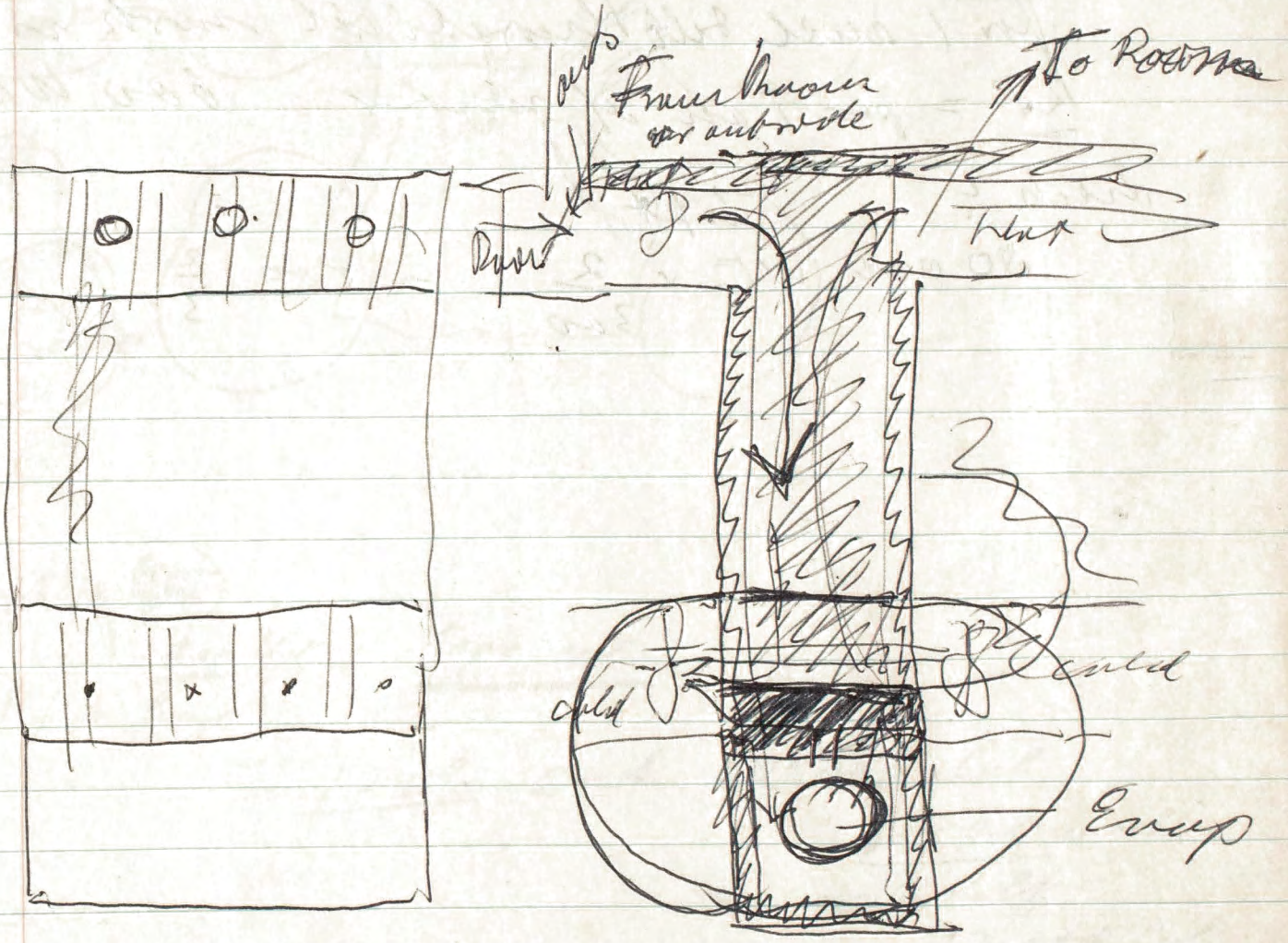
$\frac{250}{2} = 125$ cal

40-15 → ~~[illegible]~~ water 25 mm Water vapor ~~[illegible]~~

or $\frac{1}{30}$ atm = $\frac{1}{30}$ gm mol = $\frac{1}{2}$ gm = $\frac{250}{\text{cal}}$






out
Fresh Air
or outside
To Rooms
Heat
Cold
Evap

$\log(1+0.1)$

$$e^{\log(1+0.1)} = 1.1$$

$$e^{0.1} = 1+0.1$$

$$10 = 0.1 = 1$$

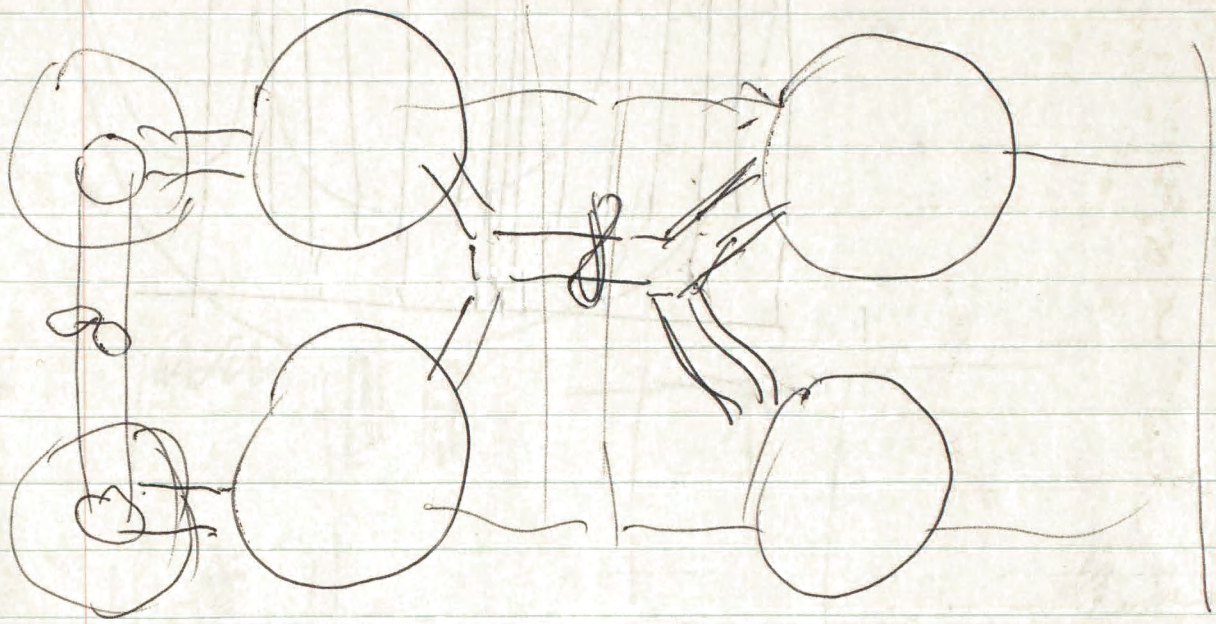
for 1 mol salt theoretical work is

RT = per Ton of water 600 WE/Ton

drech?

lift

$$80\,000 \text{ WE} \times \frac{2}{300} = 800\ \frac{2}{3}$$



party. Pat

600 Kal 6,000 cal

1 Kal hour

10 c° and 12,000 Cal

600 Cal Work

will lift

12 000 Cal

or math $\frac{12,000}{60}$ kg/m

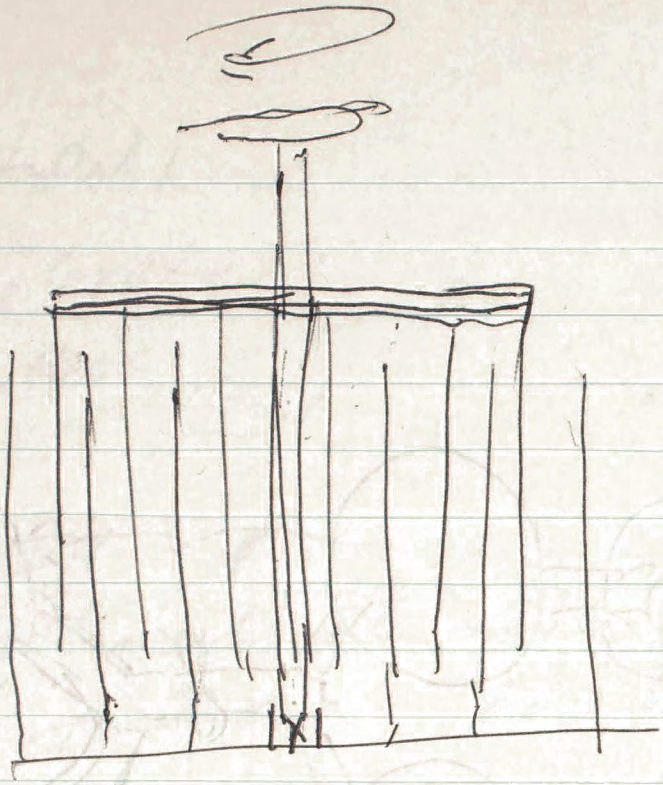
600 kg dec with 600 WE

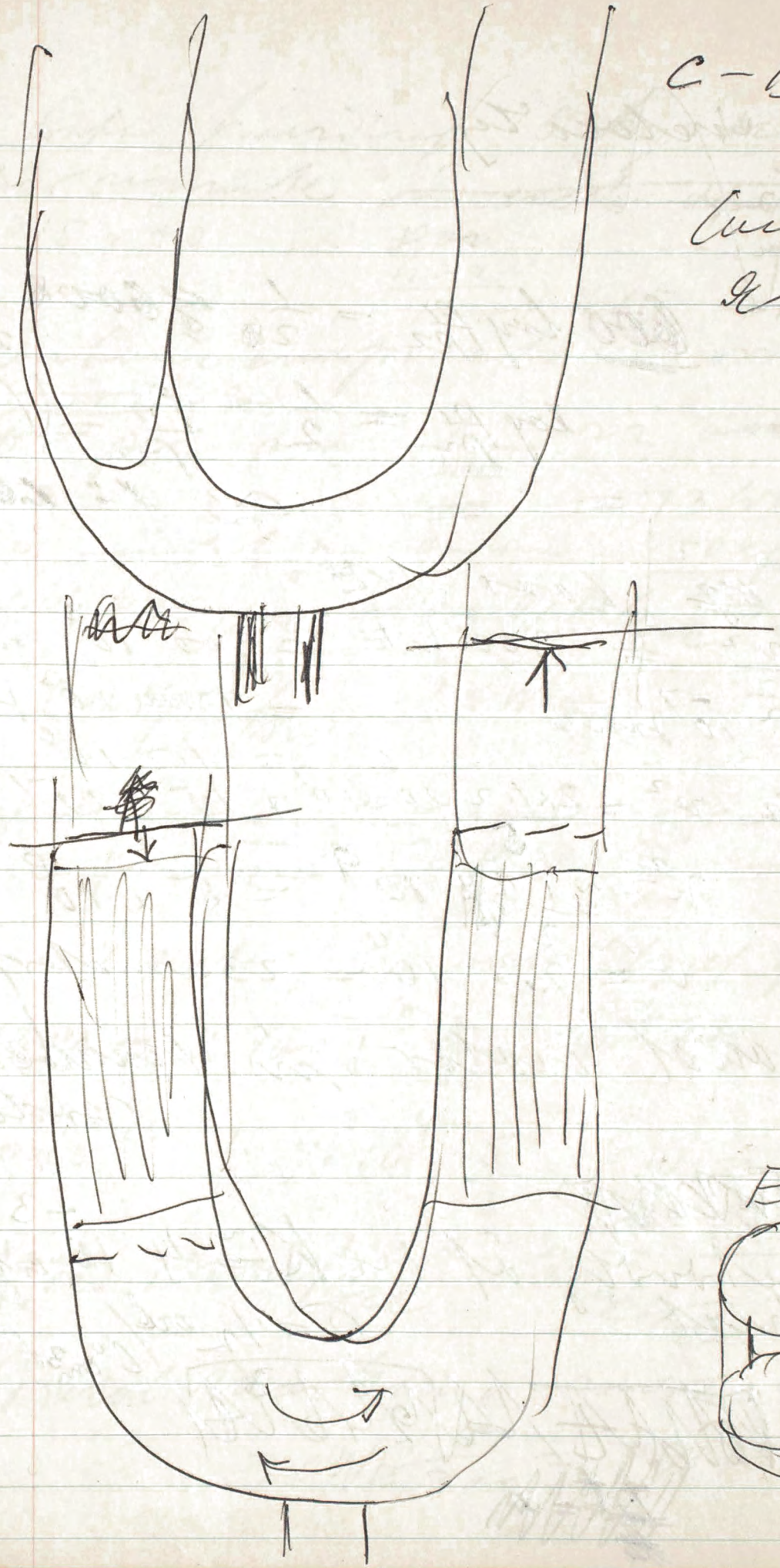
less Watt / 6 Watt hours

600

1 watt hour = $\frac{6}{4}$ 3600 cal

Evaporator



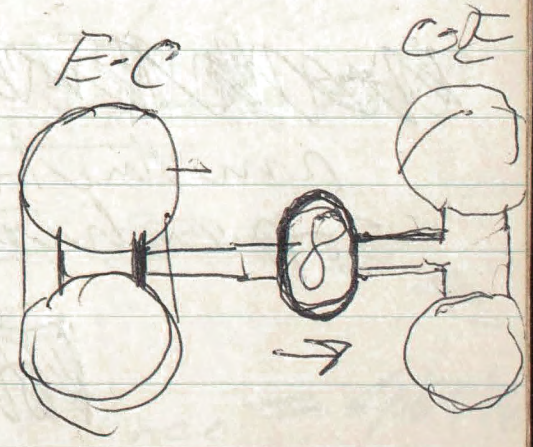


C-E

H

Condenser
Evap.

Evap
Cond.



~~electron velocity~~
~~cm/sec~~
~~per gm~~

$$600 \log \frac{p_1}{p_2} = \frac{1}{2} \cdot 4600$$

$$\log \frac{p_1}{p_2} = \frac{1}{2} \qquad \frac{p_1}{p_2} = \sqrt{e}$$

$$\approx 1 : 1.6$$

~~1 / 3 / 6 / 0.5 6~~

50 kg | 6000 WE

$$50 \times 10^3 \text{ gm} \; \frac{v^2}{2} = 300 \text{ WE} = 300 \; 10^3 \text{ erg}$$

$$50 \times 10^3 \; \frac{v^2}{2} \; 10^{-7} \text{ joule} = 1200 \; 10^3 \text{ joule}$$

$$= 1.2 \; 10^6$$

$$v^2 = \frac{2 \times 1.2}{5} \; 10^6 \times 10^7 \times 10^{-3} \; 10^{-1}$$

$$v^2 \cong \frac{1}{2} \; 10^9 = 5 \times 10^8$$

$$v \cong 2.3 \; 10^4 = 230 \text{ meter/sec}$$

Acetone and water in condenser side?

~~[illegible]~~

conductivity of ice $K \cong 4 \; 10^{-3}$ cal/cm sec

spec. heat $\sigma = 1/2$ cal/C° cm³

~~[illegible]~~

~~[illegible]~~

4

Gas burning 15 kg/sec per minute ~~in each of two~~

15×80 $\quad \frac{800}{60}$

1200 WE or $\frac{1}{5}$ kg/min

pentane evaporation or ~~[illegible]~~

or per sec $\frac{1}{3}$ 22 liter/min

= 73 liter/sec

~~weight per~~ pentane $\frac{50\,kg}{300} = \frac{5}{30}$ kg/sec

cal (kmp)/sec = 20 WE/sec = 80 KW

(10 kgm/sec ~ 1 KW

permissible mechanical loss in gas 80 KW $\frac{5}{300} = \frac{400}{300} \approx 1$ kW

X meter/sec velocity of gas (hot)

$1000 \times \frac{1}{2}[X\ 100]^2 \frac{5}{30} \cdot 10^{-7}$ joule/sec

$1000 \times 10^{-10} \frac{1}{2} X^2 10^4 \frac{5}{30}$ KW = 1 kW

$X^2 = \frac{2 \times 30}{5} \times 10^3$

$X \approx 100$ m/sec

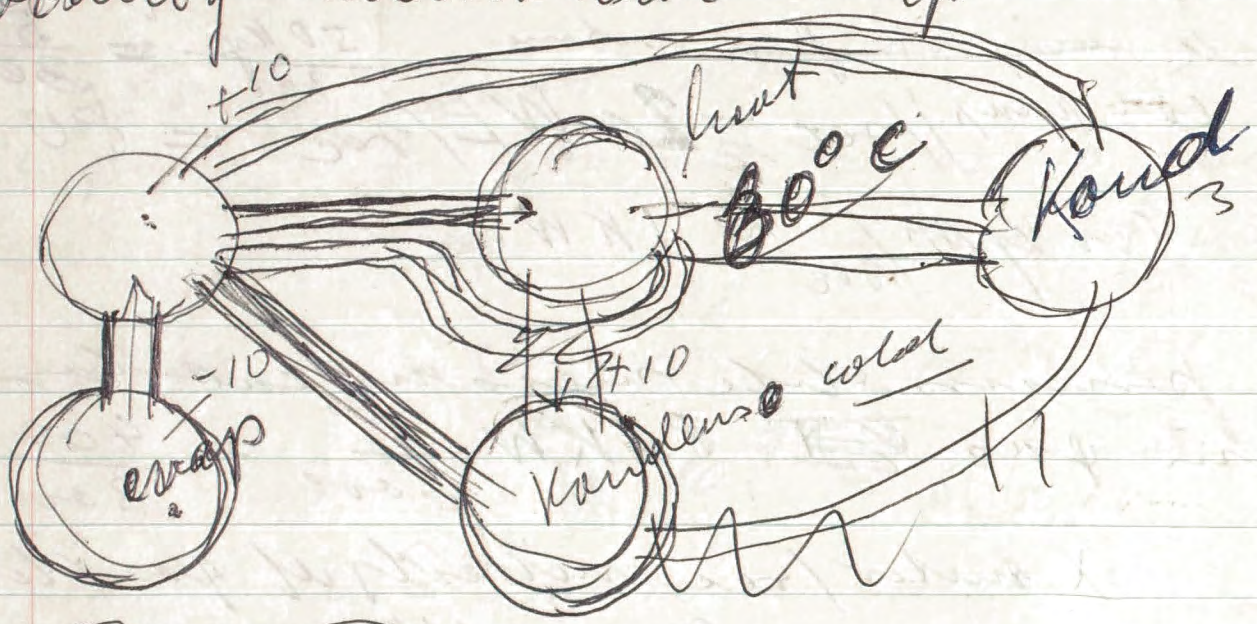
Ideal machine work

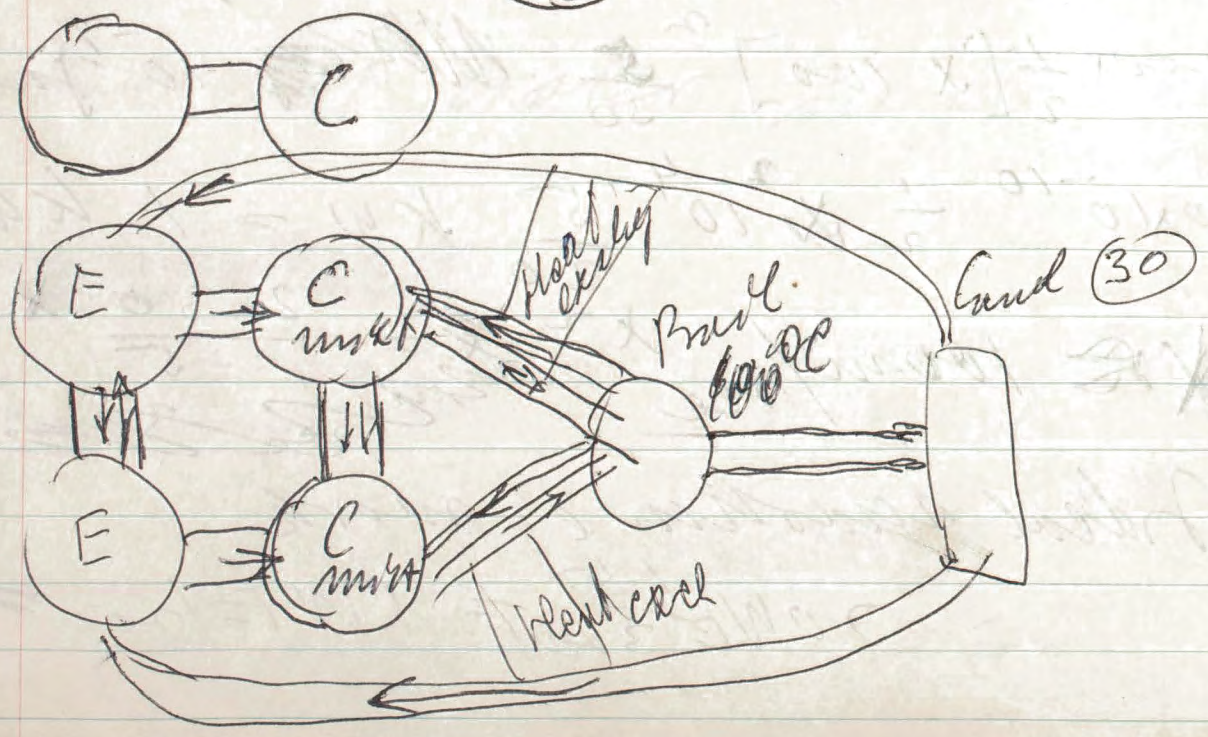
$20\,WE \frac{15}{300} = 1\,WE/sec = 4\,kW$

i.e we need about 5°

Swapping 2 times per second would be much better

Avoiding mechanical compressor:





Assume Q enters in t time

$\underline{\underline{x}} = Q$

$Q = \frac{K}{Q} t$

$Q^2 = Kt$

$\frac{K}{\sigma}$ [$\frac{cm^2}{sec}$]

$\sigma = \rho c_p / gm$

$\frac{K}{\sigma} t$ [cm^2]

$\sqrt{\frac{K}{\sigma} t}$ [cm]

Q = Heat flow =

$= \frac{2k}{\sqrt{\pi}} \sqrt{\frac{t}{\frac{k}{\rho c_p}}}$

$= \frac{2}{\sqrt{\pi}} \sqrt{Kt\sigma}$

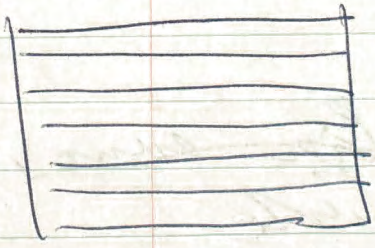
$t = 1$ sec

$k\sqrt{2 10^{-3} t} = \frac{4.5}{100}$ cm

or per cm^2 $\frac{4.5}{100} \frac{1}{2}$ cal

or in one minute 60 x 1 sec

$cal/cm^2 = \frac{135}{100} \approx 1$ cal/cm^2 per °C



if volume is 3 x 15 liter = 45 000 cc

if we have ~~to have~~ 3 m grp., or 6 cm^2 per cc

we have 270 x 1000 = 270 WE/C° per minute

we need 15 x 80 WE = 1200 WE

Jet Man:

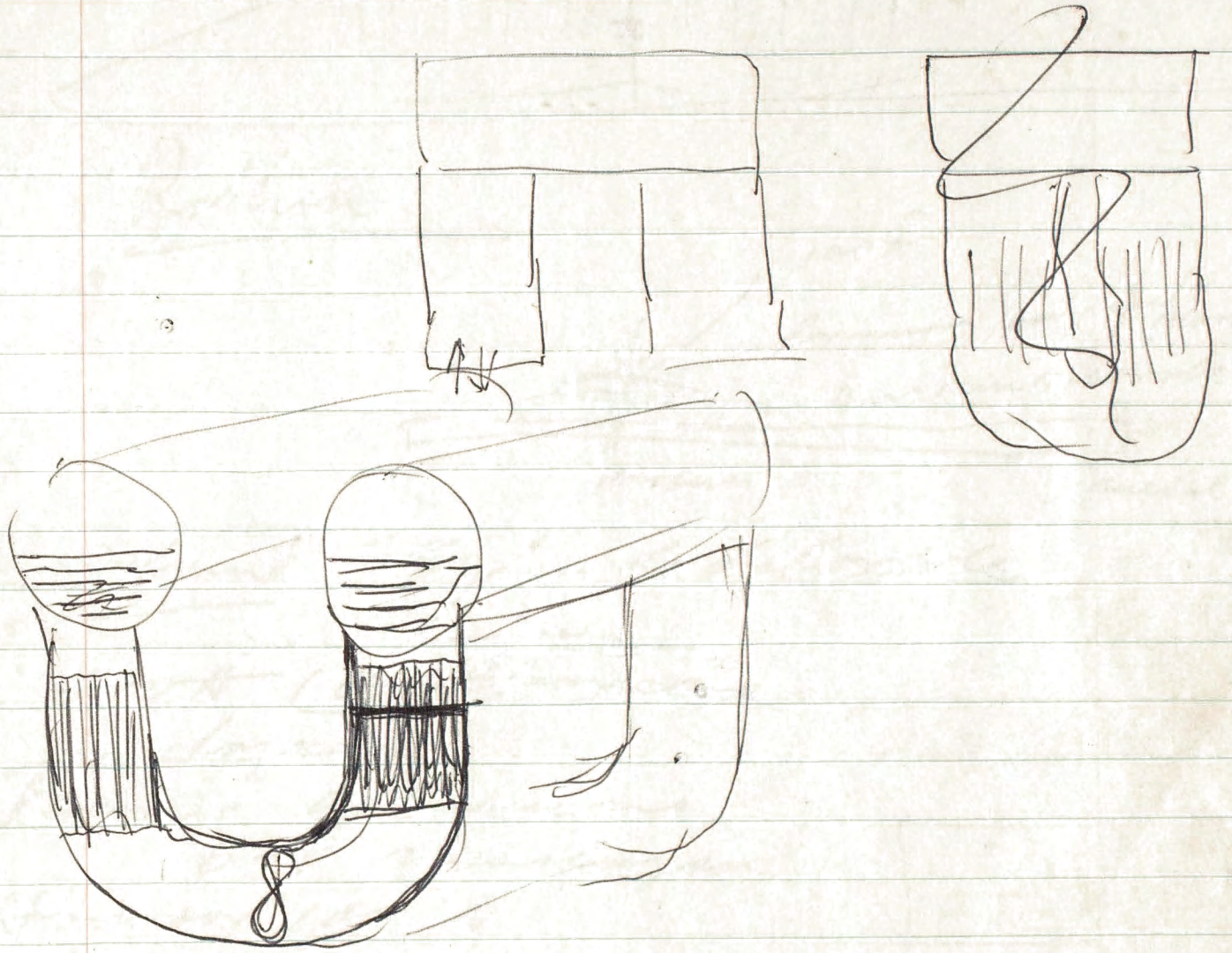
~~Denny~~ Dennis H. Wilkinson
Cambridge
Running polypous

Use CO_2 – Water ~~system~~
and de-salt by ~~[illegible]~~ CO_2
decompression. –

Or combination of CO_2 and
~~hydroc~~ Hexane or higher
hydrocarbon. Advantage:
Maybe one could work around
1 Atm. pressure.

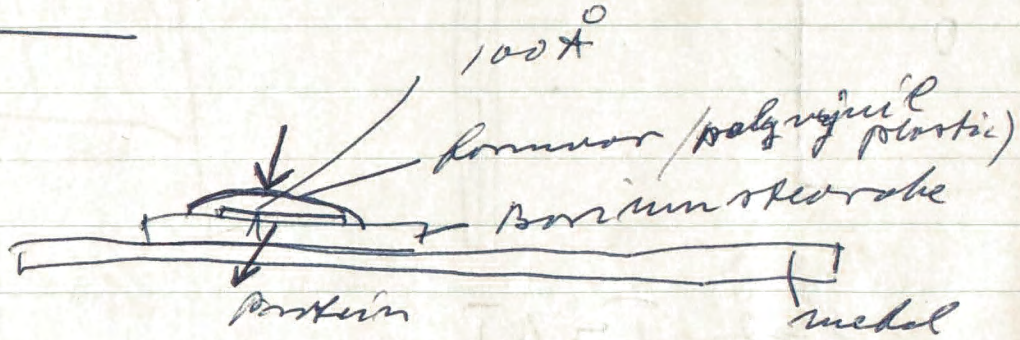
Assume 10% ~~difference in P_{CO_2} conc.~~
CO_2 : 90% "Hexane" on left side
15% CO_2 : 85% "Hexane" on right side
For 1 kg CO_2 transported in gas 20 kg
solvent must be pushed into Condenser
and out of Condenser.

Pure evaporation



~~[illegible]~~

Rathon



solvent Ethylen dichloride

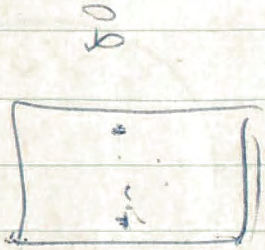
~~100 Å (bovine albumine~~

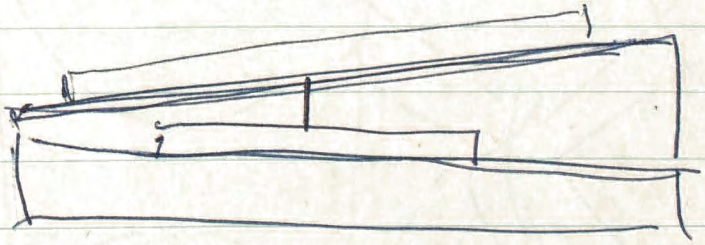
~~2 layers~~

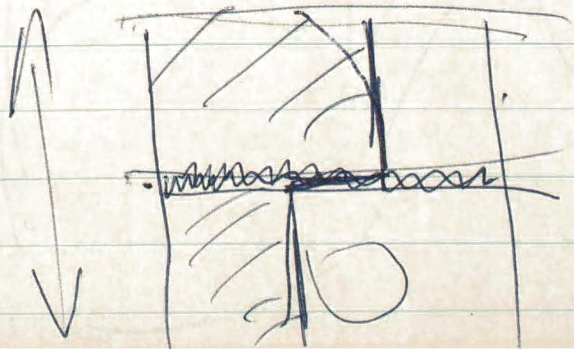
Bovine albumine

6-8 monolayers

Formvar 100 Å





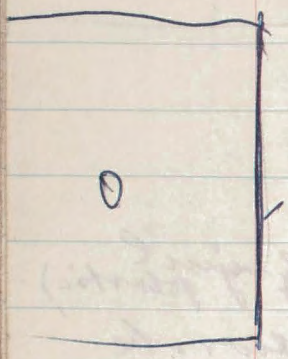


UO_2 vapour pressure

0°C 26,142 mm

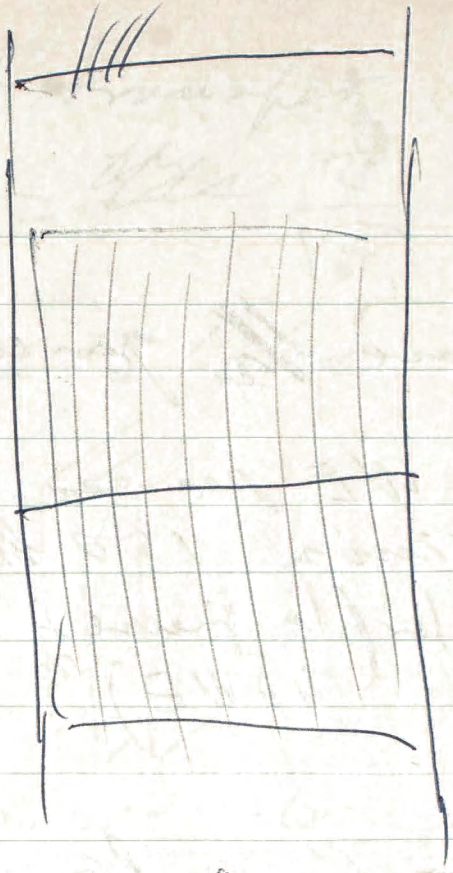
10°C 33,763

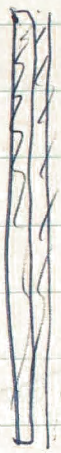
0°C



$t=0 \quad \sqrt{T} \cong 4T$

t

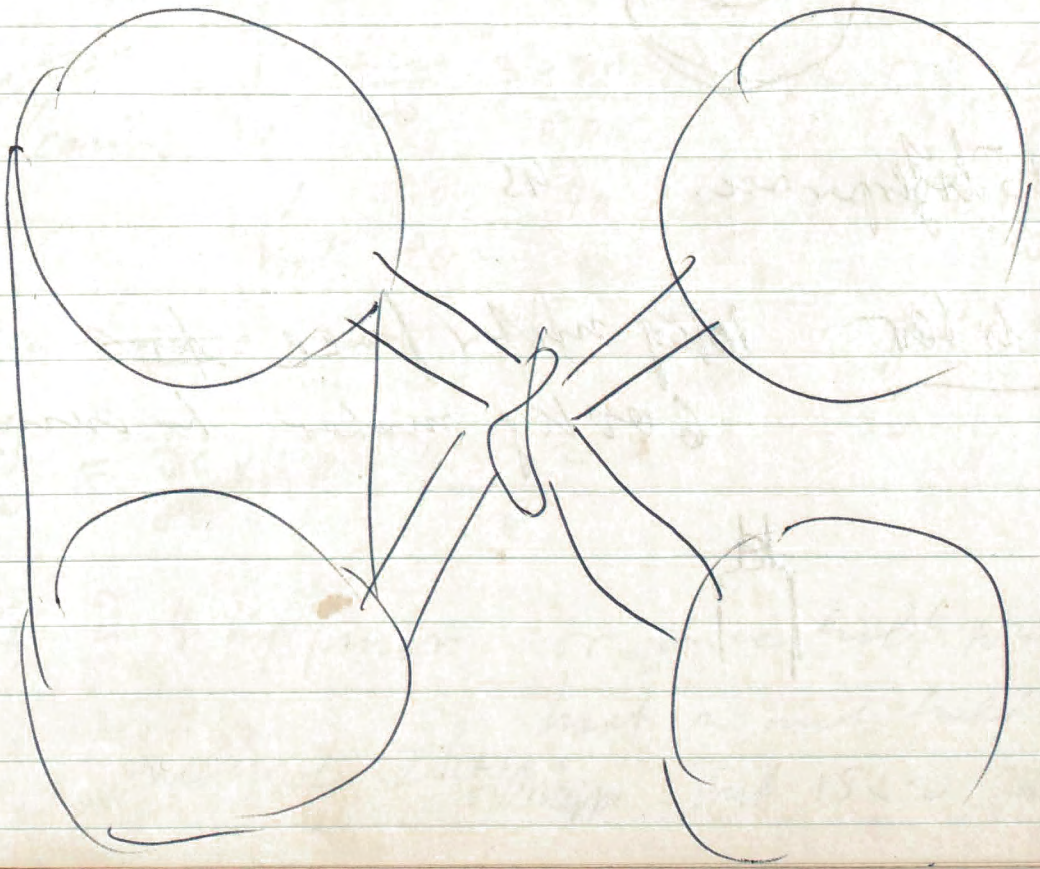




15°C

E - C

C - E



Heat capacity assume 1/2 per cc

$\frac{1}{2}$ 5° x 45.

2½ WE per sec. in one min 150 WE per liter (to freeze 1 liter 40 WE)²

How pr from ~~pentane~~ oil to bulk solution
non evap

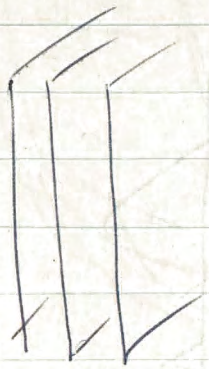
45 degs per sec. 45

1 liter 10 kg meter/sec ~~for~~
600 kg meter to cump 40 WE

Heat transfer

$$Q = \frac{2}{\sqrt{\pi}} \sqrt{K t \sigma}$$

$V = 3 \times 15$ liter $\qquad \sigma = \rho c_p$



$200\ cm^2 \times 100 = 20{,}000\ cm^2$

1 sec, $45°C$, $K = 4 \times 10^{-3}$ cal/cm² sec

$\sigma = 1/2$

per min $\quad 60 \times 20{,}000 \times 5 \times \sqrt{20}\ \sqrt{10^{-4}}\ \frac{2}{\sqrt{\pi}}$

$\frac{2}{\sqrt{\pi}}\ 3 \times 20 \times 10^3\ 4.5\ 10^{-2}$

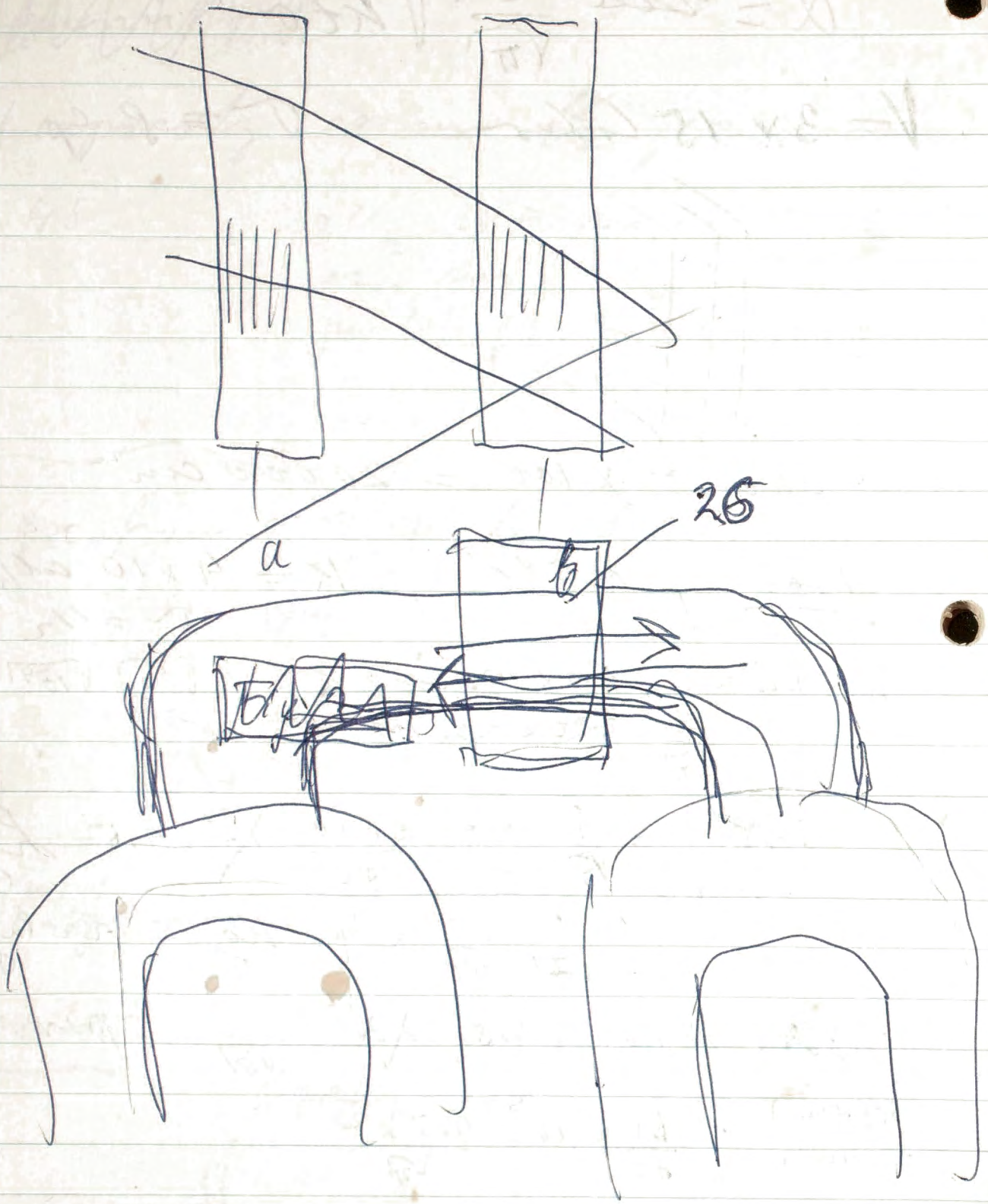
$$\text{ice/min} = \frac{Q}{\sqrt{\pi}}\ \frac{3 \times 20}{80}\ 10^3 \times 4.5\ \text{kg}$$

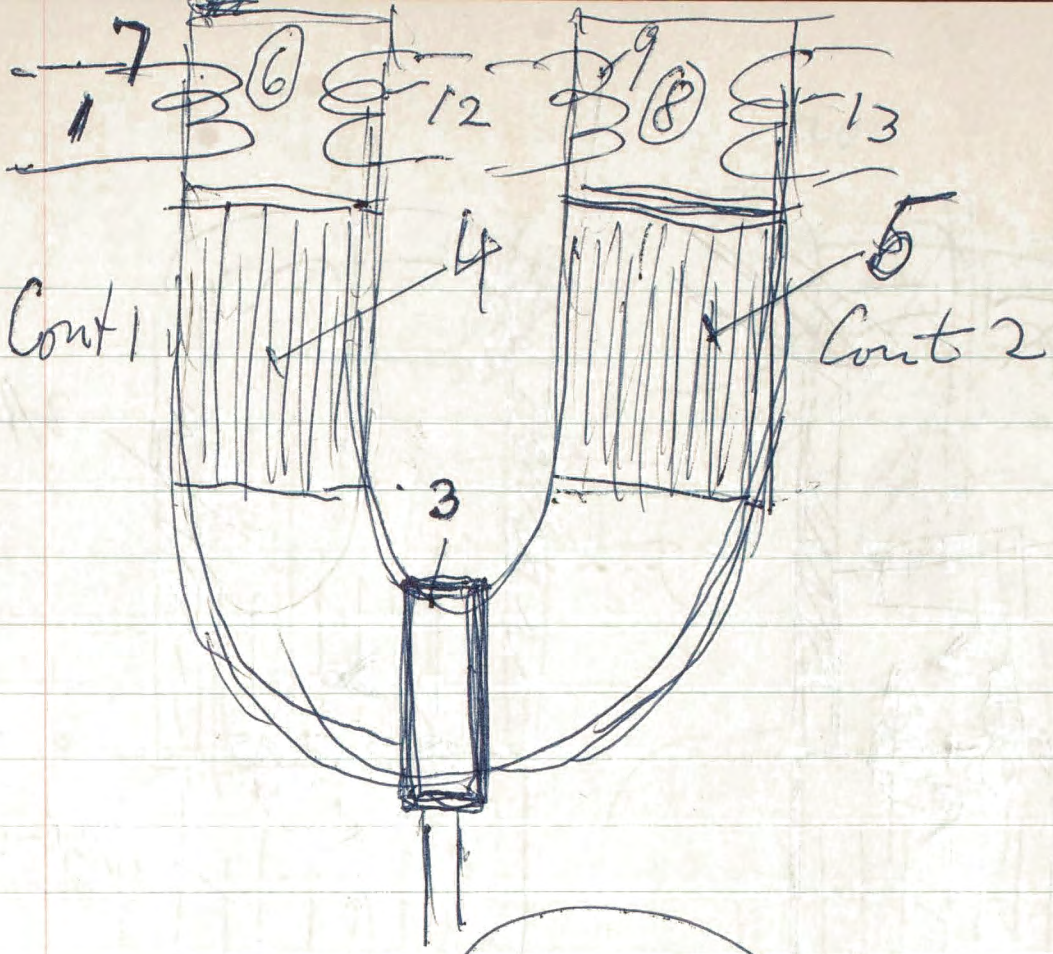
$$\frac{1}{\sqrt{\pi}}\ \frac{60}{80} \times 40\ \text{Kg} \qquad 22\ \text{kg}$$

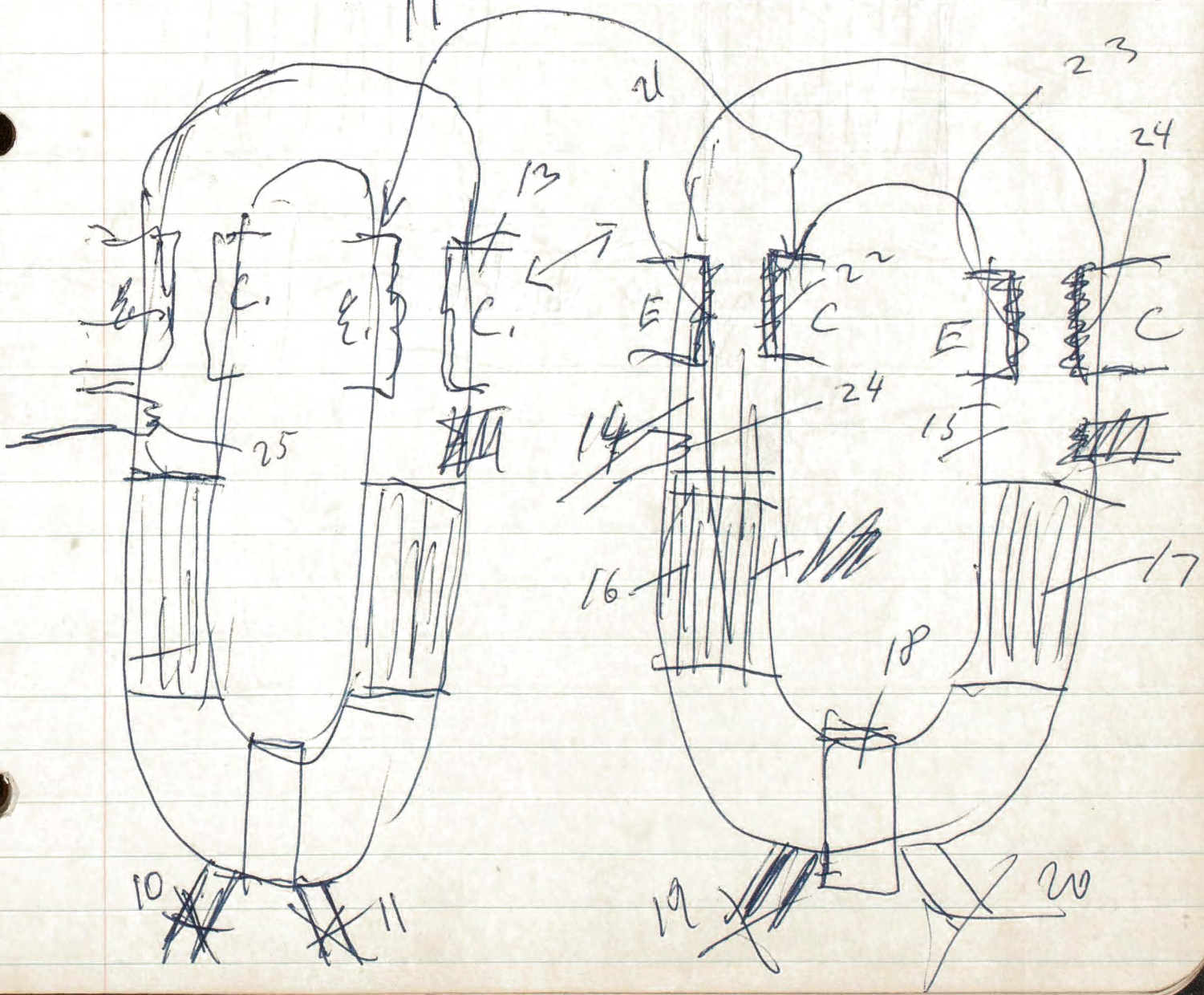
$3 \times 20{,}000 \times 4.5\ 10^{-2}\ \frac{2}{\sqrt{\pi}}$ per min

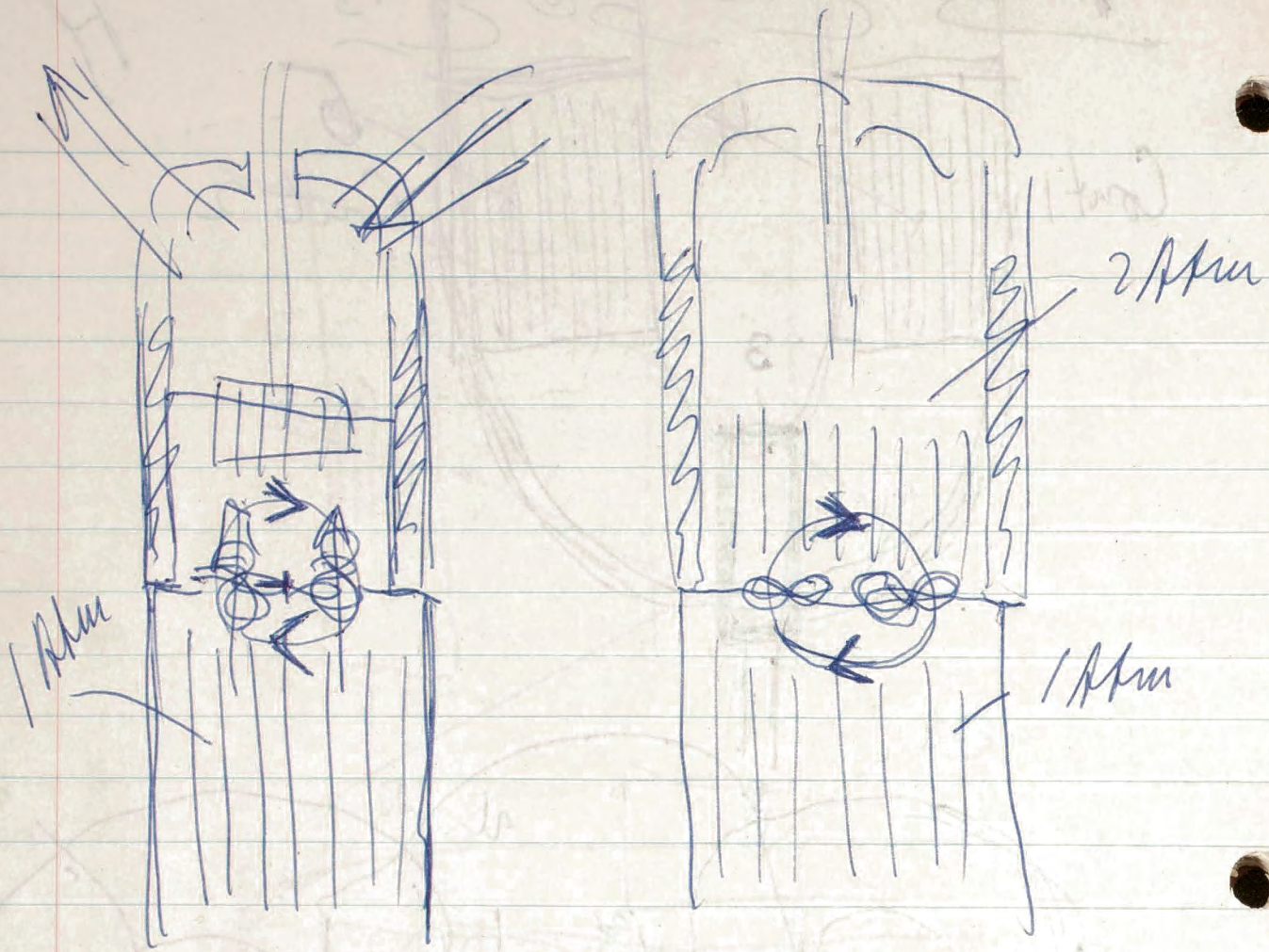
$$\frac{\text{ice (gm)}}{\text{min}} = \frac{60}{80} \times 10^3\ \frac{4.5 \times 2}{\sqrt{\pi}}$$

$\frac{\text{ice kg}}{\text{min}} \cong 4$ Kg/min or since half tons heat in and half out we have 2 kg/min and 15×2 30 kg/min

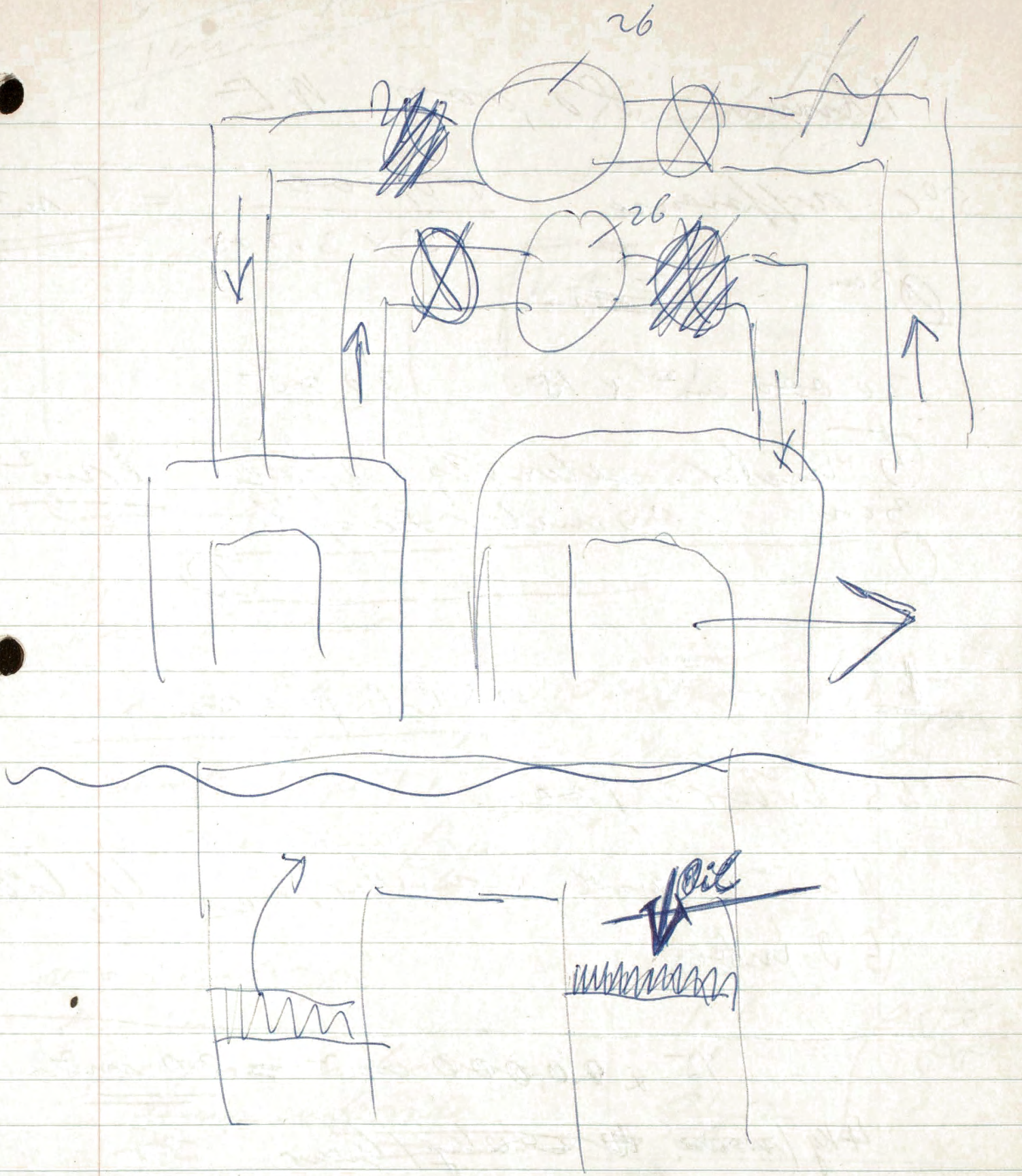

a
b
26


7
6
12
9
8
13
4
5
Cont 1
Cont 2
3


21
23
24
13
7
E
C
E
C
22
E
C
E
C
24
25
14
15
16
17
18
10
11
19
20



Trace Outcome


26
26
Oil

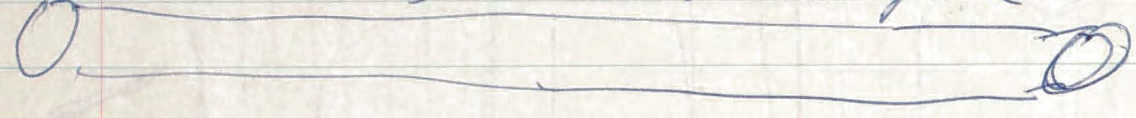
1 hour 80,000 WE

5°C difference $\frac{80,000}{5 \times 3,200} = \underline{\underline{5\ m^2}}$

Ø 3cm ~~5 m~~

20 000 cm² × 15 30 m²

5 meter velocity gives 1 m²
3cm 30 meter length



1°

25 Cal per sec.

25 litero / sec.

1 cm² and 5 meter/sec 1/2 liter
50 tube

---

15 × 20,000 cm² = 30 m²

4 kg / ~~min~~ ~~the 240 kg/hour~~

~~80 × 240 = 20000 WE~~

60 kg min 3,600 kg/hour

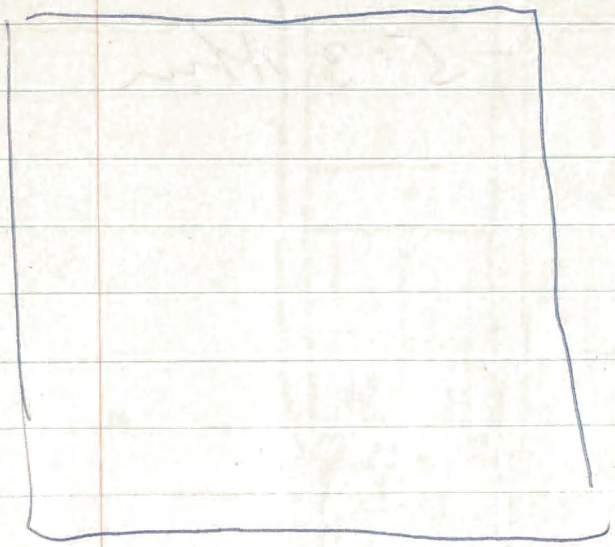
3,600 × 80 WE/hour hr camp.

with 6 × 80,000 WE/hour only factor 2 better

~~1 cm = 1 meter~~

1 meter/sec

1000



$$\sqrt{\frac{K C_p}{\mu \text{ (visc)}}}$$

heat transfer

$$h = 150 \times (1 + 0.011 \cancel{T(\text{degree C})}) \frac{v^{.8}}{d^{0.2}}$$

Btu per hour sq foot degree F°

v in feet/sec

d in inches

v = 1 meter/sec

d = 1 cm

~~sqm~~ square meter

degree centigrade

~~WE~~

2.5
1.6
11
2

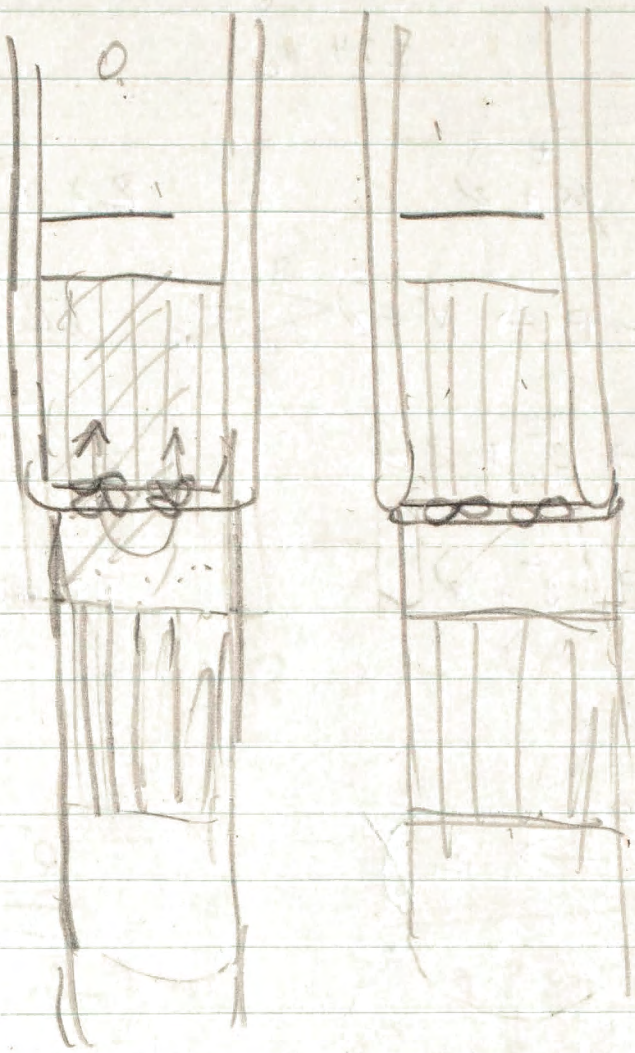
$h(\text{Btu}) = 13000 \times$

h in ~~Btu~~ WE = 3200 WE

Propane 15° C difference
ratio 1.6
at 4° C pressure 5.3 Atm

Butane
ratio 1.8
4° C 1.2 Atm

H



Rentane

~~Butane~~

Compressor

70% Turbocompressor

Elliot Co Jeannette Penna
N 047880 (271 Church N.Y.)

Allis Chalmers
Milwaukee / Wisc
N.Y. office
50 Church
Beech 39100

$$\pi \rightarrow \bar{P} + N \rightarrow \mu + \nu$$
$$e + \nu$$

μ: 210 m_e

π: 274 m_e

$\pi^{\pm}_{0} \rightarrow \mu^{\pm} + \nu$ $\quad 2 \times 10^{-8}$ sec.

$\mu^- + P \rightarrow N + \nu$ $\quad$ like K-capture

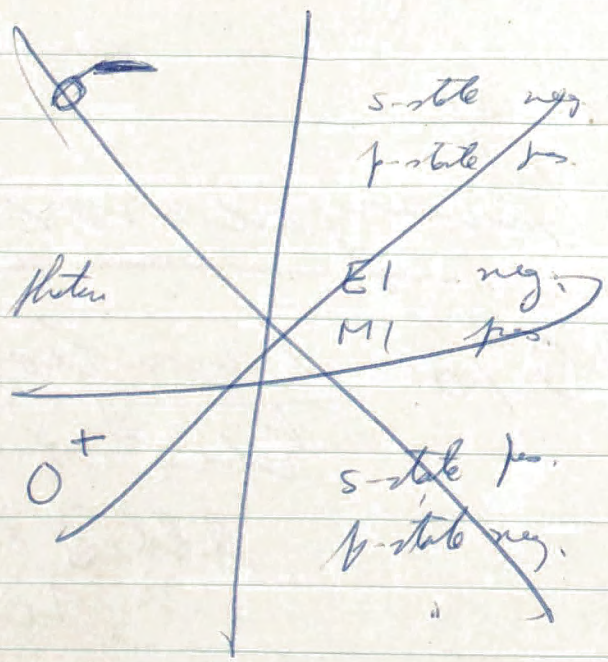
$\mu^{\pm} \rightarrow e^{\pm} + 2\nu$ $\quad 2 \times 10^{-6}$ sec.

$N \rightarrow P + e^- + \nu$ $\quad$ 15 min.

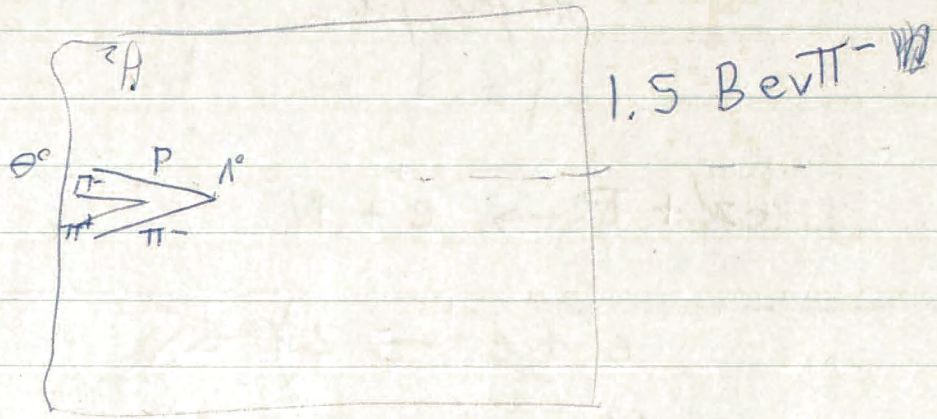
$\pi^0 \rightarrow 2\gamma$ $\quad 10^{-14}$ or 10^{-15} sec.

$2\gamma_{\parallel}$ $\quad \varphi(E^2 - H^2)$

$2\gamma_{\perp}$ $\quad \varphi\, E \cdot H$



$\vec{\tau}\cdot\vec{\phi}$ NR $\vec{\sigma}\cdot\vec{\nabla}\vec{\phi}$



$$\pi^- + P \rightarrow \Lambda^0 + \theta^0$$

$$\Lambda^0 \rightarrow \pi^- + P \qquad \theta^0 \rightarrow \pi^- + \pi^+$$

Hyperons (queer nucleons) (Y-particles):

$\Lambda^0 \rightarrow P + \pi^- + 37\,\text{MeV}$, 3×10^{-10} sec.

$\Sigma^+ \rightarrow P + \pi^0 + 115\,\text{MeV}$, $\rightarrow N + \pi^+$

$\Sigma^- \dashrightarrow N + \pi^- + 115\,\text{MeV}$

$\Xi^- \rightarrow \Lambda^0 + \pi^- + 65\,\text{MeV}$

K-particles: $\theta^0 \rightarrow \pi^+ + \pi^- + 210\,\text{MeV}$ 2×10^{-10} sec.

$$\frac{6\times10^{-8}\times10^{6}\times10^{-24}\times10^{32}}{27\times10^{30}} = \frac{1}{4}\times10^{-24}$$

$$P = \frac{6m^2a^2}{c^3}$$

Reines + Cowan

Hanford file

$a = \omega^2 x$

$\omega = 10^7$

$x =$

$\nu + P \rightarrow e^+ + N$

$E = \frac{m\omega^2x^2}{2}$

$P = \frac{GmE\omega^2}{c^3}$

$e^+ + e^- \rightarrow 2\gamma$

$G = 6\times10^{-8}$

N + nucleus $\rightarrow$ capture γ-ray

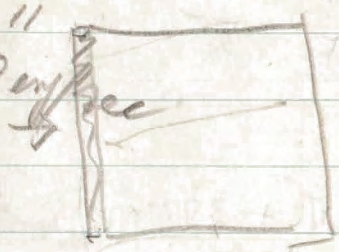
$m = 10^{-5}$

$E = 10^9$

$\frac{6\times10^6}{27\times10^{30}}$

10

$10^4\,10^7 = 10^{11}$ erg/sec



1

$\frac{1}{4}\times10^{-20}$ erg/sec

10^{11} erg/sec $\quad 10^5$ cm/sec $\quad 10^6$ erg/cm $\quad 10^7$ ergs

$10^{-27}\,10^7$

$\frac{3\times10^{10}}{10^7} = 3{,}000$

$6\times10^8 \quad 3\times10^{24}$

$N = 10^{-44}$ cm^2 $\quad N_{free}$ / cm^3 $\quad N_{bound}$

$\frac{eH}{2Mc}$

$\frac{5\times10^{-10}\ 10^{4}}{4\times10^{3}\times10^{-27}\times3\times10^{10}}$ $\frac{1}{2}\times10^{8}$

10^{7}

$p + p \rightarrow \pi^{+} + d$

$\pi^{+} + d \rightarrow p + p$

spin 0.15

10^{-27} ~~bbb~~ × ×

~~k~~

$7\times\underbrace{6.10^{3}\ 10^{2}\ 10^{3}}_{R}$

$\frac{4\pi R^{3}}{3} \approx 4R$

$k\ 7\times4\times6\ 10^{8} = 10^{3}$

$k = 6\ 10^{-8}$

$g,\ k\ 10^{-54} = 6\ 10^{-62}$ g.

$E\ \ 25\ 10^{-20}$

$\frac{E}{g.} = \frac{25}{6}\ 4\ 10^{42}$

$\frac{137}{3\ 10^{10}}\ \frac{1}{10^{2}}\ 10^{-8}$

$20\ \ 10^{-18}$ sec

$2\ 10^{-17}$

$\frac{1}{2}\ \frac{1}{2}\ \frac{1}{3}\ 10^{17}\times10^{5}\ 10^{3}\ 10^{10} = 34$

Lifetime
Rest-mass
Rest-range

$10^{-5} \times 10^{-16}$

Electron flip.

$$\frac{G m^2 x^2 \omega^4}{c^3}$$

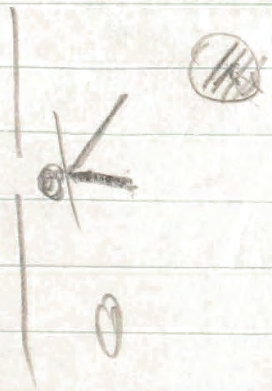
Take Compton wave-length, grams electrons.

$$P = \frac{6 \times 10^{-8} \times 10^{-21} \times 10^{42}}{27 \times 10^{30}}$$

$(2\pi)^4$

$$= \frac{1}{4} \times 10^{-17} \text{ erg/sec.}$$

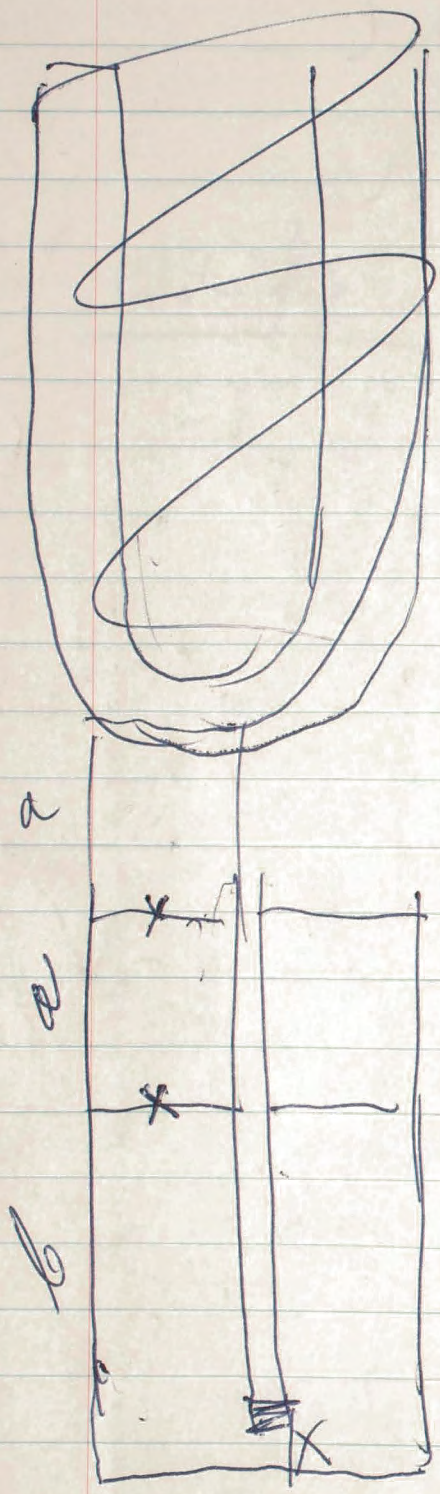
End quanta $= 10^{-27} \times 6 \times 3 \times 10^{10}$
$= 18 \times 10^{-17}$

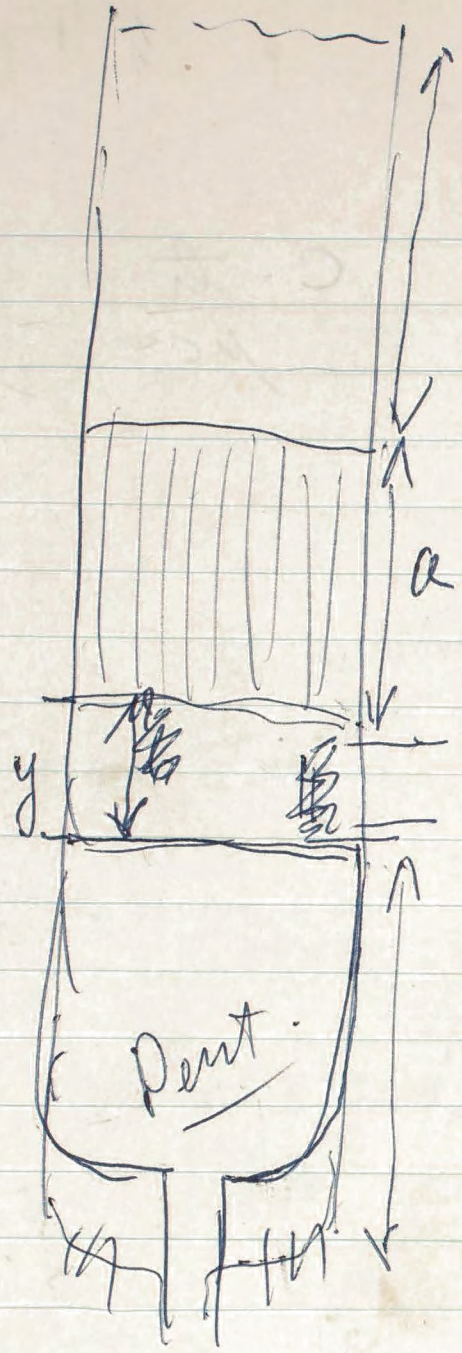


$\Delta \lambda = \alpha t \left(\frac{m^2 - n^2}{m^2 n^2} \right.$

$\frac{1}{\lambda} = \left(\frac{1}{m^2} - \frac{1}{n^2} \right)$ ehc

$c \cdot \frac{\hbar}{\mu c^2} = \frac{\hbar}{\mu c}$





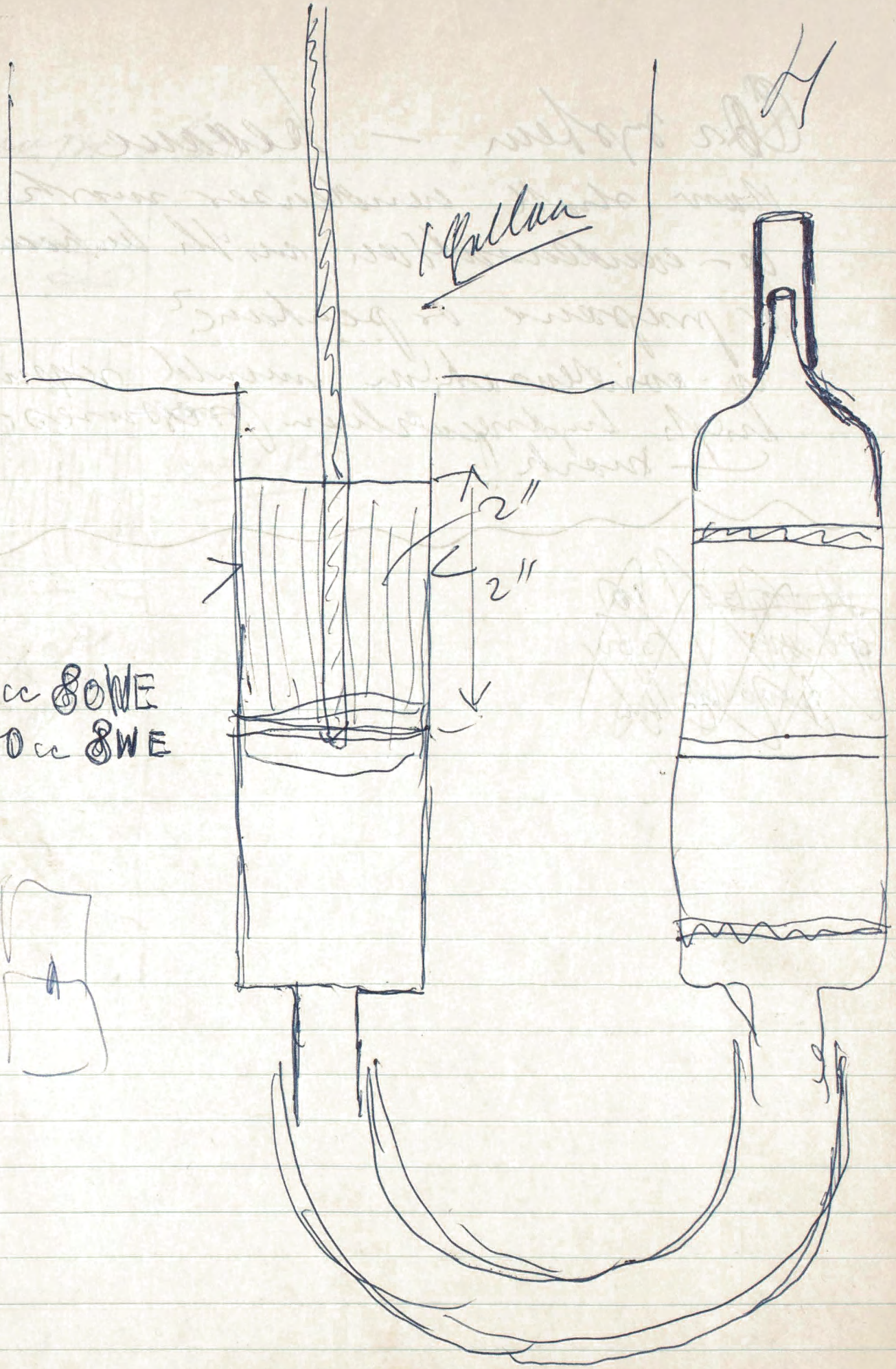
a+b is total water

a+x is pentane

$b = a + x + y$

total water is

$2a + x + y$



100cc SOWE
1000cc SWE

CO_2 system – because

How shall condenser work?

Co-condensation with butane

or propane or pentane?

Co-condensation would require

high hydrocarbon pressures – more work!

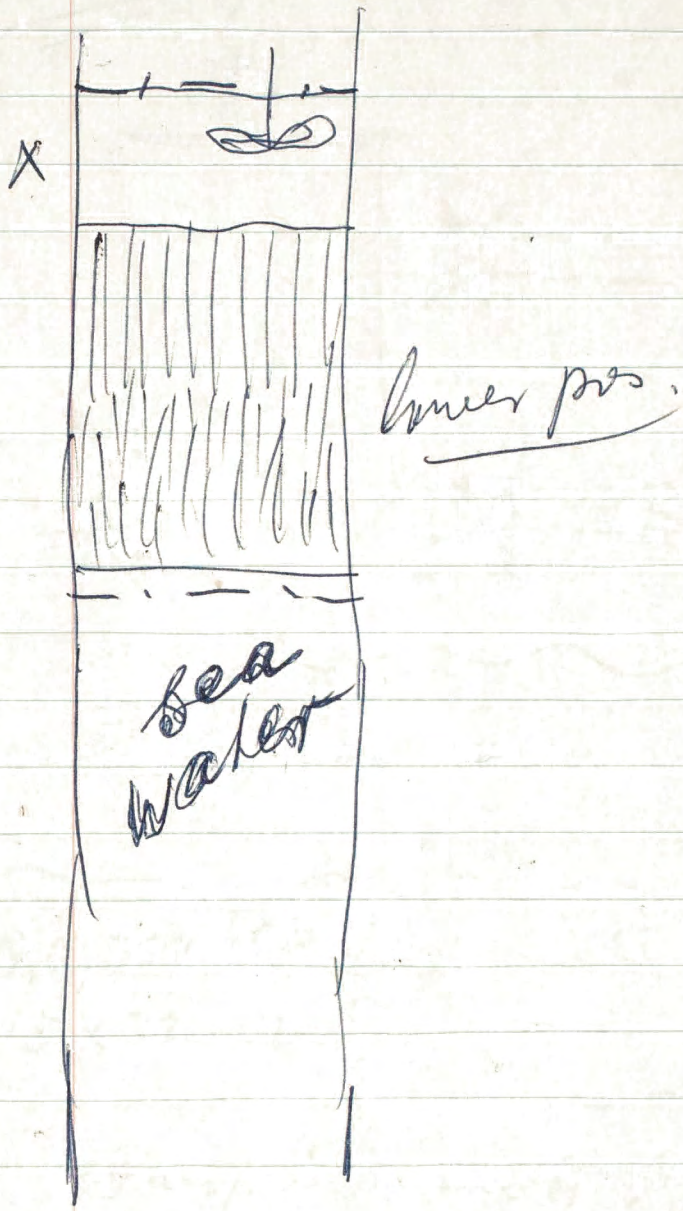
~~DOUBLE~~ 10

~~90.000~~ 300

~~DOUBLE~~

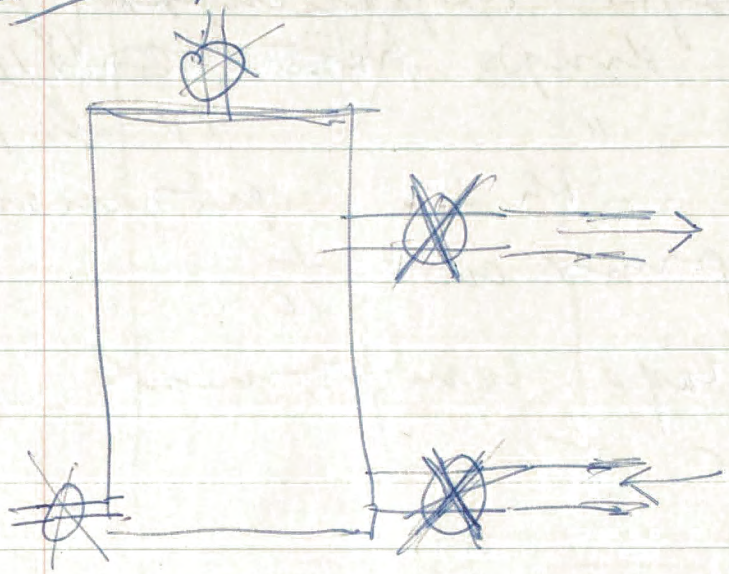
evaporator

4



CO_2 process

Gidaliegs



Gas volumes

100,000 WE/h 15 kg Mol/hr freezing

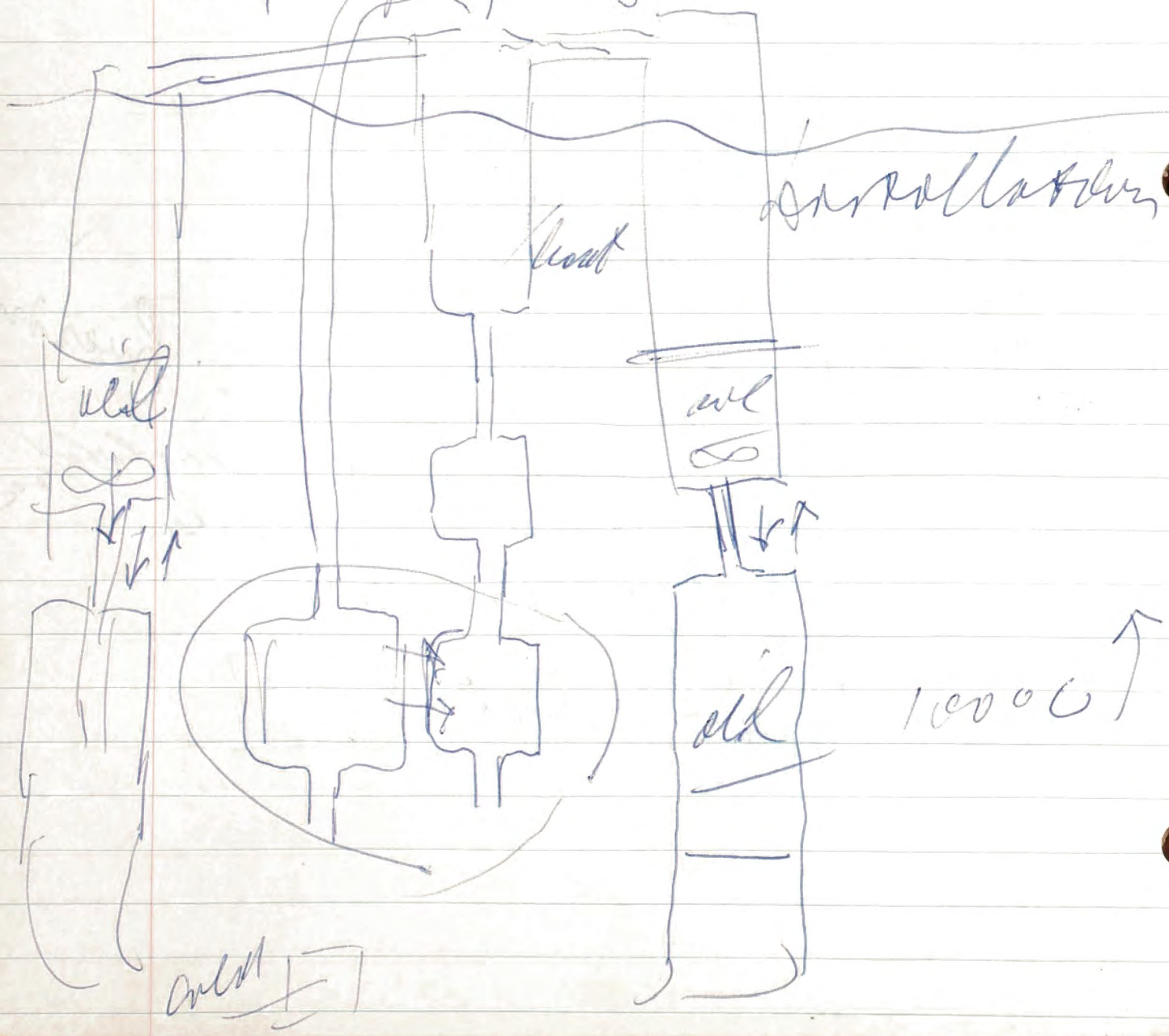
15 × 22 m³/h gas = 330 m³/hr

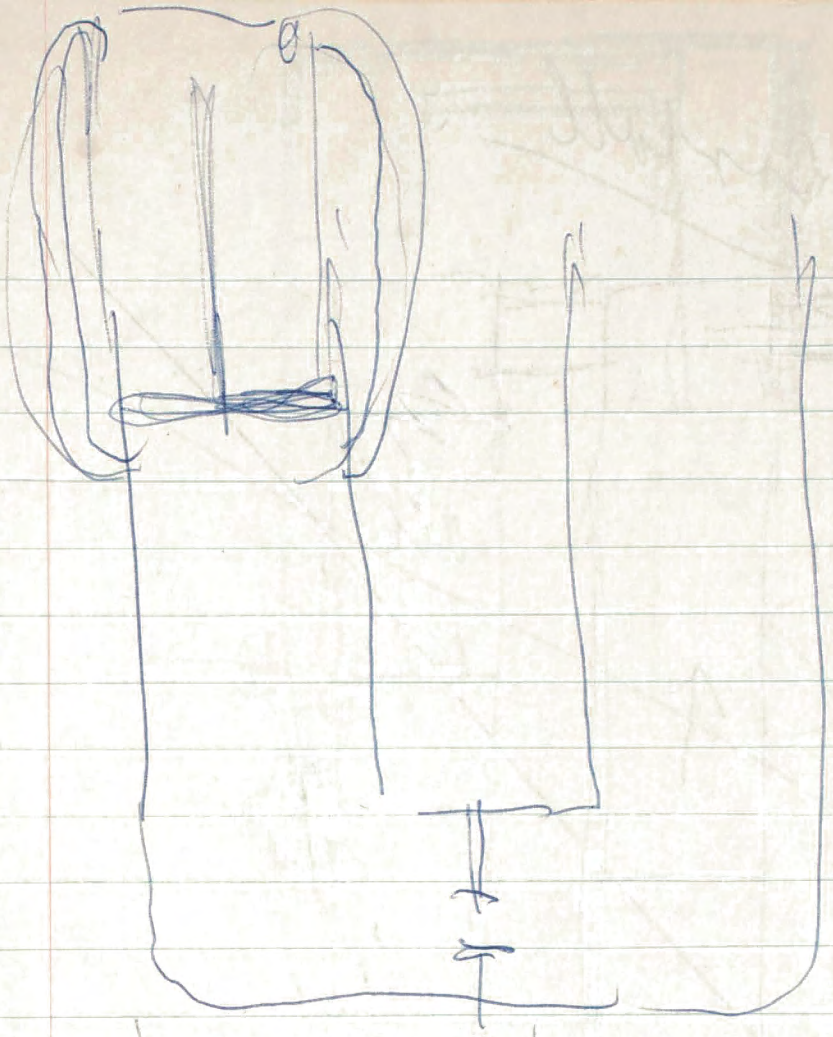
or per sec ≈ 1/10 m³ or 100 liter/sec

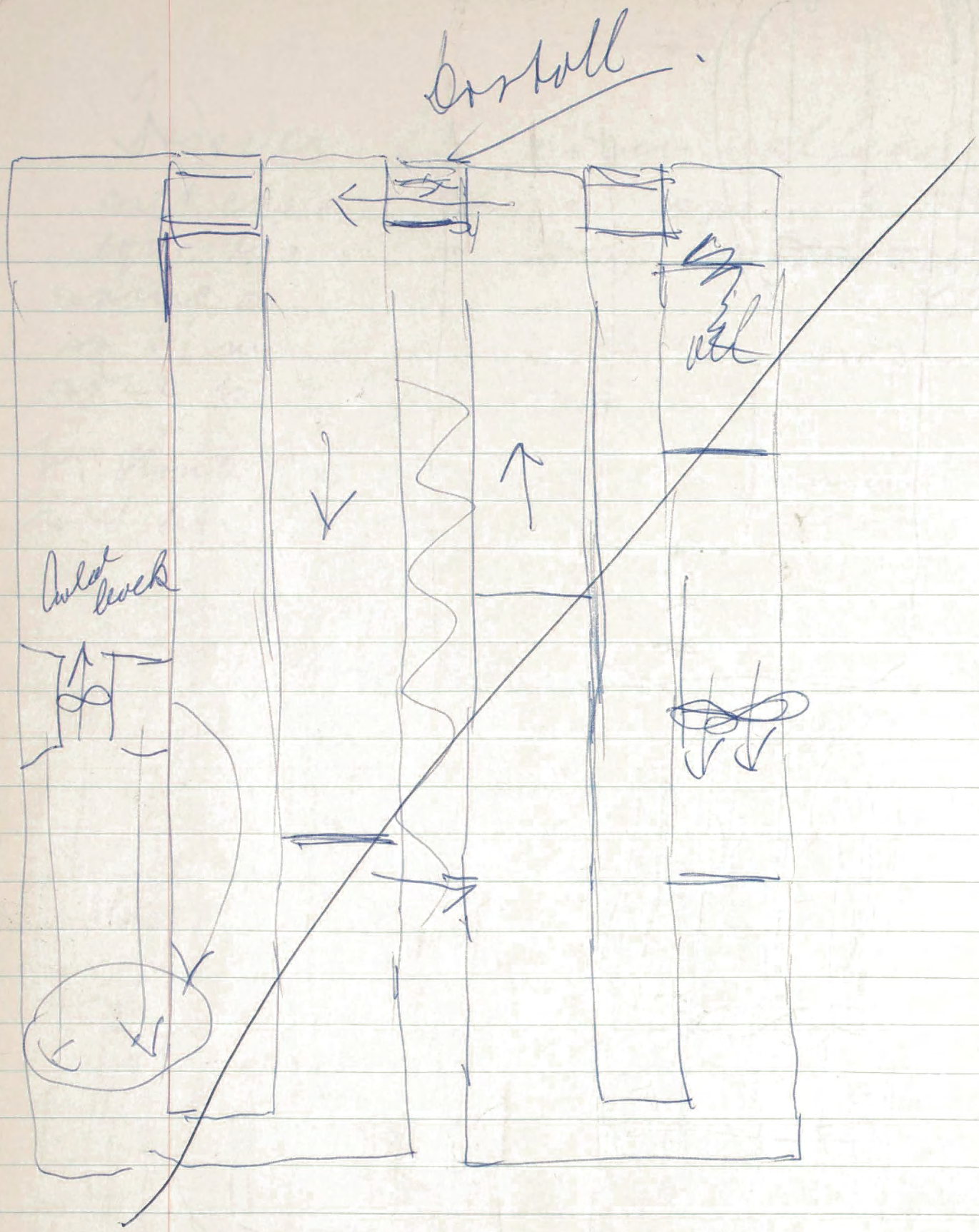
100 m/sec velocity gives cross section of tube at 1 Atm pressure σ =

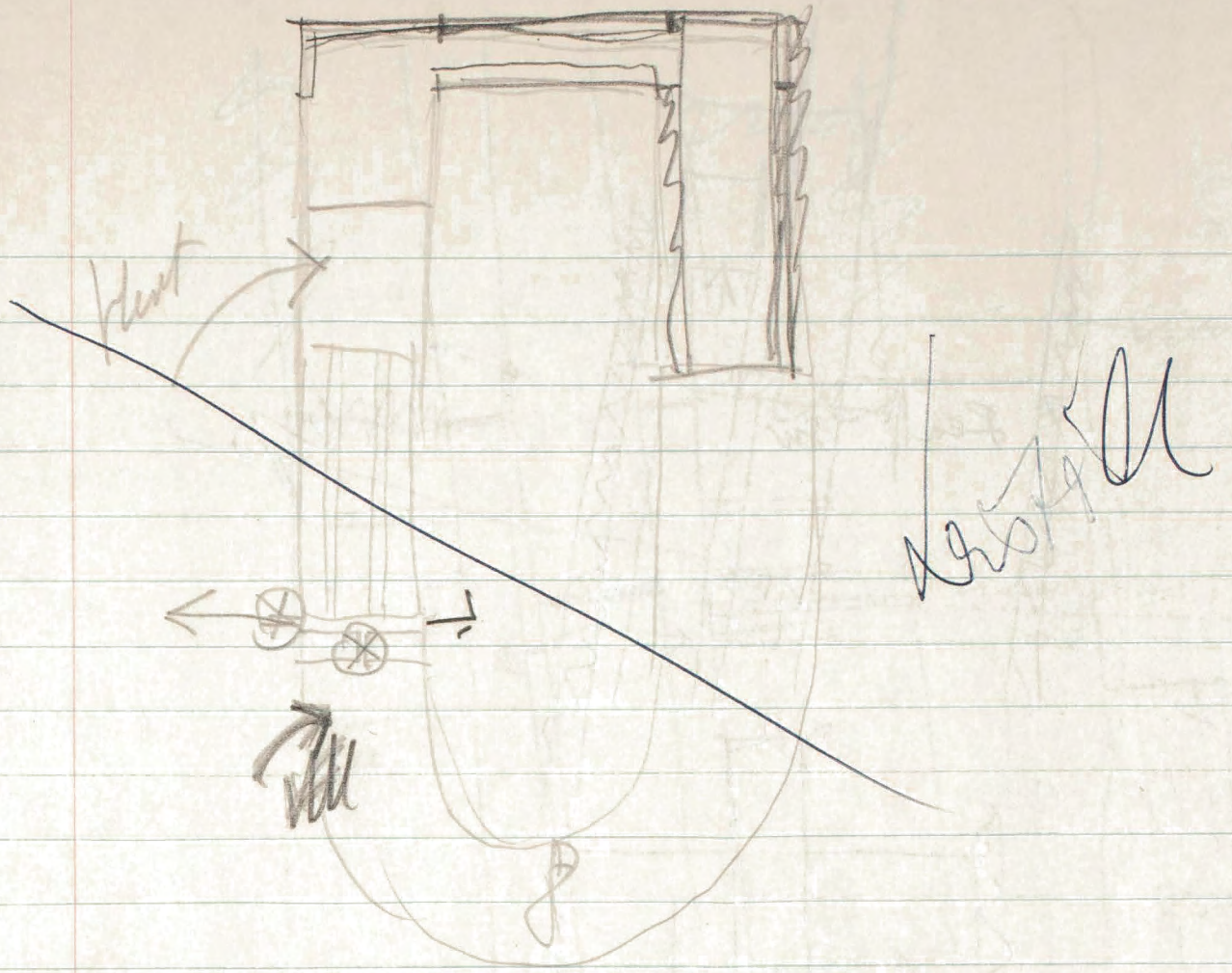
$$\frac{10^5 \text{ cc}}{10^4} = \boxed{10 \text{ cm}^2}$$

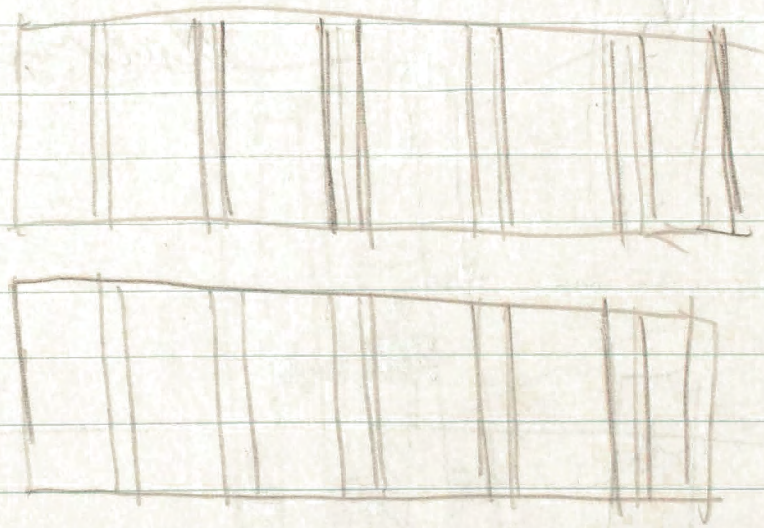
Fuses for given voltage
self canc. drops exponentially
~~expo~~ time to drops from 100 to 10
same as " " " " 10 to 1
so if we start with 10 equipment
size is $\frac{1}{2}$, ll power cost $\frac{1}{10}$
by doubling voltage equipment
will be $\frac{1}{4}$ power $\frac{1}{5}$

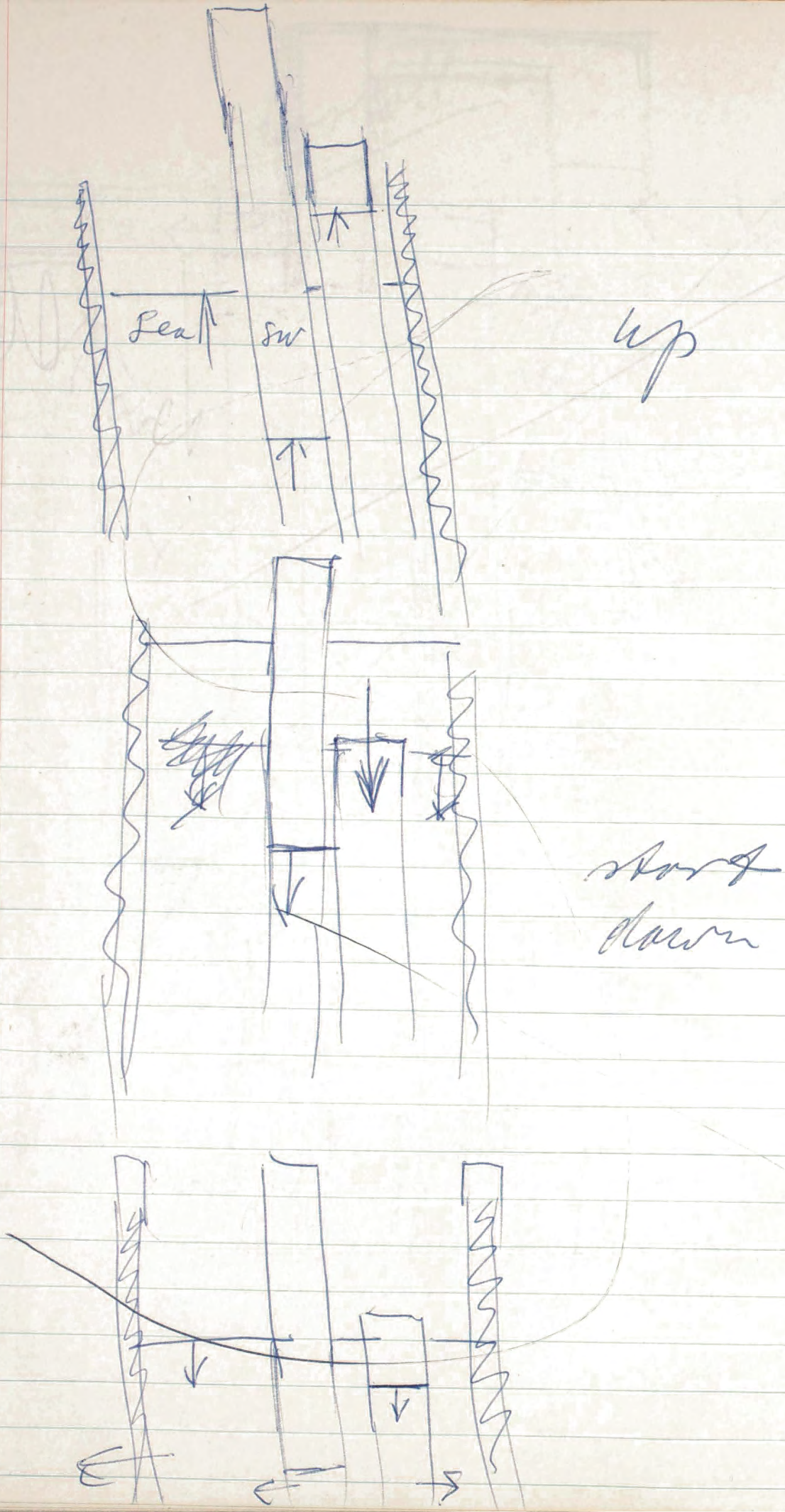


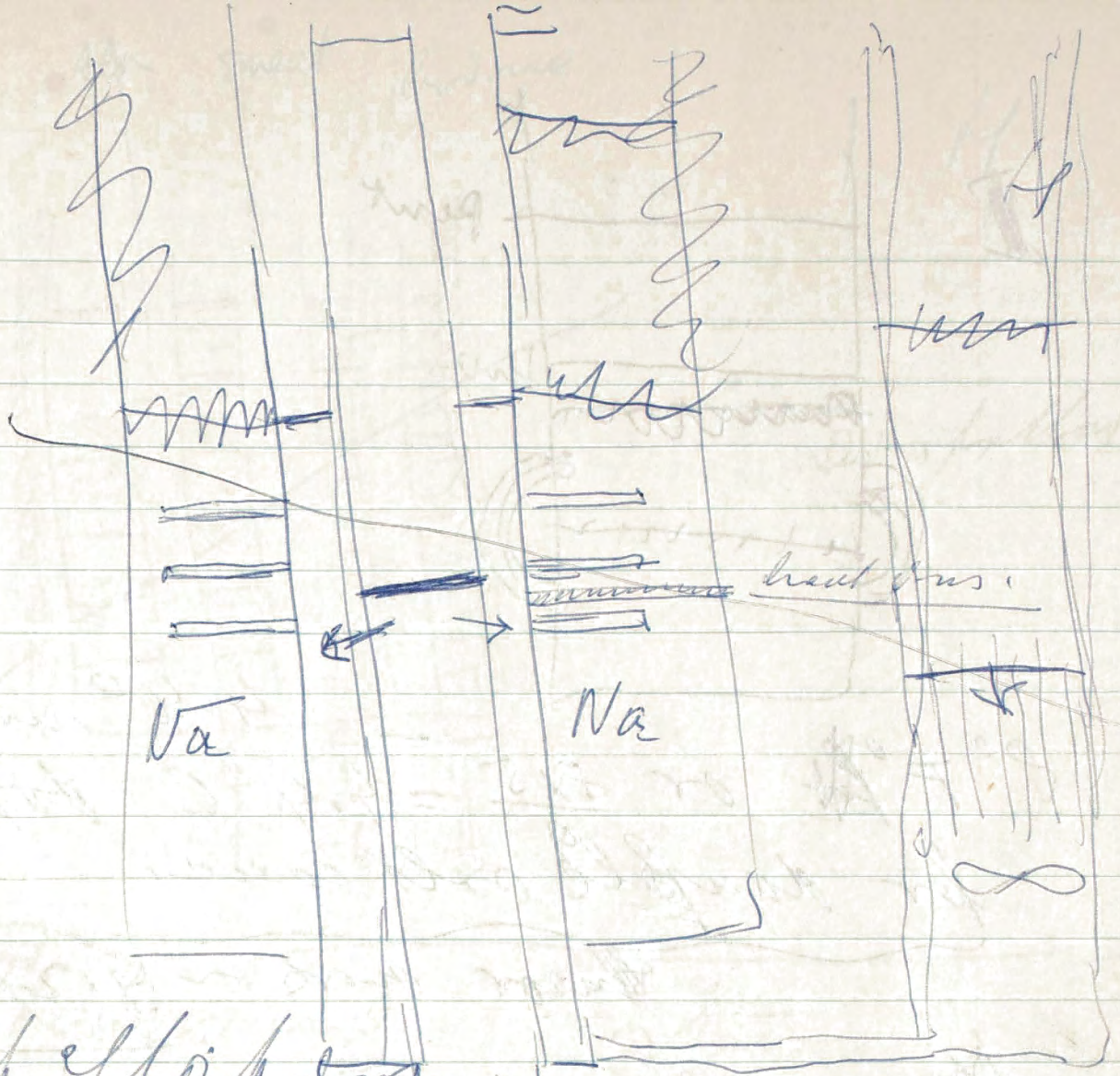



bristoll
well
outlet block


Heat
Vertical
Hill

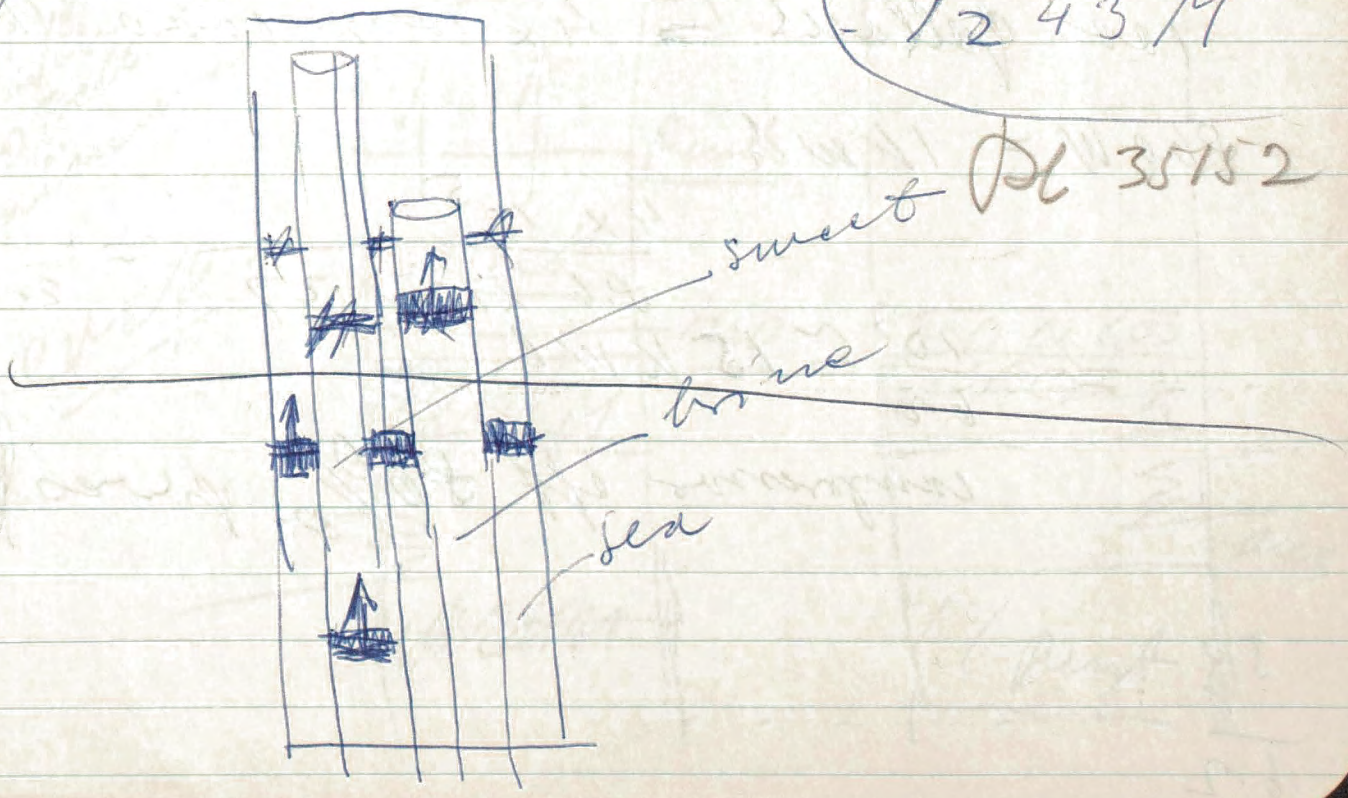


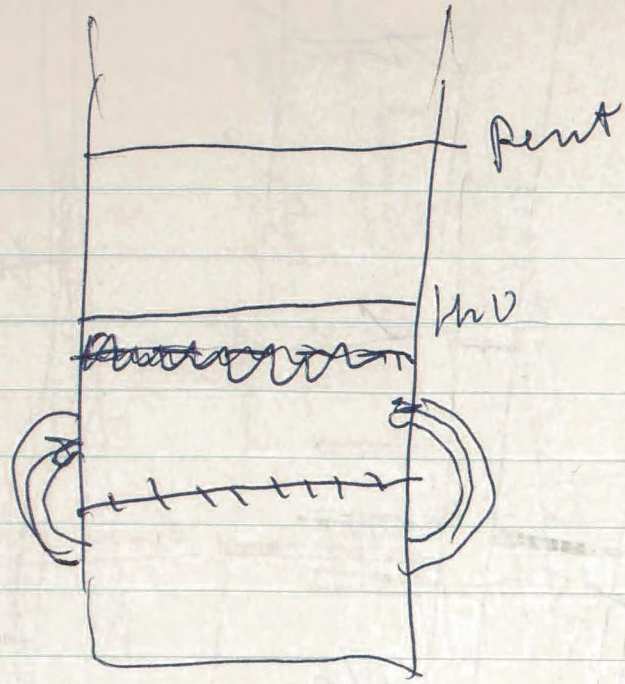

Sea
SW
up
start down



Distillation

Brookings
1243M
DL 35152





$8°F$ or $\frac{8 \times 5}{9} = 4.4°C$ — $4.4°$ needed ~~difference~~ for double salt cone.

theor work ~ 5.2 kWh

$$\frac{10°}{270} = \frac{1}{27}$$

1000 gallons $\cong 4 \times 100 \times 1000$ W $\cong$

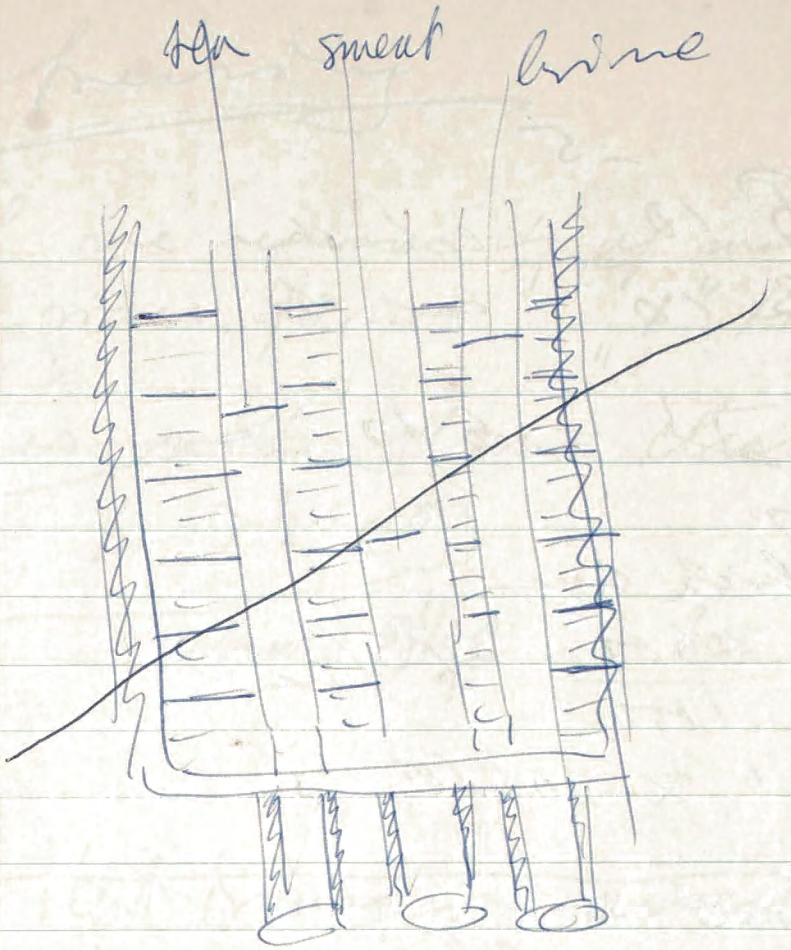
860 W = 1 kWh

$$\frac{4 \times 10^5}{8.6 \times 10^2 \times 27} = \frac{10^3}{2.3 \times 27}$$

$$= \frac{10^3}{62} \cong 15 \text{ kWh}$$

compressor eff 80% gives $\boxed{20 \text{ kWh}}$

$$\frac{54}{8} \quad 6.2$$



4

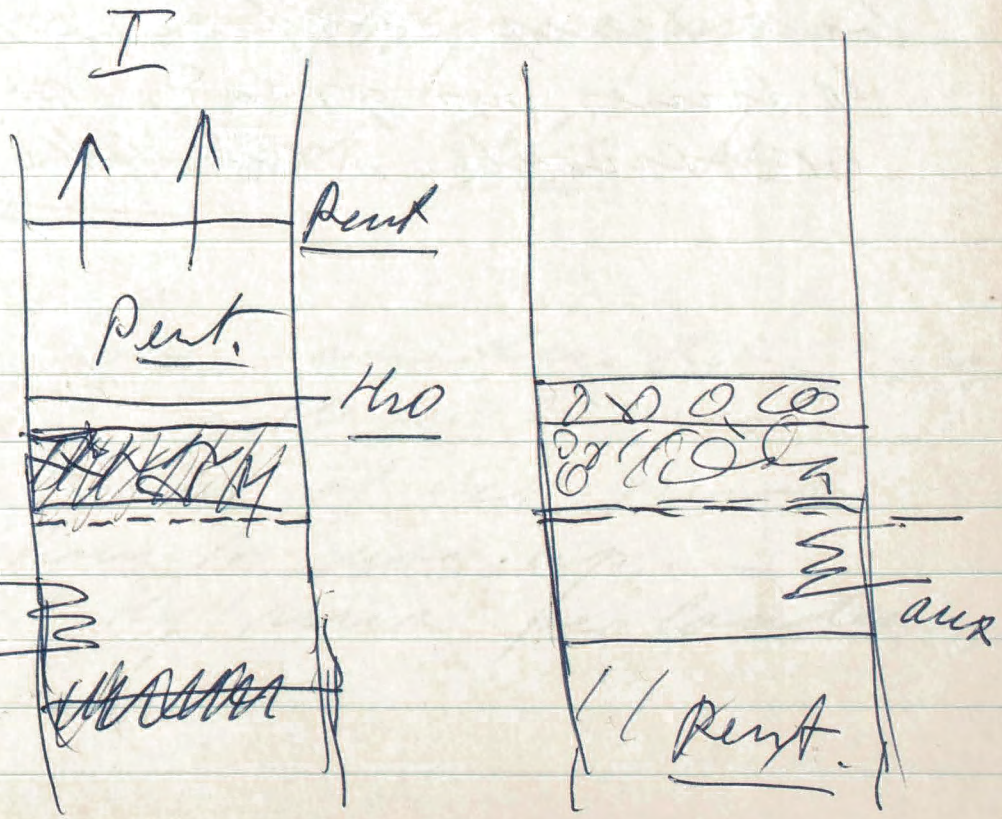
Desalination

Freezing

slurry

p. 108
2.6 KWh per 1000 gallons minimum

evap.



air $k = 6\ 10^{-5}$ cal cm

CO_2 $k = 3\ 10^{-5}$ cal cm

~~1 cm~~ $1\,m^3$ $\square$ $= 6\ 10^4\ cm^2$

30° drop

30 cm thick layer

$30 \frac{6\ 10^{-5}}{30} 6\ 10^4 \frac{3600}{1000}$ WE/hr

$3.6 \times 3.6 \approx 10$ WE

100×1000

10 loss in heat exchanger

2 - 4.40 loss because of cure *

$\boxed{3.2^\circ \text{ loss}}$

4 WE comp hr 8 OWE is $\frac{1}{20}$

but temp difference

4 times as great so that $\frac{1}{5}$ is

reasonable or 4 KWh

freezing

If we remove $\frac{1}{3}$ of water salt M
and rises from "1" to "1.5"
" "
Degrees ~~with~~ then change from
2°C to 3.2°C

allow 2°C in ice containers

2
4.4
6.4
3.2

Heat transfer across 10^{-2} cm ice or (water?) per sec.

15×20, ~~and~~ cm^2 $4 \times 10^{-3} \times 100$ cal
$15 \times 2 \times 4$ WE/sec/degree C°
120 WE/sec

1.5 kg/sec. ice or 90 kg ice/min

May be we can cut Ellis to 5°C total

→ however water conductivity is $0.3\ 10^{-3}$ or three times less i.e. 30 kg of ice/min
or 1/2° we have to use up.—
1/2 for 15 kg/min per condenser

Heat exchanger

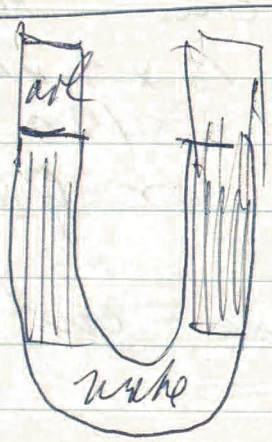
Heat transfer from
discharge to wall.

$k = 3 \times 10^{-4}$
$c_p = 0.5$
$\mu = 0.3$ cp
(pentane
(water (?)

water $\frac{1}{100}$

Heat to be
transferred

$\frac{1}{4}$



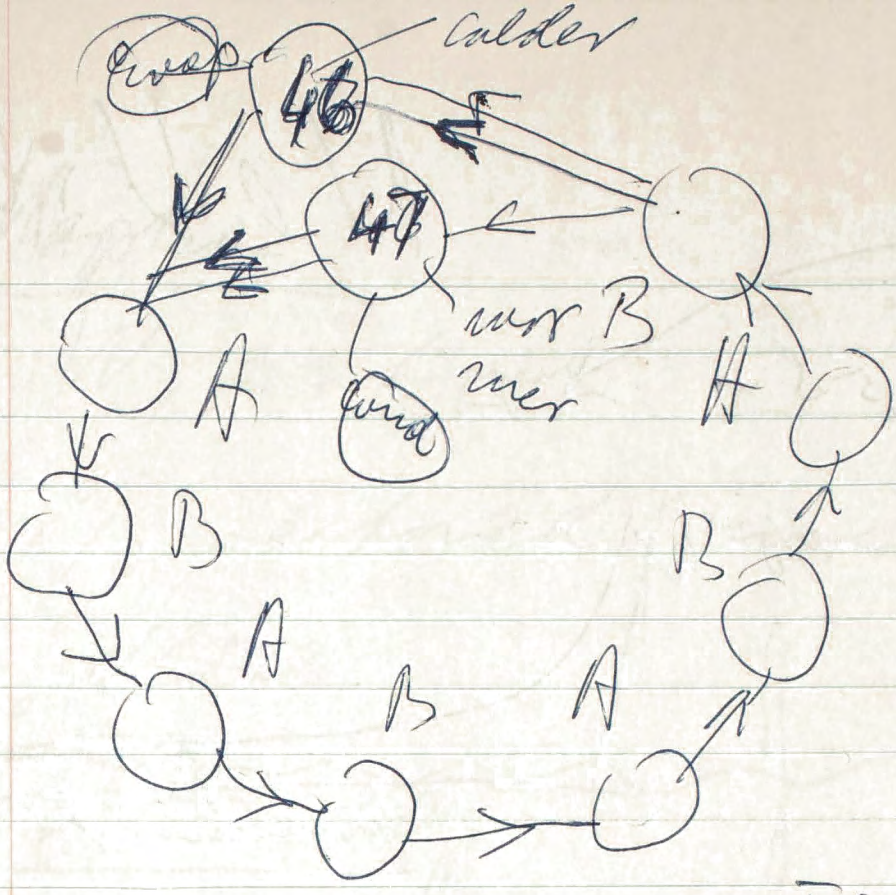
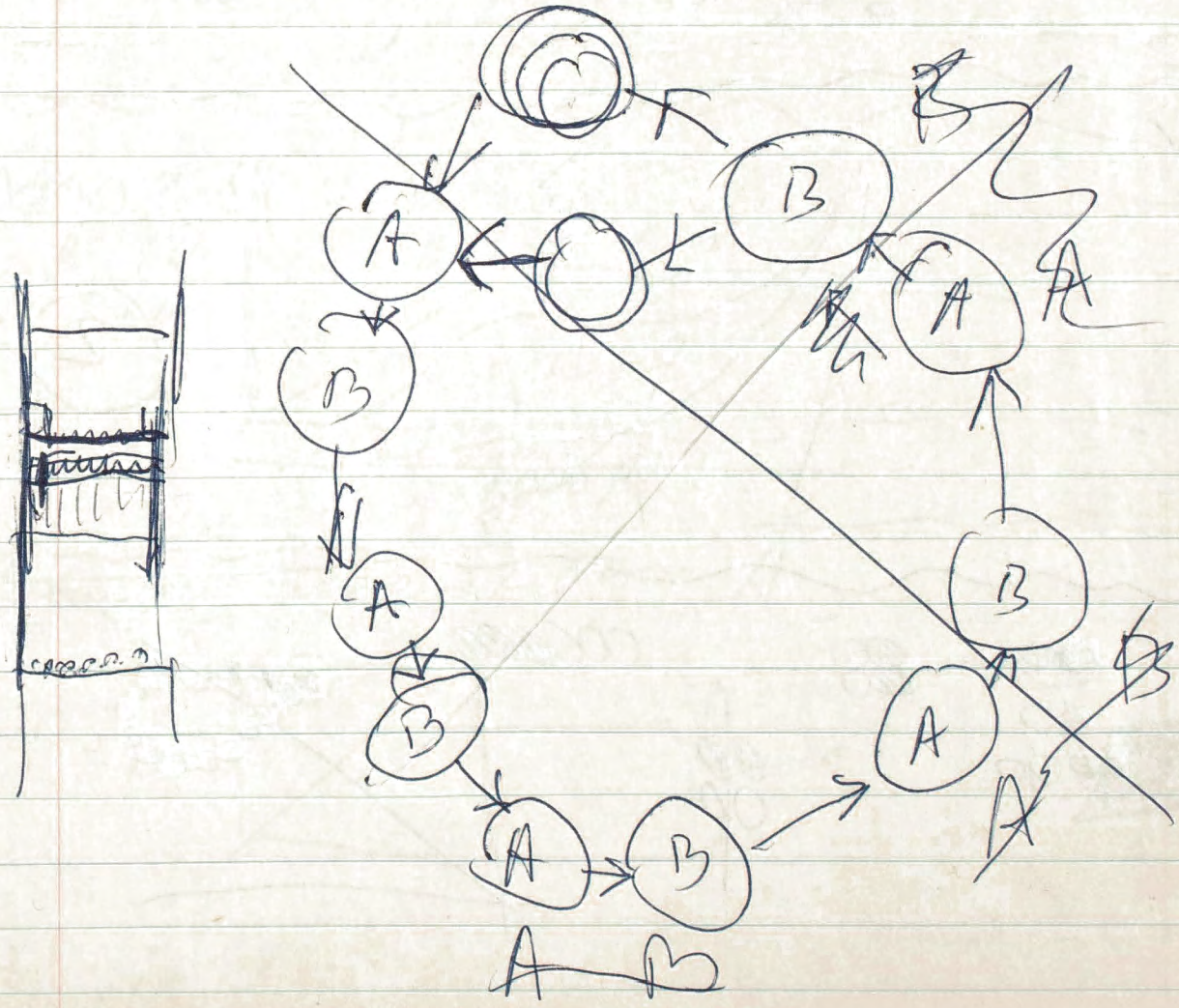
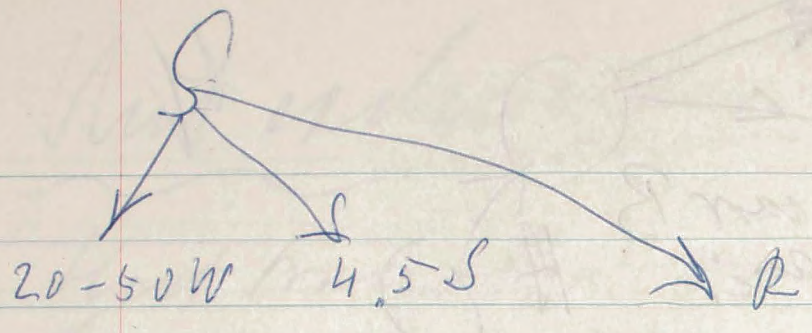
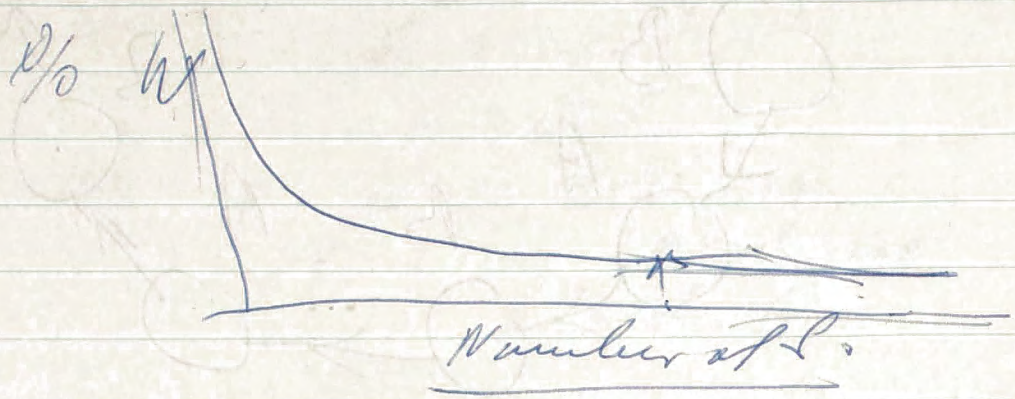


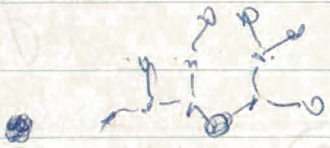
Fig 4



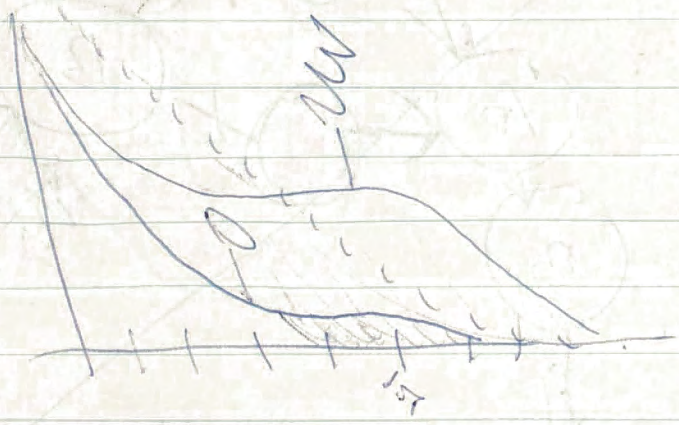
N.U.V.



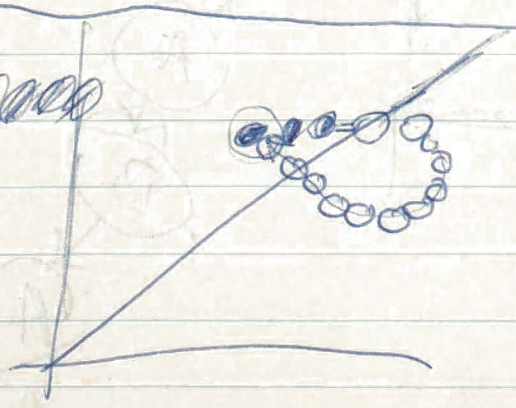




U.V.



2



Kaplan

R (W, Sechred

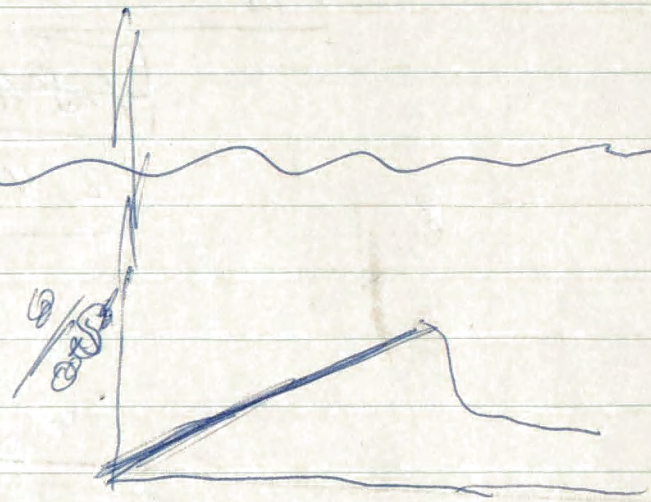
2% Sechred (more than)

2 to 4% White

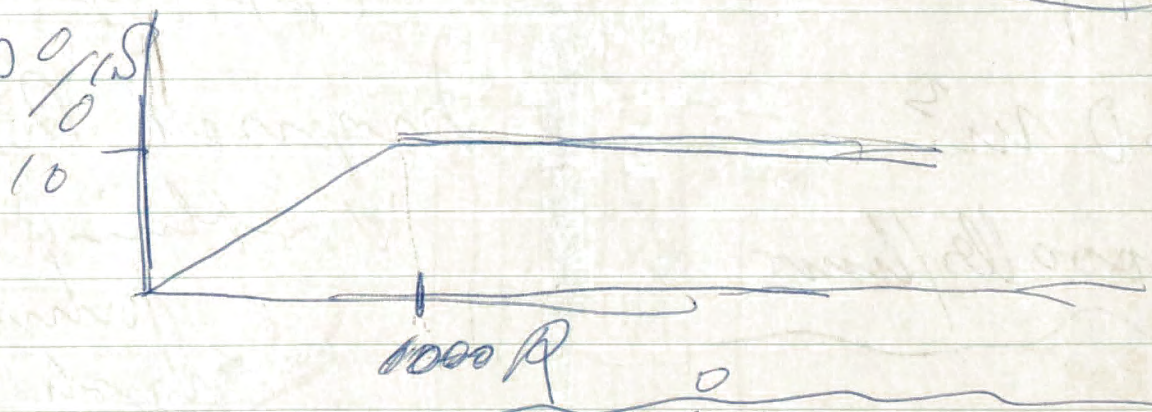
V.V. (10^{-2} to 10^{-5})

S% go up to 20%

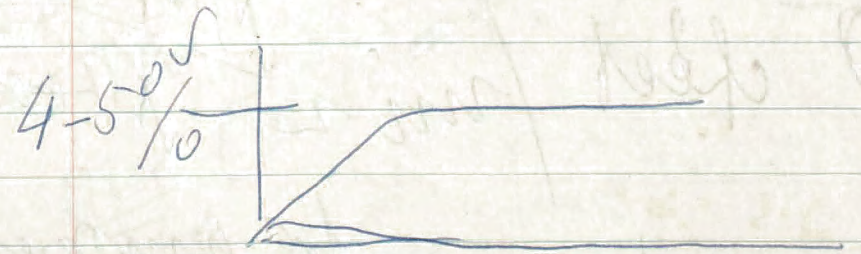
W unchanged



X rays



between 3000 - to 8000 Å



For 40° difference:

$$\frac{1}{2.7}\,\frac{4\times 80}{860} \cong \frac{4\times 80}{24} = 13\ \text{kWh}$$

$$+ \cancel{25\%}\times\frac{10}{7}$$

$= 18$ kWh aux 40°C

~~1.8 kWh~~

2.4 kWh

4/30 and perfect compr.

Ship

30 m³

2000 lbs/hour

Carrier

Ingersoll Rand

Worthington

Joshing and Wash.

$10,000

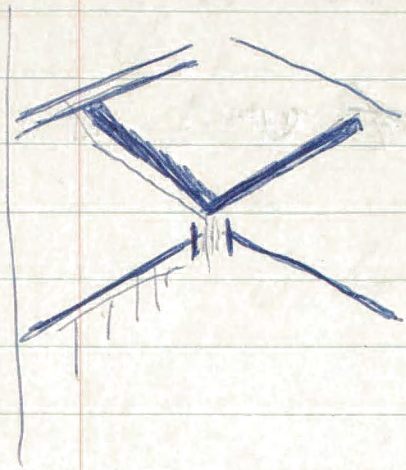
~~$1000~~

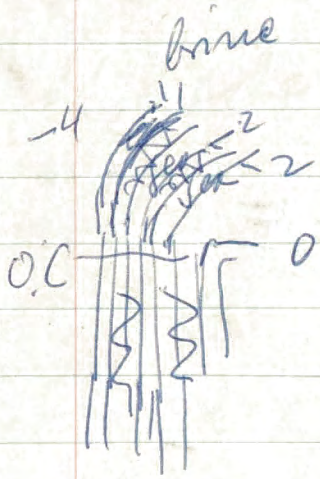
10,000 cfect/min²

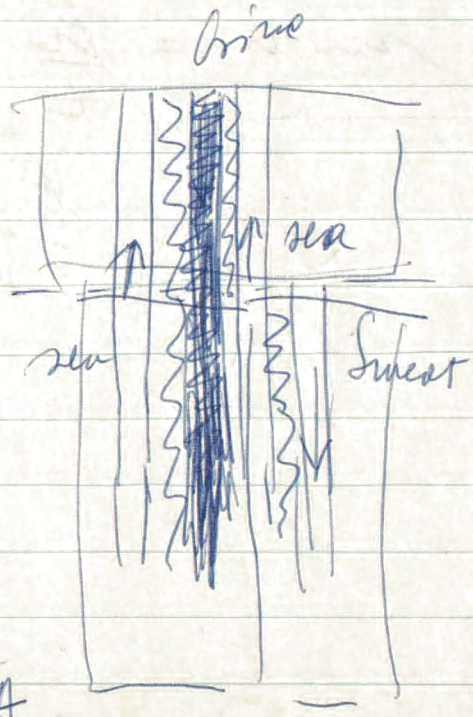
~~500 H.P.~~ 350 kW

for compressor for 15,000

Heat exchanger







$$\frac{T_{hot} - T_{cold}}{T_{hot}} = \frac{Q_{hot} - Q_{cold}}{Q_{hot}}$$

$$\frac{Q_{hot}}{T_{hot}} (T_h - T_c) = A$$

Universel

$$\frac{\Delta}{c} = t$$

distance = $t\,v = \Delta x$

$$\frac{m v^2}{2} = E$$

$$\frac{\Delta x}{\cancel{t}}\, m v = h$$

$$m v = \frac{h}{\Delta x} = \frac{h}{t v}$$

$$m v^2 = \frac{h}{t}$$

$$\frac{h c}{\lambda} = E$$

Jonis

factor 12 from 4000 ppm
to 350 ppm

6 to 8 cent / 1000 gallon

$\frac{P}{Q}$

Voltage

1/2 time

1/2

$\boxed{1/4}$

$\boxed{\frac{1}{2}}$

0^-

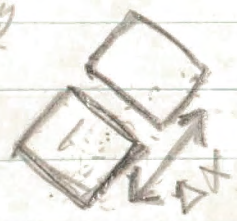
Class e-m.

Class Yuk. $\hbar \to 0$, $\mu \to 0$, $\frac{\hbar}{\mu c} = \boxed{1}$

Q.M. e-m

Q-M Yuk

Mean ang. mom. carried off by photon ~ 1.



$\frac{\Delta x}{t}$.

(t)

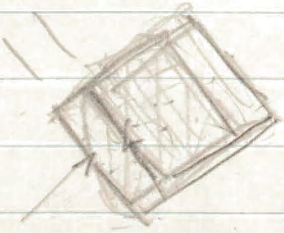
m. $\xrightarrow{\Delta x}$

$\frac{\Delta t}{}$.

$\Delta p > \frac{\hbar}{\Delta x}$

$v > \frac{\hbar}{m \Delta x}$

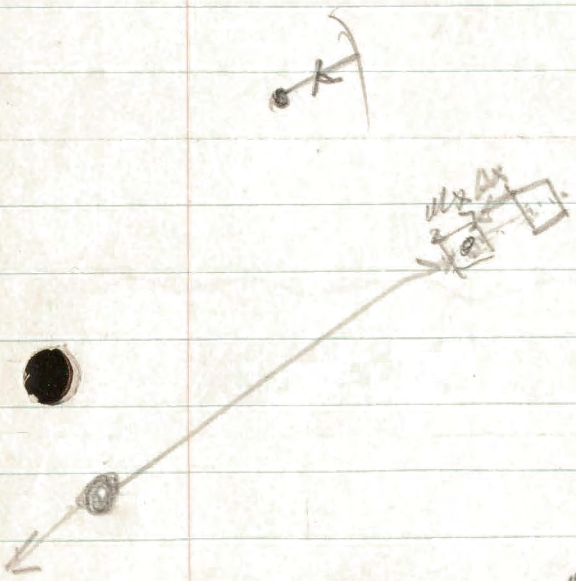
$\frac{\Delta x}{\Delta t}$



t

N 20,000

μ $t = \frac{h}{c}$



$v = \frac{\Delta x c}{h}$

$E = m\left(\frac{\Delta x c}{\lambda}\right)^2$

$m v \times \Delta x = h$

$v = \frac{h}{m \Delta x}$

$v^2 = \left(\frac{h}{m \Delta x}\right)^2$

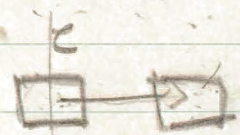
$E = m v^2 = \frac{1}{m}\frac{h^2}{(\Delta x)^2}$

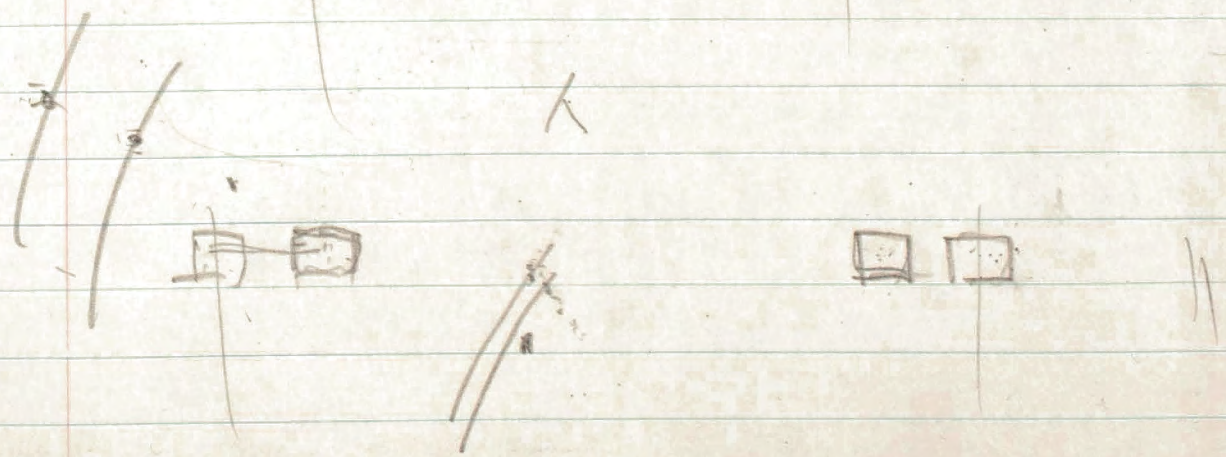
$m^2 (\Delta x)^4 = \frac{h^2 \lambda^2}{c^2}$

$\Delta x = \sqrt{\frac{h}{mc}}\,\lambda$

$E \cong m \frac{h}{mc} \lambda \frac{c^2}{\lambda^2}$

$\cong \frac{hc}{\lambda}$





500 a

4

~~500 cm~~ ~~1000 x 5000~~ = 10^7 cm

1000 Watt

$3\,10^9$ el Stat

$\frac{10^3}{5\,10^8}$ ~~3×10^{-1}~~

=

10^{-3} $\left[\frac{p}{\mu c}\right]^3$

3000/cm

formerly loss 60
loss 20

Knoll
with RCA.

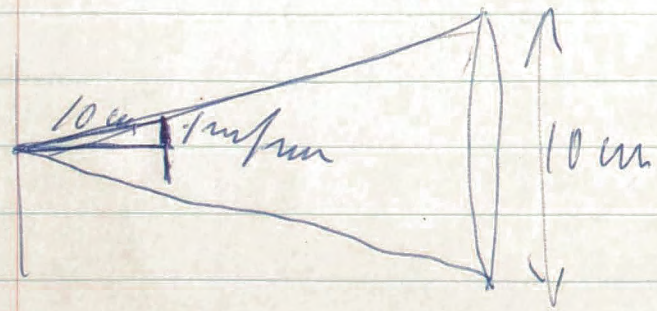
To see one electron you need several million volts

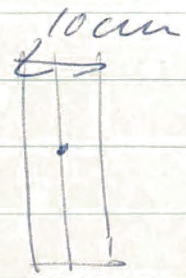
NaI 10% efficiency
no storage

blue light
10^{-5} to 10^{-6} sec

hydrids 10^{-9} sec

1%





$\frac{\pi}{100}$ cm² comes 400 cm²

Dark current Q_{10} is 10

10,000
20,000

dark emission
10^3/cm² sec

5% efficiency electron/hv

Jun might release with
imposed in 1/100 sec

~~Stored in Tlnye crystals~~
~~NaCl Ua 1%~~ ~~2400 and 3500~~
~~but release takes~~ ~~40~~
~~U.V.~~
~~no use~~

Lyman clusive
3500-4500
efficiency 1 to 3%

30 Volts 10^5 ion pairs with 1%
10^4 quanta (3V)
5000 quanta per cm

Viral, Rickettsial
Infections of Man
T. M. Rivers
J. B. Lippincott

Bacterial and Mycotic
Infections of Man
R. J. Dulos
J. B. Lippincott

1st year 1st Quarter Surgery 150
Anatomy
Physiology
Biochem 50
Pharmacy 50 Path 50 Bact 50
150 200

II Quarter Med. Anatomy
150 200

III Med
150 200 Biochem

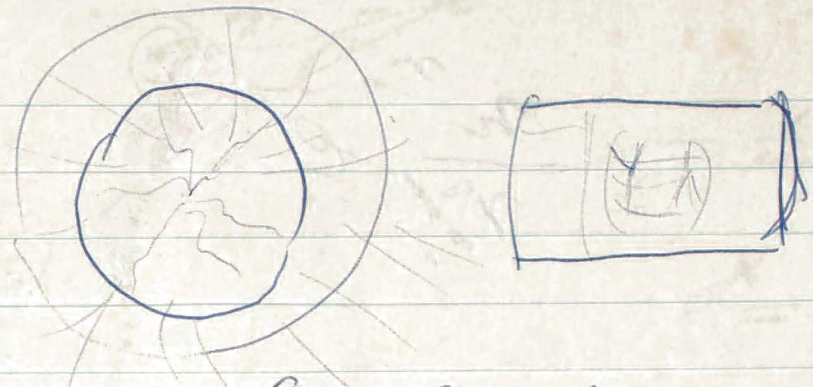
2nd year 1st Q. Med 150 Path 200

II Q Med 150

III Q Med 150 Bact 200
Pharmacy

II year Med, Red, Bact

11



120 - 140 students | Prof + 2 teach
3 x 3 hrs lab | prepare
1 x 3 lectures | + 5

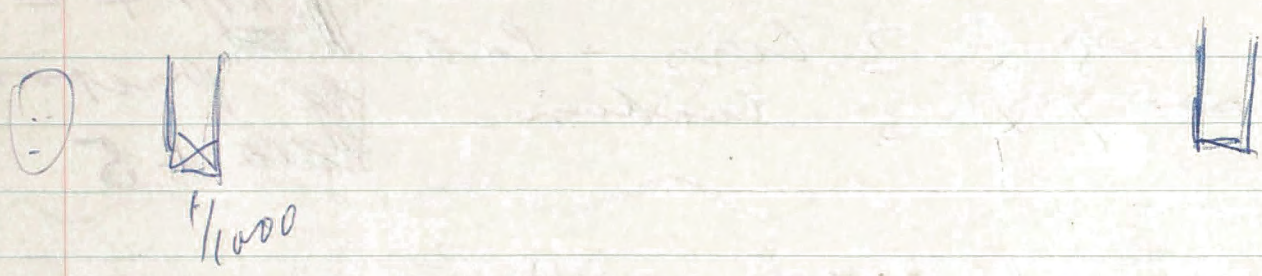
9 on staff
2 Prof
3 assoc.
1 ass.
1 instructor
7

6 teach in lab.
3 grad. student maximum
(groups of 25 - 30)

lectures 120 - 140
2 hours of conference of 30 students per week

Gelinkey
Keynes
Bries. & wolas

$$\frac{n^r}{r!} e^{-n}$$

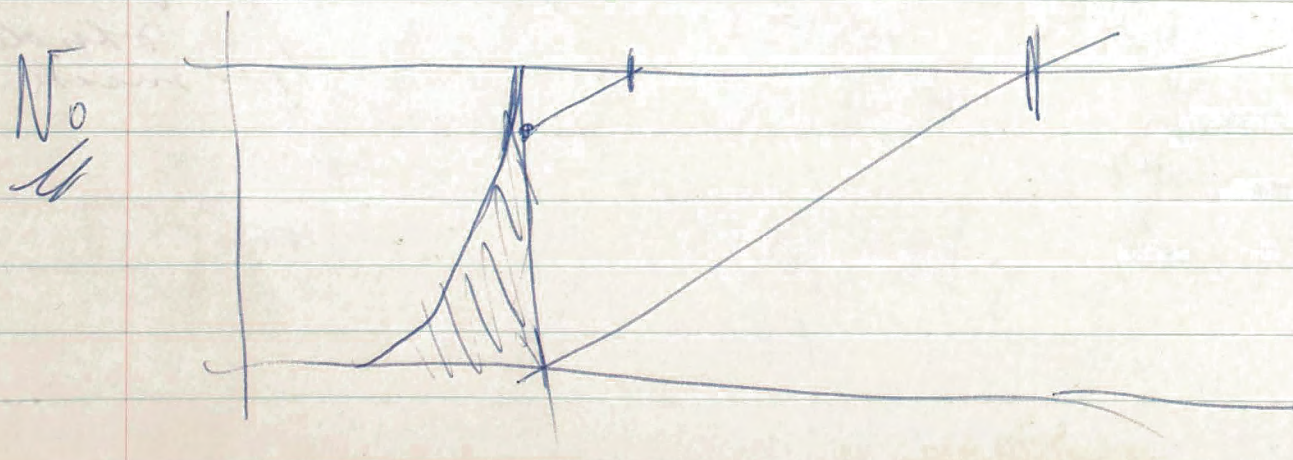


$$\frac{n^3}{3} \qquad \frac{(3r)^3}{3!}$$

$$\log N(n) = \text{const} \times \text{const}\, n$$

$$= \text{Const}\, n$$

Cons e



$$\cancel{\frac{r^n}{n!} e^{-r}}$$

4

$$e^{-\frac{1}{1000}} = 1 - \frac{1}{1000}$$

$$e^x = 1 + x$$

$$r = \frac{1}{1000}$$

$$\boxed{P(n) = \frac{r^n}{n!} e^{-r}}$$

r^n

$n \log r$

$$n! \cong \sqrt{2\pi n}\, n^n e^{-n}$$

big neg. number

300

$2 \times 2 \cdot 3$

$$-r + n \log r + \sum \log n + \log(n-1)$$

$$\frac{1}{r} = R$$

$$-r - n \log R$$

$$\frac{dS}{dn} = \log n$$

$$S = n \log n$$

$\log n!$

$$\frac{dS}{dn} = \log n$$

$$\frac{1}{P} \sim R$$

$$1 + \log n$$

10

$$n \log n = n \cancel{\frac{1}{n}} + \log n$$

$$r + n \lg R + n \log n =$$

$$r + n \log Rn$$

$$\int \log x \, dx = x \log x - x + C$$

$$\int_1^x \log x \, dx = \left[\quad \right]_1^x$$

$$\int_1^x \log x \, dx = x \log x - x + 1$$

e^{-n} for $(t=0)$

e^{+t} e^{+t}

$$n + \alpha t = N_0$$

$$n_1 = N_0 - \alpha t$$

$$n_2 = N_0 - \alpha(t+1)$$

α

$$\alpha n_1 t = N_0$$

$$\alpha n_2 (t+1) = N_0$$

$$n_1 - n_2 = N_0$$

$$\frac{1}{t^2} e^{-n}$$

$$n_1 = \frac{N_0}{t\alpha}$$

$$n_2 = \frac{N_0}{(t+1)\alpha}$$

$$\boxed{n_1 - n_2} = N_0 \frac{(t+1)\alpha - t\alpha}{t(t+1)\alpha}$$

e^{-t} e^{-t} $\frac{N_0}{t^2}$

Probleme der Biokliminatologie
Lintze (Franz) in Leitfaden 1948
Vol I (H. Fischer, B de Rudder
Vol II

Waterspray Münchener Med
BOOJ (John) Wochenschrift 84 p135 1937
Exp in Insbruck

Pfanner (H) Münch. Med.
Thinks it is Wochenschrift
not in air! - beats 86 p1190; 1939
with Sodium bicarbonate. -

Dr. Manfred Curry Book: Biokliminatik
1946
American Bioclimatic Res. Inst.
Rideran am Ammersee Bavaria
Curry: Ärztlicher Med. Wochenschrift 1949
(on shelf) p. 668 - 686

FANO-FOHN STANGL E.
Director Heimbach FOHN and F Beschwerden
Praxis 40 p475 1951

$$\log P(n) = -r - n\log R - n\log n + n - 1$$

$$\cancel{-r} - n\log Rn + \cancel{n} - \cancel{1}$$

$$-n\log R - n\log n$$

$$R^n \qquad nt = A$$

$$t = \frac{A}{n}$$

$$\cancel{\frac{A}{n} - \frac{A}{n+1}}$$

~~nothing between~~ $t = \frac{A}{n}$ ~~and~~ $t_2 = \frac{A}{n+1}$

$$R^{t} \quad \Delta t$$

$$\frac{A}{n^2}$$

$$P(n) \cong \frac{1}{(Rn)^n} = \left(\frac{n}{r}\right)^n$$

$$nt = A$$

$$t = \frac{A}{n}$$

$$\frac{dt}{} = \frac{-A}{n^2}\,dn$$

$$-\frac{n^2}{A}\,dt = dn$$

$$dn\,P(n)$$

$$\underbrace{\frac{n^2}{A}P(n)}_{f(t)}\,dt$$

Wild type (W)

Homoserine inhibits
10^{-3} molar

Reversed: A { proline, leucine
keto leucine, D-L.
L amino butyric ~~acid~~ de
methionine
alanine $2 \cdot 10^{-3} - 10^{-4}$ molar

B { glutamine
glycine
arginine
ornithine
proline
glycosamine

Mutant of B

requiring: homoserine (lower case)

inhibited by

by A group (not yet tried
L-amino butyric
and keto leucine)

not inhibited by B. ? ? ?

1°/

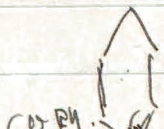
H.

~~Pfanner grubes~~
~~Düll B. / Düll~~
~~umschau 43 605-615 1939~~
~~(Spectrophon)~~

Bac. subtilis

Cu.

Dipicolinic Acid



30 %
8 –

12

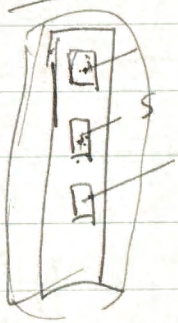
10

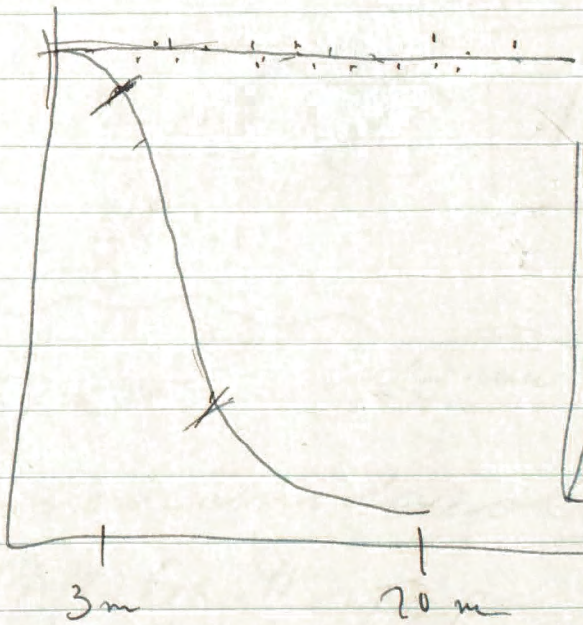
60 °C

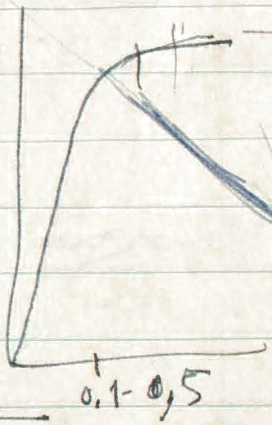
l.

0,1 – 0,01

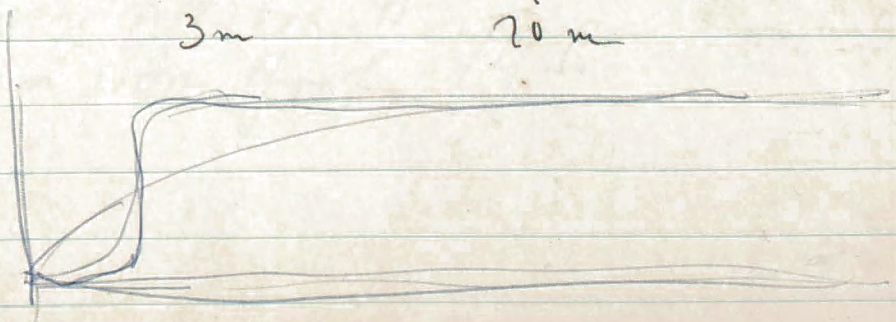
35 °C







0 – 3



Atwood

inoculate candida/multinucleate

plate on minimal

pick one colony and plate on methionine

Frank - Mukai

Calvin-Park-Lhuraton

Ryan

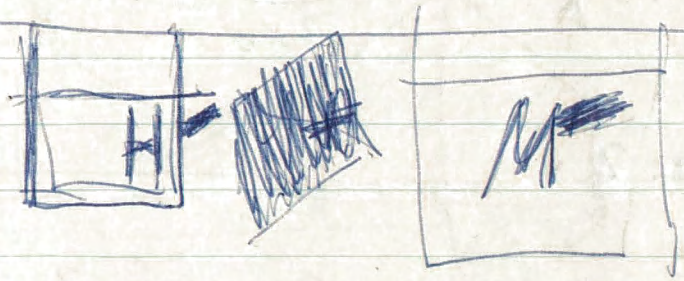
Ratio of different mutations should be different for high and low U.V. dose

Ryan finds no delay of mutant appearance for low dose (U.V.) but large delay for high dose

10^{-4}

10%

Exp.



Measure

Shalda Greer Automutagen

Nitrohydroxibenzamidazol

5 hydroxy 7 Nitro 11

from Dan Graf P.J.S.

$$K = e^{-\lambda(x_0 - x)^2} = e^{-\lambda(\alpha t - x_0)^2}$$

$$= e^{-\lambda((\alpha t)^2 - 2\alpha t x + x^2)}$$

$$e^{-\lambda x_0^2} \times e^{2\lambda\alpha t x} \times \boxed{e^{-\lambda x^2}}$$

$$\log K = -\lambda x_0^2 + \underline{\underline{2\lambda\alpha t x}} - \lambda x^2$$

Raindrops

$$\lambda = \frac{1}{2M} = \frac{1}{2x_0}$$

$$\log K = -\frac{1}{2}x_0 + \frac{x}{2} - \frac{x^2}{2\alpha t}$$

$$\frac{x^2}{2x_0} \approx 10 \qquad \frac{10^6}{2x_0} = 10 \qquad x_0 = \frac{1}{2}\,10^5$$

$$\frac{x^2}{2x_0} = 2 \qquad x_0 = \frac{1}{4}$$

$$\log K = +\frac{(x_0 - x)^2}{2x_0} = 10$$

$$(x_0 - x)^2 = 20x_0$$

$$x_0^2 - 2x_0 x + x^2 = 20x_0$$

$$x_0^2 - 2x_0 1000 + 10^6 = 20x_0$$

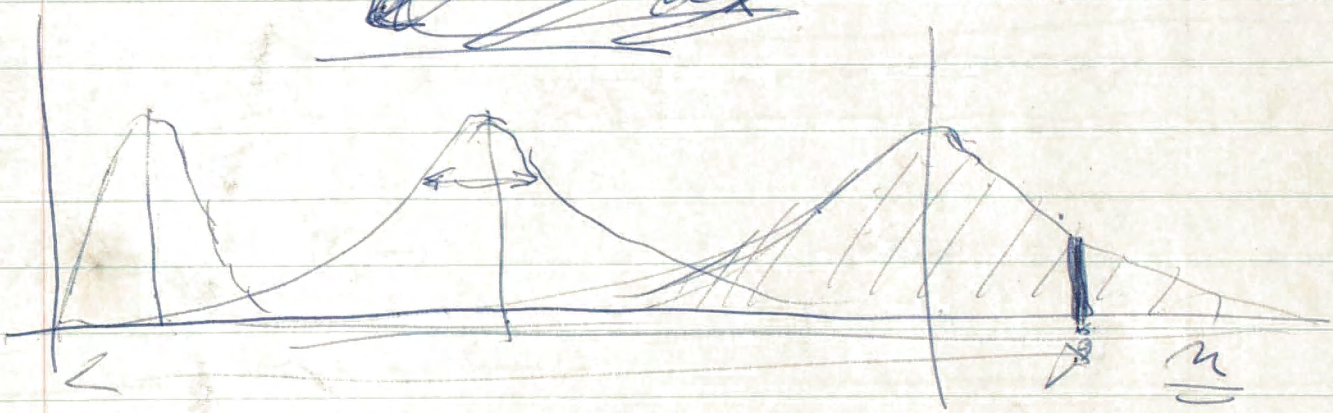
$$x_0^2 - 2020\,x_0 + 10^6 = 0$$

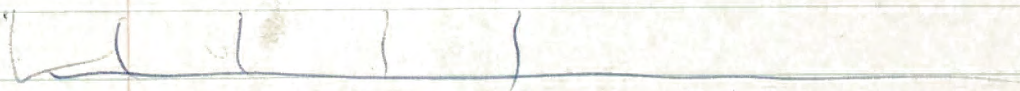
Fex

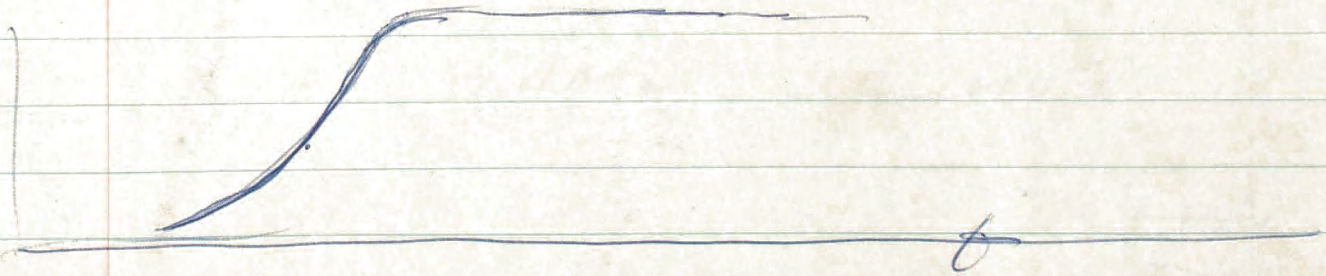
$$e^{nt} = A$$

$$\frac{A}{t^2} P(n)\, dt = \frac{A}{t^2} \frac{1}{\left(\frac{RA}{t}\right)^{\frac{A}{t}}}$$

$$\log f(t) = -2 \ln n - \log A + n \log R n$$







$$e^{\alpha t} + e^{\alpha(t+1)} + e^{\alpha(t+2)}$$

$$\frac{(x_0 - x)}{x_0} \quad \frac{(x_0 - x)^2}{2x_0^2}$$

$$\frac{1}{x_0} - \frac{(x_0 - x)}{x_0^2} - \frac{(x_0 - x)}{x_0^2} + \frac{(x_0 - x)^2}{x_0^3}$$

$$\frac{1}{880} - \frac{2 \times 120}{(880)^2} + \frac{(120)^2}{(880)^2}\frac{1}{880}$$

λ does not vary

$$\log K = \lambda (x_0 - x)^2$$

$$\frac{\boxed{2\lambda(x_0 - x)}}{2\lambda}$$

120.

2004 = 2.1002 4 1004

~~1.002~~

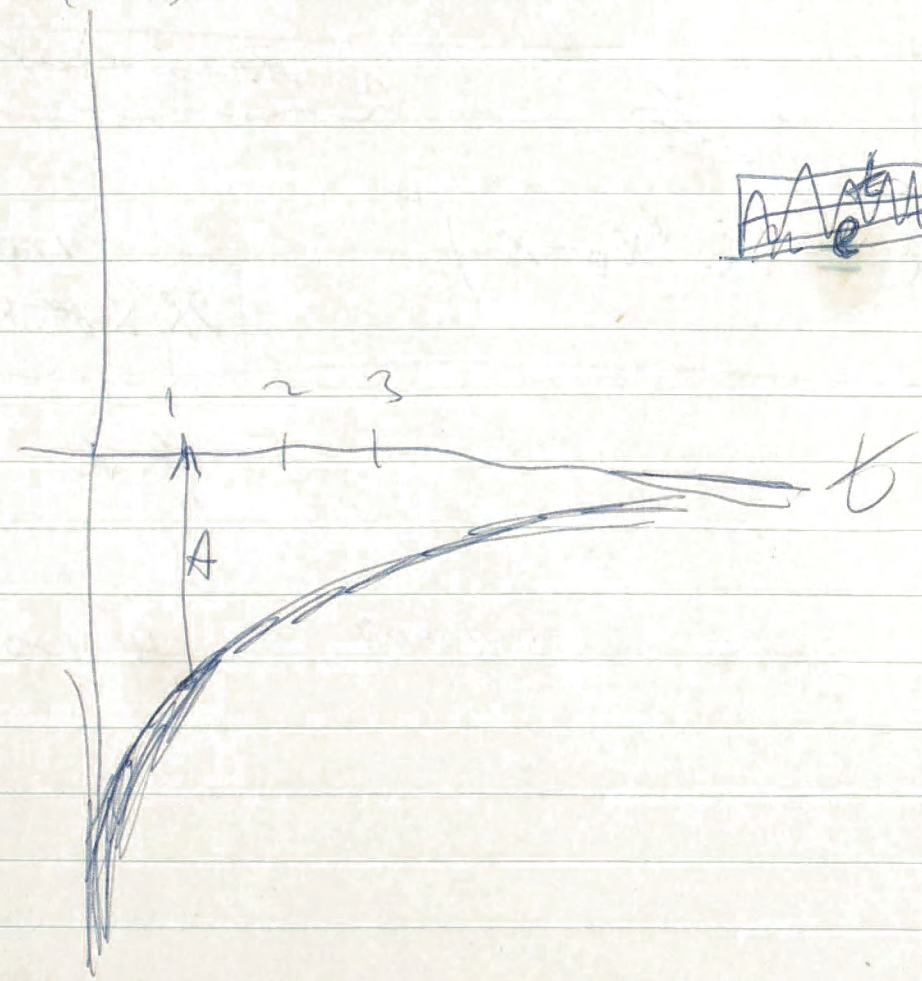
~~1.004~~

$$\Delta n = \frac{-A}{\left(\frac{A}{n}\right)^2} \Delta t$$

$$\Delta n = \frac{n^2}{A} \Delta t$$

$$\int_n^\infty P(n)\,dn \cong \frac{1}{(Rn)^n}$$

$$\log \frac{1}{(Rn)^n} = -n \log \frac{n}{R}$$



Ex

Ist theory

$$\ln(f(t)) = 2\ln n + \cancel{\ln B} - \ln A - n\log\ln n$$

$$P(n)\,dn = f(t)\,dt$$

$$nt = A$$

$$n = \frac{A}{t}$$

$$dn = -\frac{A}{t^2}\,dt$$

$$\underbrace{P(n)\,\frac{A}{t^2}}_{f(t)}\,dt = f(t)\,dt$$

$$P(n) = \frac{1}{(\ln n)^n}$$

$$n = \frac{A}{t}$$

$$0 = \int_0^c f(t)\,dt$$

$P(0) =$

$\underline{\mathcal{L}_1 a} = \#$ $\quad 60/t = 5.37$ at $50t$

$\underline{\mathcal{L}_2 a}$ $\quad 60/t = 2.32$ at $450t$

$$-4.6 = 5.37A_1\left(\ln \frac{5.37A_1}{r} - 1\right) - r - \tfrac{1}{2}\ln 2\pi \frac{A_1 5.37}{5.37}$$

$$-4.6 = 2.32A_2\left(\ln \frac{2.32A_2}{r} - 1\right) - r - \tfrac{1}{2}\ln 2\pi \frac{2.32A_2}{2.32}$$

$A_1 = 50k$

$A_2 = 450k$

$$-4.6 = 5.37(50k)\left[\ln \frac{5.37 \cdot 50k}{r} - 1\right] - r - \tfrac{1}{2}\ln 2\pi \frac{50k\, 5.37}{5.37}$$

$$-4.6 = -268k\left[\ln \frac{268k}{r} - 1\right] - r - \tfrac{1}{2}\ln 1680k$$

$$-4.6 = -104k\left[\ln \frac{104k}{r} - 1\right] - r - \tfrac{1}{2}\ln 655k$$

$$-4.6 = \qquad -r - .5\ln 1680k$$

$$\frac{268}{104} \quad +11.9 = \qquad +2.58r + 1.29\ln 655k$$

$$7.3 = 1.58r + 1.29\ln k - .5\ln k + 1.29\ln 655 - .5\ln 1680$$

$$7.3 = 1.58r + .79\ln k + 1.29\overset{8.35}{(2.3)(2.817)} - .5\overset{3.7}{(2.3)(3.225)}$$

$$7.3 = 1.58r + .79\ln k + 4.6$$

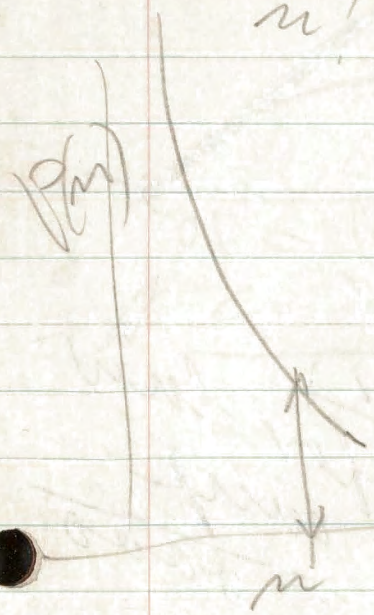
$$2.7 = 1.58r + .79\ln k \qquad r = \frac{2.7}{1.58} - \frac{.79}{1.58}\ln k$$

$$r = 1.71 - .5\ln k$$

Fox

$$P(n) = \frac{r^n}{n!} e^{-r}$$

$$n! = \sqrt{2\pi n}\, n^n e^{-n}$$



$$P(n) = \left(\frac{n}{r}\right)^{-n} e^{n-r} \frac{1}{(2\pi n)^{1/2}}$$

$$P_n \neq P_{n+1} \cong P_n$$

$$nt = A$$

$$\ln P(n) = -n \ln \frac{n}{r} + n - r + \ln \frac{1}{\sqrt{2\pi n}}$$

$$\ln P_n = -n\left[\ln \frac{n}{r} - 1\right] - r - \frac{1}{2}\ln 2\pi n$$

$$-2.3 \times 6 = -n\left[\ln \frac{n}{r} - 1\right] = -n \ln n$$

$$\text{slope}_1 = s_1 \times k \ln m$$

$$\text{slope}_2 = s_2 \times k \ln m$$

~~100 mg/liter~~

1 gm/liter

72

96

12

180

$\frac{1}{180}$ molar

$$\frac{\ln \frac{n}{r} - 1}{\ln \frac{n}{r} - 1 - \underbrace{\ln 30}_{3.3}} \approx 1.7$$

$$x = 1.7x - 6$$

$$6 = 0.7x \qquad x = 8$$

$$\frac{n}{r} = 10^3$$

$$\boxed{n = 1}$$

r for low curve = 2000

~~Pr~~ $\cancel{x = .57x - 1.95}$

$\cancel{.43x = 1.95}$

$\cancel{x = -4.5}$

$$\ln \frac{n}{r} = 3.5$$

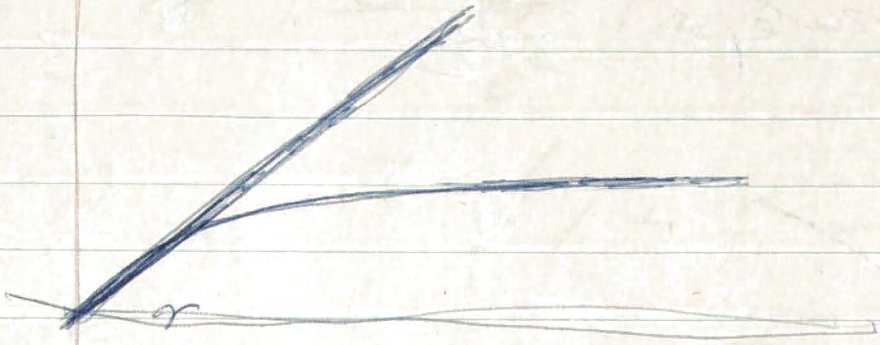
$$\frac{\ln \frac{n}{r} - 1}{\ln \frac{n}{r} - 1} = 2$$

$$\frac{1}{1-q} = 1 + q \sum \left(\frac{x}{n}\right)^i$$

$$n = \frac{200}{t} \qquad \frac{r}{n} = \frac{r\,t}{200}$$

$$\text{Br} \quad \frac{r}{200} \frac{t^2}{1000}$$

$$1 - e^{-r} = x - \lambda + r - \frac{r^2}{2!} + \frac{r^3}{3!}$$



$c_1 \neq c_2$

$1.3 \cdot 10^{-5}$

$1/0$

$$\boxed{\cancel{p}\, r = R}$$

$P(n)$

$$P(n) = \pi(n)\, P(n)$$

$$\pi(n) = 1 - e^{-kn} = kn + \cancel{k^2 n^2}$$

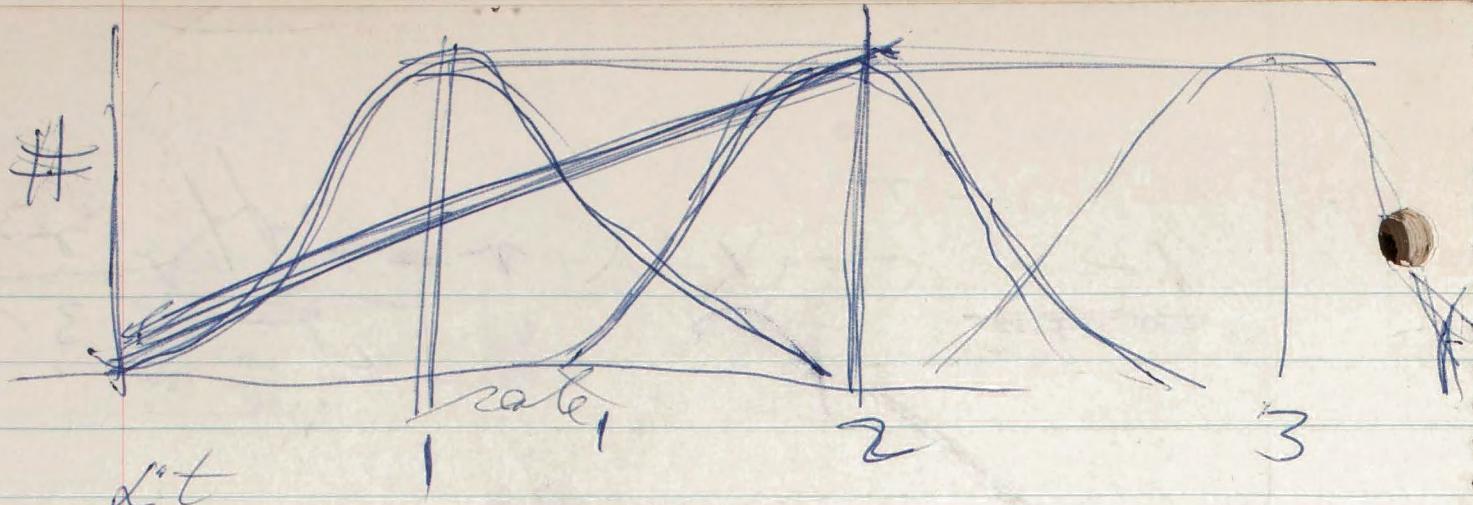
$$\log \text{obs.} = \cancel{\quad} - n\left(\ln \frac{n}{r} - 1\right) - r$$

$$- \tfrac{1}{2} \ln 2\pi n$$

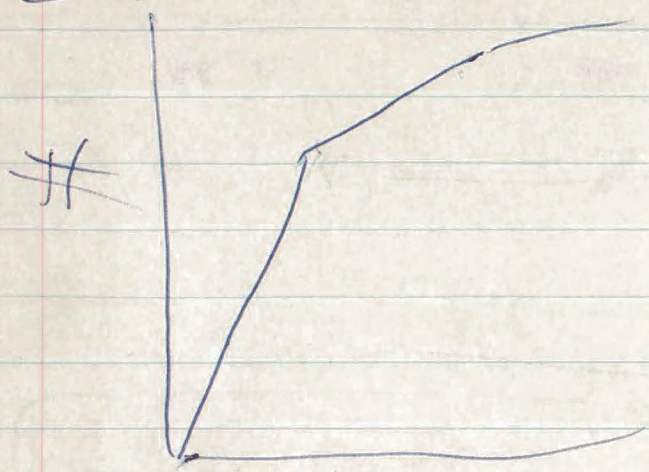
$$+ \ln n + \ln k$$

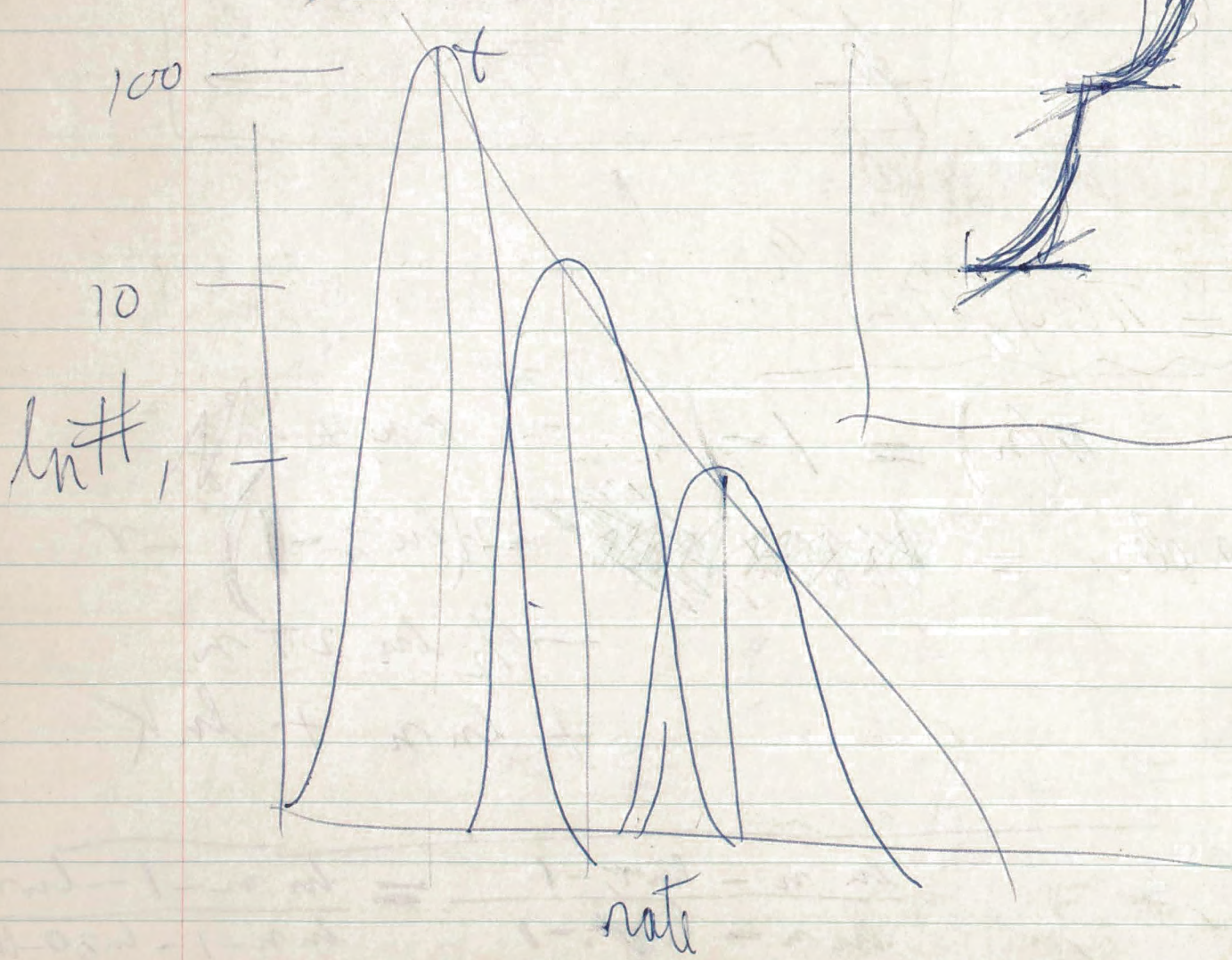
$$\frac{\ln n - \ln r_1 - 1}{\ln n - \ln r_2 - 1} = \frac{\ln n - 1 - \ln r_1}{\ln n - 1 - \ln 30 - \ln r_1}$$

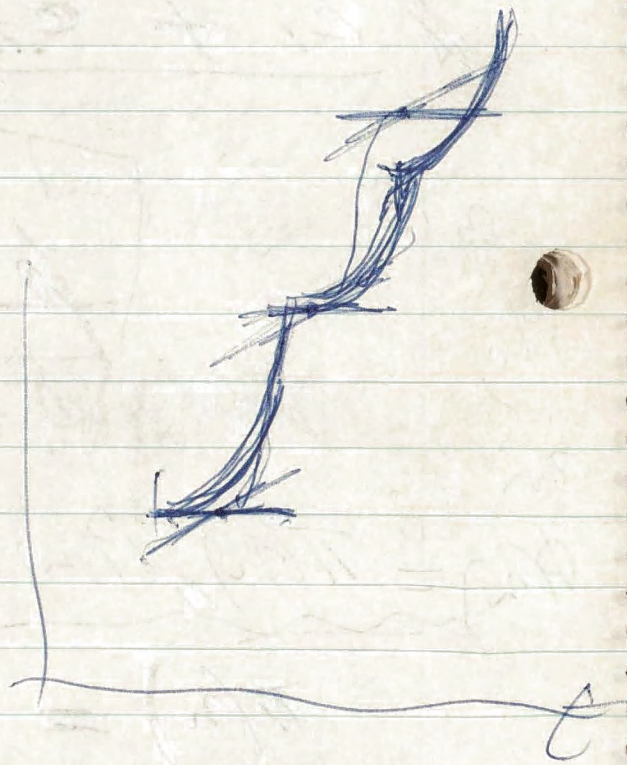
$30 r_1$



$\alpha^{n} t$



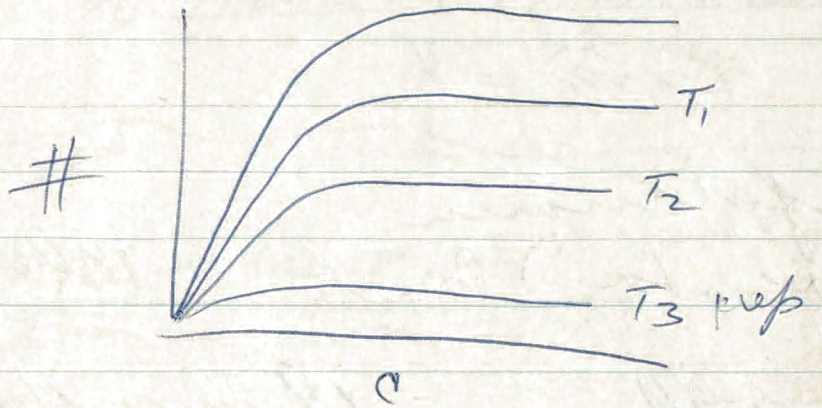


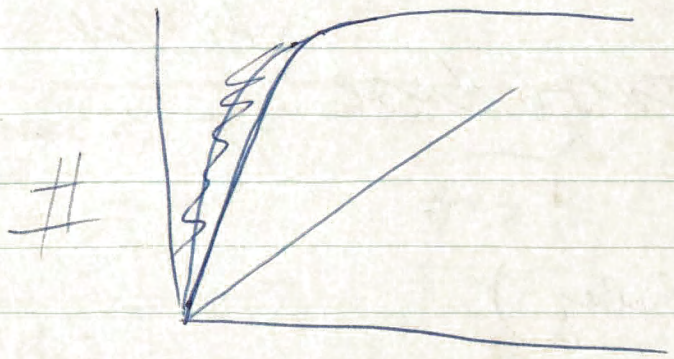


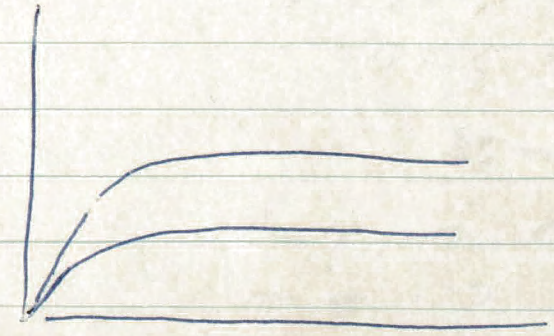
Fox formula

$$1 - \sum_{0}^{m} P_n$$

$$\xi_{fox} = e^{-r}\left(1 + \frac{r}{1} + \frac{r^2}{2!} + \frac{r^n}{n!}\right)$$







Blocking

$$x - 2.7x = -8.8$$

$$x = \frac{8.8}{0.7} = 12.6$$

$$\ln r = -13.6$$

$$r = 10^{-6}$$

$$E_{na} = \frac{X}{\alpha}$$

Spiegelman
Proc. Soc. Biol. 1949

1/6 of 90 min 12 min doubling time for enzyme

Rh phosphatase dose

Pardee (Berkeley)

$$\sum_{1}^{\infty} \frac{r^n}{n!} e^{-r} \, kn$$

4

$$kr \sum_{1}^{\infty} \frac{r^{n-1}}{(n-1)!} e^{-r} = kr$$

$k < 21$

$r =$ Laplace transform

$10^{-2} = k \quad 10^{-5}$

$$\frac{\ln n - \ln r_1 - 1}{\ln n - \ln r_2 - 1} = \frac{9.5}{3.5}$$

$r_2 > r_1$

$$\frac{\ln n - \ln r_1 - 1}{\underbrace{\ln n - \ln r_1 - 1}_{x} - \underbrace{\ln 1000}_{9.3}} = 2.7$$

1.7

$$\frac{x}{x - 9.3} = 2.7$$

5.2

$$x - 2.7x = -25$$

$$1.7x = 25$$

$$x = 15$$

$$-\ln r_1 \approx 16$$

$$r = 10^{-7}$$

$$e^{-\frac{(x - x_0)^2}{M}}$$

Fwd

$x = \alpha t$ $\qquad d\alpha = \frac{x}{t} - \frac{x}{t+\Delta t}$

$e^{-\frac{(\alpha-\alpha_0)^2}{K}} d\alpha$ $\qquad d\alpha = \frac{x}{t^2} dt$

$\frac{e^{-\left(\frac{x}{t}\right)^2 + 2\alpha_0 \frac{x}{t} - \alpha_0^2}}{K}$

25 $x = e^{\alpha t}$ $\qquad \log x = \alpha t$

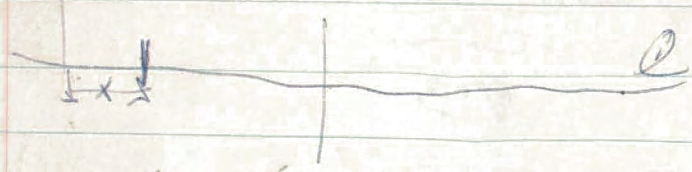
$e^{-\left(\frac{x}{t}\right)^2}$ $\qquad e^{-z^2}$

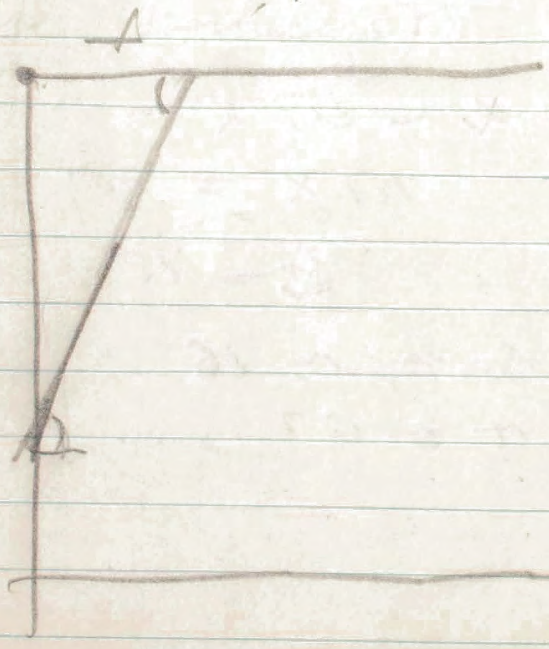
rt $\qquad t$

e^{-rt}

T

$e^{-r(T-x)} = e^{-rT} e^{rx}$





$rx - rT$

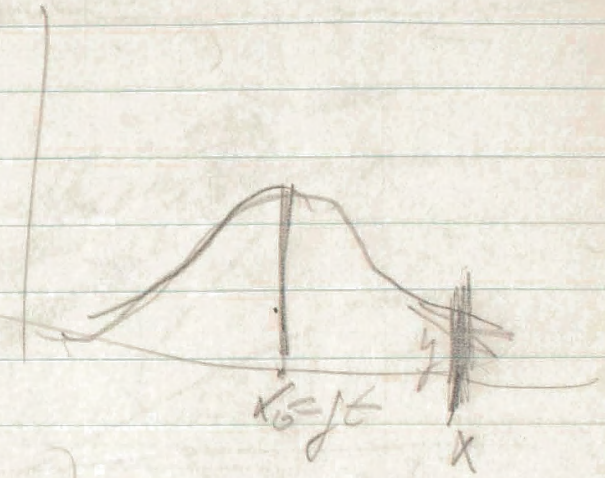
$\frac{L}{r} = T$

For
Gaussian

H

$$C e^{\frac{B}{t}} =$$

$$\frac{B}{t^2} C e^{\frac{B}{t}} = y \qquad \frac{B}{t} = x$$



$$e^{\frac{-(x-x_0)^2}{x_0}}$$

$$e^{\left(\frac{-x^2}{x_0} + 2x - x_0\right) \text{Exp}}$$

$$\text{Exp} = x\left(-\frac{x}{x_0} + 2 - \frac{x_0}{x}\right)$$

$$\frac{1}{x} \text{Ex} =$$

$$\frac{1}{x} \frac{x_0 10}{x} = \left(\frac{x}{x} - \frac{x_0}{x}\right)^2 \qquad 10 = \frac{(x-x_0)^2}{x_0}$$

$$+10x_0 = x^2 - 2xx_0 + x_0^2$$

$$\frac{1}{x} 10 = \frac{x}{x_0}\left(1 - \frac{x_0}{x}\right)^2$$

$$e^{-\frac{1}{x}\left(x^2 + x_0^2 - 2xx_0\right)}$$

$\alpha > \beta$

$$\frac{\alpha}{\beta}x + \frac{\beta}{\beta}y = \frac{T_0}{\beta} = T_0$$

$$\boxed{T(x) = x + y = T_0 - \varepsilon x}$$

$$\beta y = T_0 - \alpha x$$

$$y = \frac{T_0}{\beta} - \frac{\alpha}{\beta}x$$

$$\underline{\underline{T}}(x) =$$

$$x + y = \frac{T_0}{\beta} - \frac{\alpha}{\beta}x$$

$$x + y = T_0 - \frac{\alpha}{\beta}x$$

$$x + y = T_0 - \left(\frac{\alpha}{\beta} - 1\right)x$$

$$\frac{\alpha}{\beta} = \gamma$$

$$x + y = T_0 - \overset{\varepsilon}{(\gamma - 1)}x$$

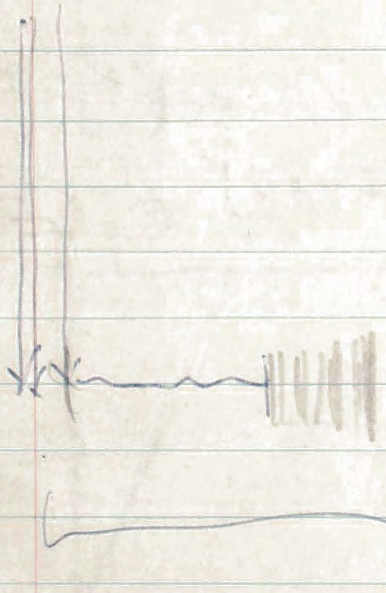
$$\varepsilon = \gamma - 1 > 1$$

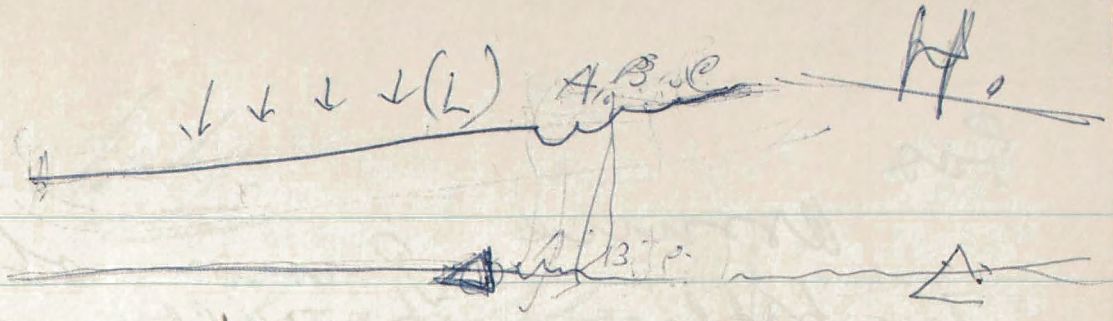
Old $\quad e^{-r(T - x)} = e^{-rT} e^{rx}$

New $\quad e^{-r(T_0 - \varepsilon x - x)} = e^{-r(T_0 - \frac{\alpha}{\beta}x)}$

T_0 is expression Time at lower Temp.

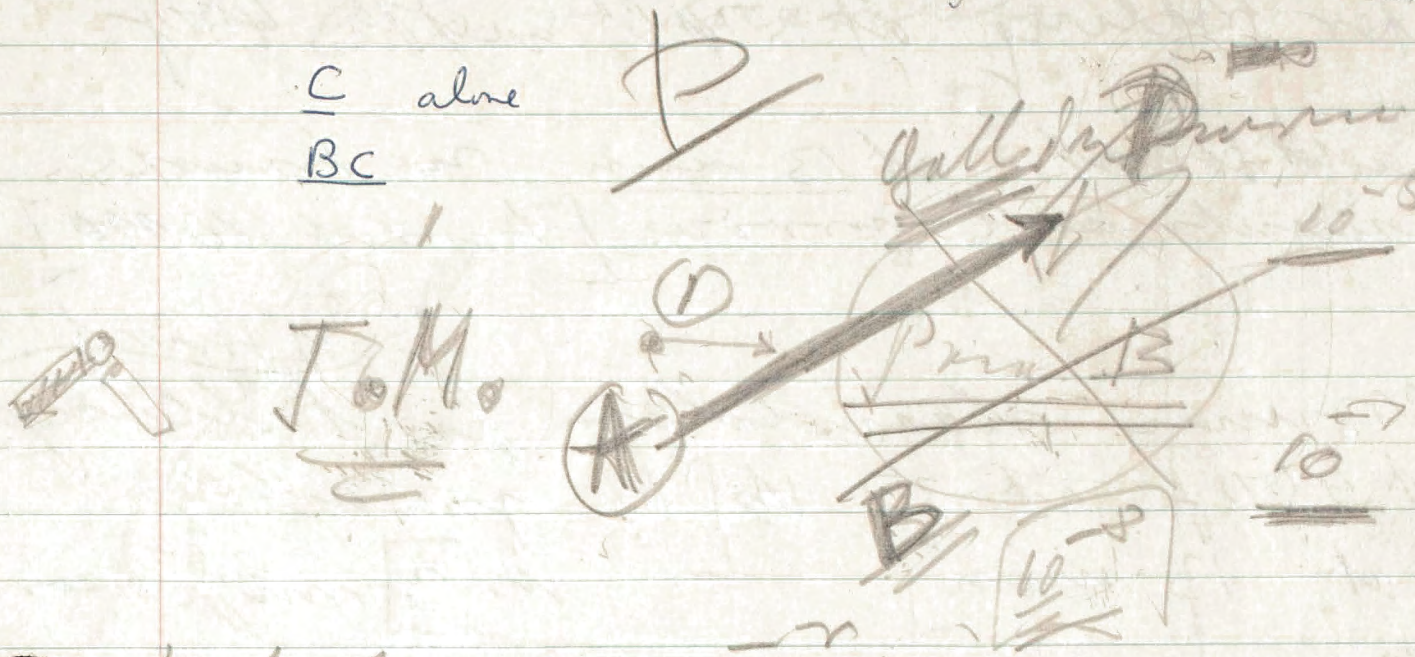
for $T_0 = \frac{\alpha}{\beta}x$





C alone

BC



$$\frac{e^{-r}}{r e^{-r}} = \left[\frac{1}{r}\right]$$

$$\frac{r^n}{1} e^{-r}$$

(1)

$$e^{-10}$$

$$5\ 10^{7}$$

Pas

Assume 9 min shoulder for killing at 37°C with 450J

add strept at 13 min no transformants will survive [4 out of 10000]

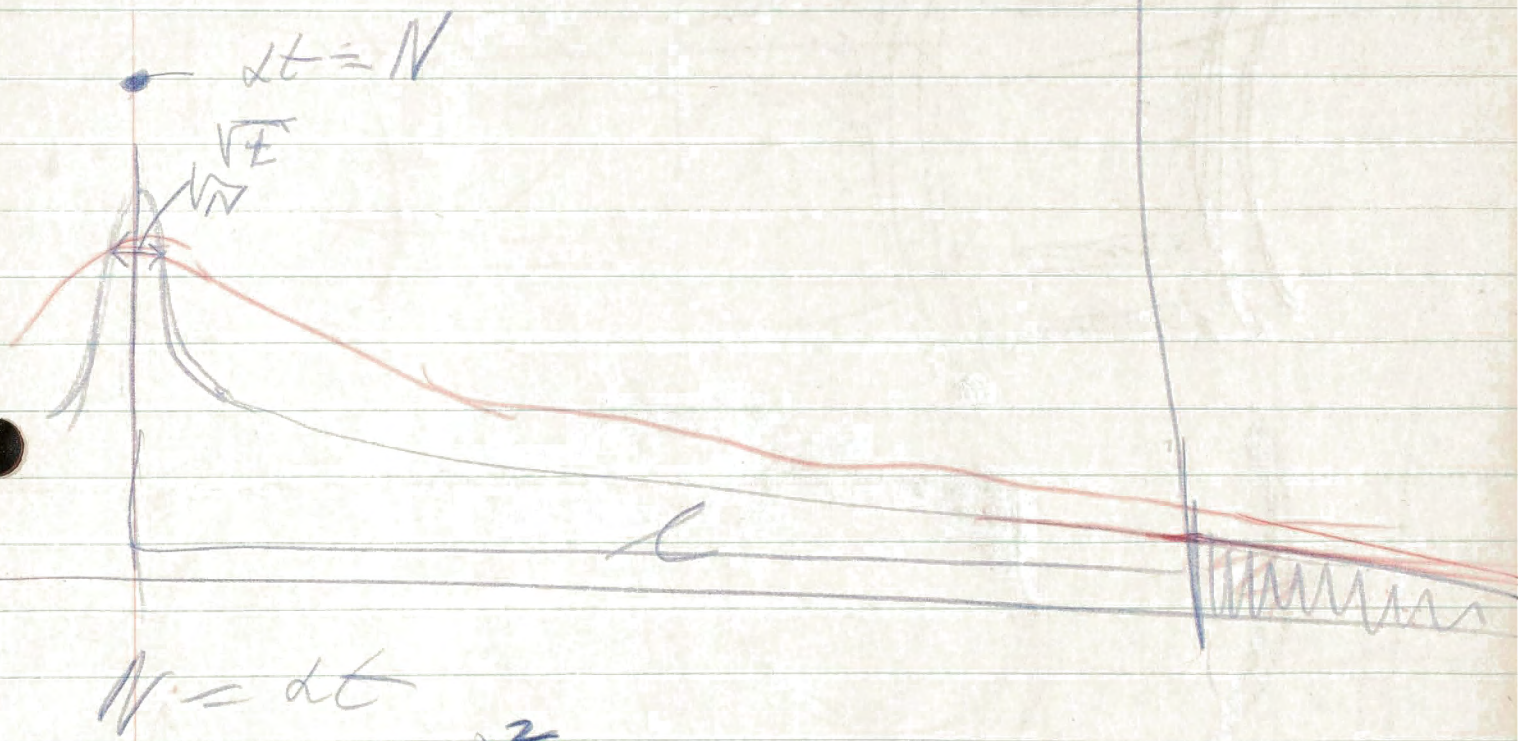
Assume shoulder for killing at 450J at 37 [if you add S at 13 min] is 3 min. —

Assume slope 0.87 (e slope)
6 minutes or total exposure to S (starting at 13 min) is 9 min

+ Control: with no transforming principle S but DNA + S to give killing curve

Fox Lube

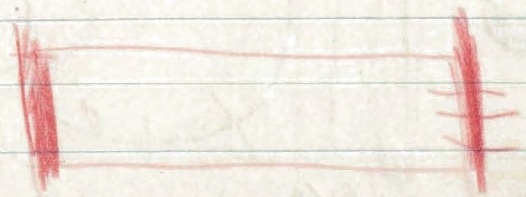
$1 - e^{\alpha t}$ ~ vulnerable

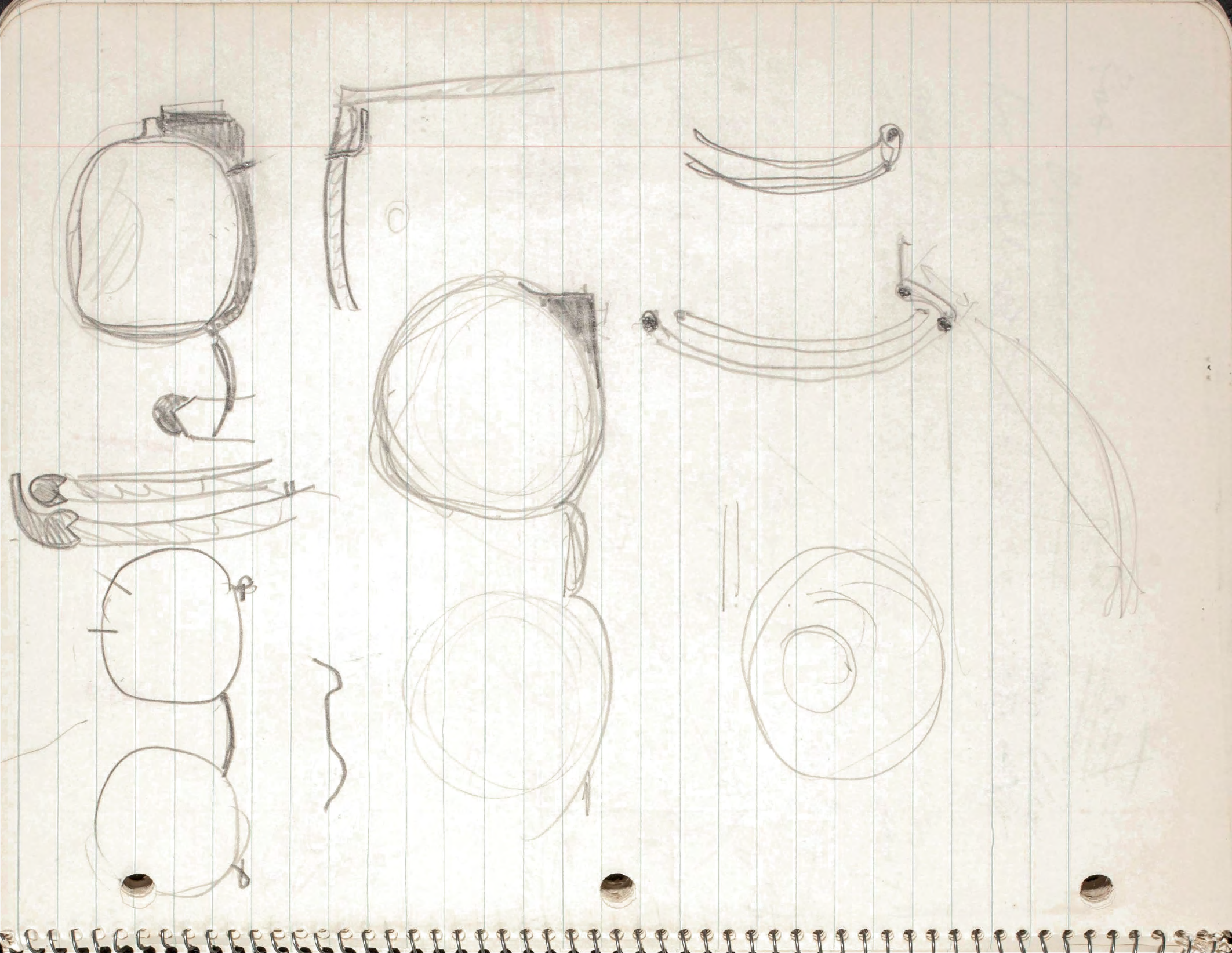


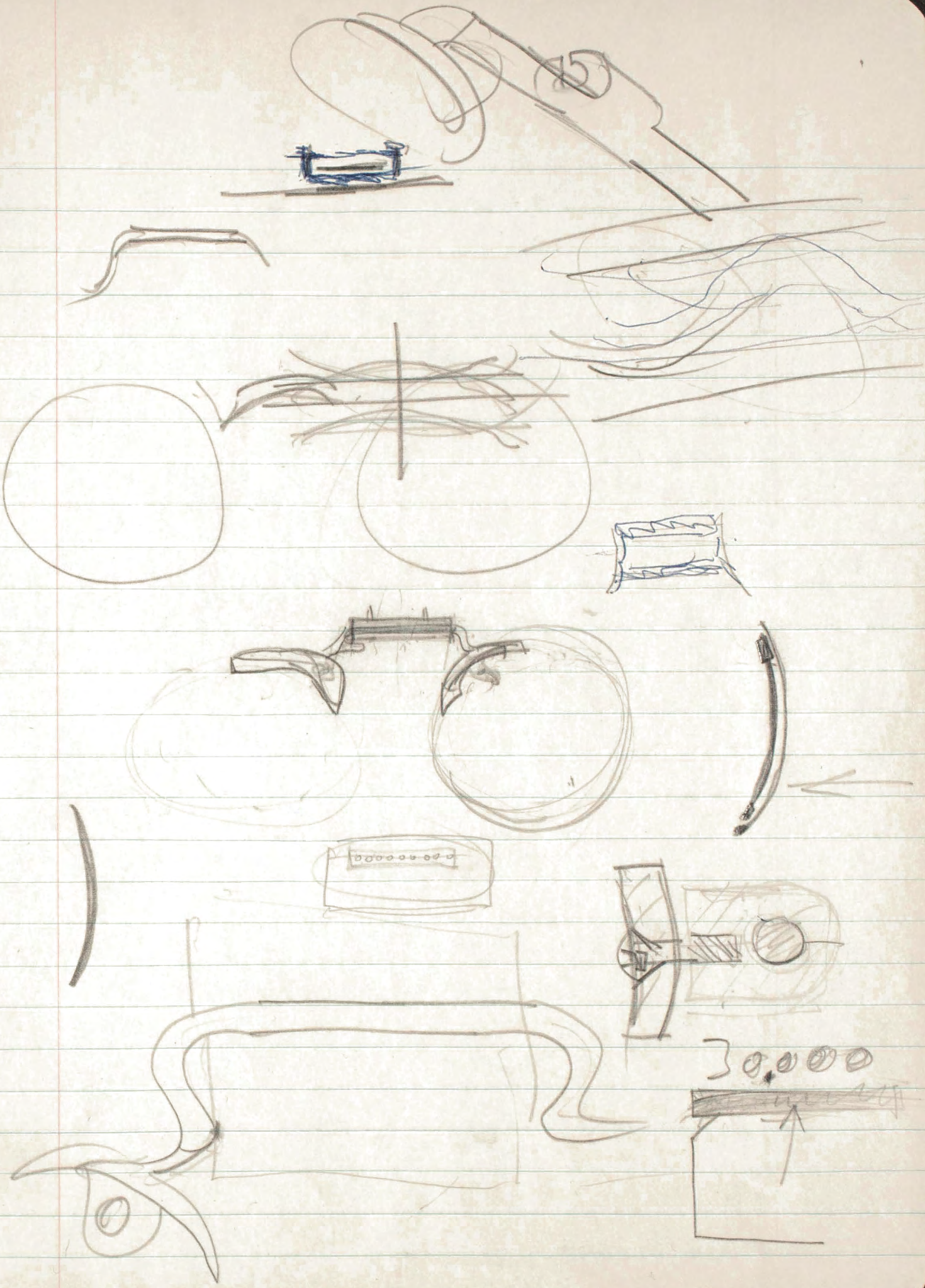
$N = \alpha t$

$$\sum_{\ell}^{\infty} C e^{-\frac{(\ell)^2}{N}}$$

$$\frac{\ell}{\sqrt{N}}$$






30,000

The way's of the world
Cherry Lane Theatre
830
Gr. Village
San Antonio Tex

~~10 [illegible]~~ 10 KW days / for U mebull

N35 lb for U mebull

Parlor A 12 15

44 = 20

46 = 22

Pearly nail polish
Red

1) ~~Helmuth~~ Helmut Nathan (William R.) Friedlaender

OX 71383

$\boxed{\frac{1}{2} \text{ cent per KWhr for Pu}}$

$\frac{1}{6}$ cent per KWhr heat from U_{235}
could be $\frac{1}{10}$ cent

15 cent per KWhr heat
[could be 10 cent per KWhr]

20,000
30,000 "units"/Kg
exp. elements

24×10^6 KWhr

Air Force Magazine
Invented in the M. Age

245

Irving Salomon
Mathematician
wife Ruth Wolfcaff
Fund for the Adv. of Education

8/5/35 6.3 [illegible]
57 Benson

Un 55969 Herbert Wilf
Mt Pl. 31900 morning
Lot 127

[illegible]