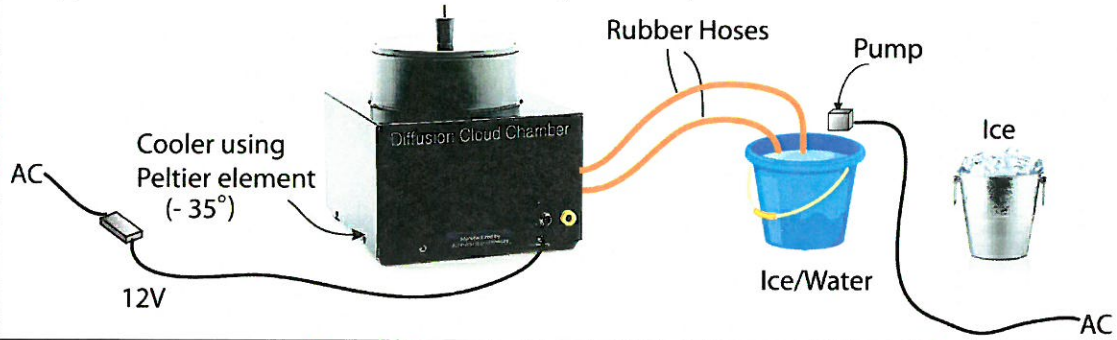


[ I ] Cloud Chamber 霧箱

1. Objectives Observing the tracks of  $\alpha$  and  $\beta$  rays

2. Apparatus: PASCO Diffusion Cloud Chamber (Model 600)

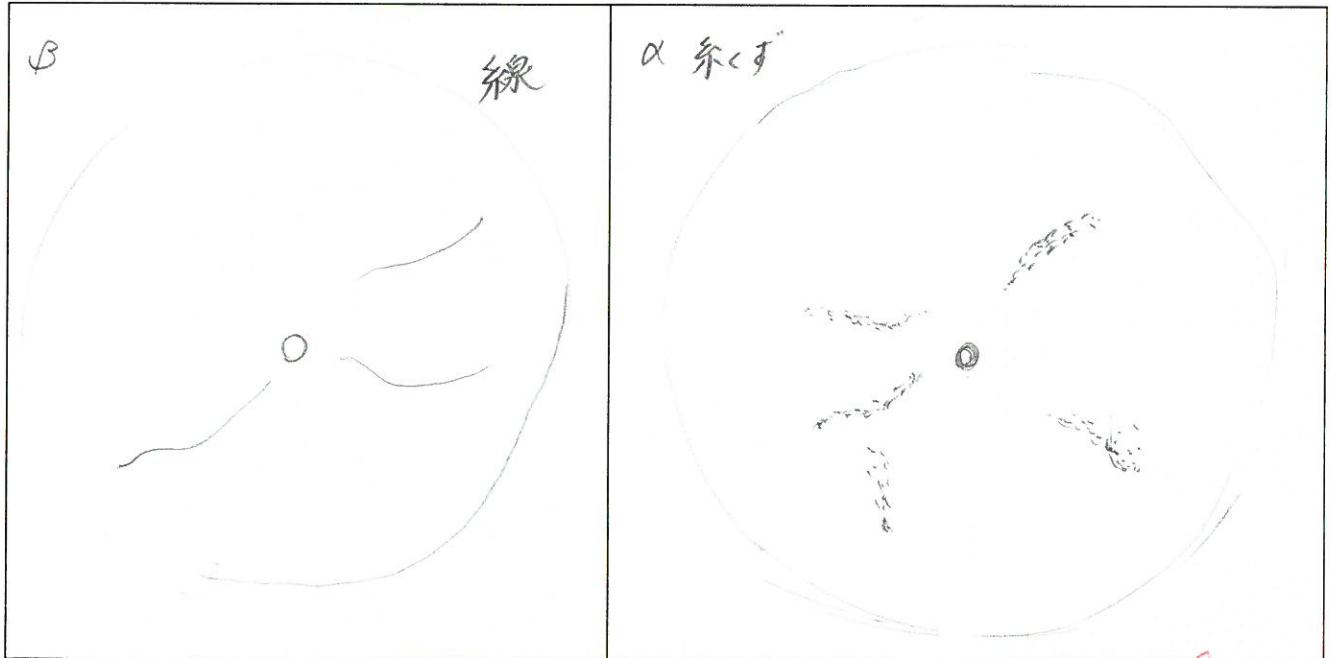


3. Radioactive samples:

A) Isotope: Pb-210  
 Activity: 0.01  $\mu$ Ci  
 Half Life: 22.3 y (= 370 Bq)  
 Decay mode:  $\beta^-$  (100%),  $\alpha$  ( $1.9 \times 10^{-6}$  %)  
 Daughter isotopes:  $^{210}\text{Bi}$ ,  $^{206}\text{Hg}$

B) Mantle for lantern (Coleman Co.)  
 Isotope: Th-232  
 Activity:  
 Half Life:  $1.41 \times 10^{10}$  y  
 Decay mode:  $\alpha$  (100 %)  
 Daughter:  $^{228}\text{Ra}$



4. Results





*Handwritten signature in red ink.*

PhysicsLab-063A	Radioactivity	Name
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[ II ] Geiger-Muller Counters

GM-1 (SE International Monitor-4)	GM-2 (NDS Products ND-200P)
	

	GM-1 (SE)	GM-2 (ND)	Sources
Background count [CPM]			Needle (PB-210) 
Needle (CPM / mR/h)			
Lantern (CPM / mR/h)			Lantern (Th-232) 
Lantern /Paper (CPM / mR/h)			
Lantern /Glass (CPM / mR/h)			
Lantern /Acrylic (CPM / mR/h)			

1	Radioactivity	Becquerel	<b>Bq</b>	Emission /s	
		Curie	<b>Ci</b>	1 Ci = $3.7 \times 10^{10}$ Bq	
2	Energy	Gray	<b>Gy</b>	1 Gy = J/kg	
		Rad	<b>Rad, R</b>	1 rad = .01 Gy	
3	Biological effect	Siebert	<b>Sv</b>		
		Rem	<b>rem</b>	1 rem = 0.01 Sv	

2. Measurement with Geiger counters

Geiger Counter: <b>cpm</b> (Counts per minute)	
Converting cpm to mR/hr	1200 cpm $\approx$ 1 <b>mrem/h</b>
	120 cpm $\approx$ 1 <b><math>\mu</math>Sv/h</b>

3. Safety

3. Safety

**100 mSv** (accumulation) is a measure for safety.

Common Radiation Exposure

Background Radiation(US)*	620 mrem/y	(= 6.2 mSv/y)
(Jpn)	240 mrem/y	(= 2.4 mSv/y)
Flight from NRT to NY	10 mrem	(= 0.1 mSv)
Dental X ray	9 mrem	(= 0.09 mSv)
Chest X ray	10 mrem	(= 0.1 mSv)

\* Background a) Cosmic, b) Terrestrial (Earth) U, Th, c) Internal  $^{40}\text{K}$ ,  $^{14}\text{C}$ ,  $^{210}\text{Pb}$