the preceding issue of this Bulletin (**26**, 65. (1951)). In order to analyse the spectrum of the backscattered β-rays more closely, we have measured it by means of the lens coil spectrometer with or without the backscatterer of Pb. The experimental results obtained are shown in the following table.

Table 1. Spectrum of Backscattering.

Energy ($H\rho$)	Counts/Min.		Conuting Rate of Backscattering	
	without Pb	with Pb	Experimental	Theoretical
3060	216±11	336±17	24.0±3.4	26.60
3339	340±12	362±18	24.4±2.4	29.06
3617	264±13	378±19	22.8±2.3	31.19
3896	230±15	392±20	20.0±2.0	30.51
4173	294±15	380±19	17.2±1.7	27.51
4452	296±15	370±19	14.8±1.5	25.39
4730	290±15	354±18	12.8±1.3	21.30
5009	272±14	328±17	10.0±1.0	18.72
5286	256±13	294±15	8.8±0.8	15.64
5565	232±12	270±14	7.7±0.7	12.34
5843	200±10	236±12	5.6±0.6	9.58

To analyse the shape of the backscattered β-spectrum we have tried the theoretical consideration as follows. We assumed many thin layers below the surface of the scatterer, each parallel to it, and these thin layers constitute many surfaces. We also assumed that the β-rays of P^{32} were composed of many monochromatic β-particles. We selected the value of each thin layer as 10 mg/cm^2 and the value of each monochromatic energy interval as $\frac{v}{c}=0.064$. The amount of the energy straggling of the monochromatic β-particls suffered in the thin layer could be calculated by the White-Millington formula (Proc. Roy. Soc. Lond. **120A**, 701. (1928)), and that due to the surface scattering was calculated by the Mott's equation (Proc. Roy. Soc. Lond. **124A**, 425. (1929)) considering the scattered angle of this instrument. The shape of the spectrum of the scattered β-rays could be estimated as the superposed curve of each monochromatic β-ray suffering the effects of the surface scattering on the surfaces and the energy straggling in the thin layers. The results of the numerical evaluation and the experimental values are shown in Table 1.

---

7. On the Nuclear Reaction of $_7N^{14}$ by Low Energy Neutrons. (III)

Kiichi Kimura, Ryutaro Ishiwari, Kazunori Yuasa, Sukeaki Yamashita and *Kōzō Miyake*

(K. Kimura Laboratory)

As we previously reported (Rep. Inst. Chem. Res., Kyoto Univ., **19**, 19 (1949) Mem. Coll. Sci., Kyoto Univ., A **26**, 151 (1950)), we measured the total ioniza-

tion produced in air by the reaction $_7N^{14}(n, p)_6C^{14}$ and determined the Q-value of the reaction as 0.606±0.005 Mev assuming the proportionality between the ionization and the energy. Then, the Q-value of this reaction has been determined to be 0.626 Mev from several well-founded bases.

In the present work, we have redetermined the total ionization produced in air by this reaction. If we assume the proportionality between the ionization and the energy, the present result also gives the Q-value of 0.609 Mev which accurately agrees with the previous result. We have thus ascertained that our experiments were not in error. So the origin of the discrepancy between our result of 0.609 Mev and the accepted nominal value of 0.626 Mev must be attributed to the nature of the relationship between the ionization and the energy for protons in air.

On the bases of the present result and our results on the ionization by alpha-particles in air (this Bull. **26**, 62 (1951)), some preliminary arguments have been made on the relationship between the ionization and the energy for protons in air.

---

8. On the State of Fluidized Bed

Junji Furukawa and *Tsutomu Oumae*

(Oda Laboratory)

The fluidization of solid particles accompanies slugging and eruption, which we examined photographically by using a box-type vessel with parallel glass-plate windows on both sides.

An abnormal fluidized state, i. e. the slugging is caused by the different buoyance of foams: the smaller foam goes up more slowly than the larger one, and the foam grows larger by joining together until their diameter reaches to the magnitude of the vessel, the so-called slugging state.

This phenomenon is similar to the continuous foaming in liquid. The net-plates of moderate mesh in the vessel, through which particles are capable to pass freely, are effective to prevent the slugging.

---

9. Study on High Dielectric Constant Ceramics. (XIII)

Analytical Research on Coupled Vibration

Kiyoshi Abe, *Tetsuro Tanaka* and *Koji Uo*

(Abe Laboatory)

Mathematical analysis about the mechanical vibration of a rectangular