where $\beta^K_{M_1}(\lambda = 1)$ is the conversion coefficient without penetrations B_1 and B_2 are penetration coefficients for magnetic multipole conversion coefficients and λ is the penetration factor defined as ratio of penetration matrix element to the gamma ray matrix element. Taking the values of the quantities $\beta^K_{M_1}(\lambda = 1)$, B_1 and B_2 from the work of Hager & Seltzer (1968, 1969) and giving different values to λ we plot a graph between $\beta^K_{M_1}(\lambda)$ and λ.

From the graph corresponding to our value of the conversion coefficient determined above we find λ essentially equal to unity. Thus the conversion process is taking place without any dynamic nuclear effects present in it. This is confirmed from the study of the L_1 and L_2 conversion coefficients as well.

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Reference

Geiger J S, Graham R. L. & Evans G. T. 1960 *Nucl Phys.* **16**, 1.
1961 *Nucl. Phys* **28** 387.

Hager R. S & Seltzer E. C 1968 *Nuclear Data* A**4**, 1.
1969 *Nuclear Data* A**6**, 1

Iwashita T., Inamura T, Ikemota Y. & Kageyama S. 1963 *J. Phys. Soc. Japan* **18**. 1358.

Mangal P C. & Trehan P. N. 1969 *J Phys. Soc. Japan* **27**, 1.

Potins V R, Agin G. P. & Mandeville C. E. 1970 *J. Phys. Soc Japan* **29**, 539

Indian J. Phys. **44**, 610–612 (1970)

Binding energy of hyper nuclei from K⁻—capture

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(*Plate*–16)

Experimental determinations of binding energies of hypernuclei have been made during the last decade. Yet there are reports of some observed uncertainties in the binding energies of hypernuclei. Thus it seems desirable to find the binding energies of hypernuclei just to increase the statistics and sharpen the mean values

In this note a study is made of mesic decays of hyperfragments produced by K^--reaction at rest in an emulsion which yields data on the binding energies of $Li^7{}_\Lambda$ and $B^{10}{}_\Lambda$ The average binding energies of $Li^7{}_\Lambda$ and $B^{10}{}_\Lambda$ was found to be 5 92 MeV and 8.90 MeV which agree with the binding energies summarized by Levisetti & Slater (1963), Slater (1959), and Gilbert (1956) as 5 5 MeV and 8 MeV.

During a systematic scanning of an emulsion plate $4.3' \times 4.3' \times 400\mu$ thick exposed to K⁻-particle beam, with momenta 800 MeV/c at the CERN Proton synchroton, a number of events have been observed among which the case of Li^7_Λ h.f. and B^{10}_Λ h.f are mentioned here. These are designated as event 1 and event 2 respectively.

$$\left.\begin{array}{c} K^- + O^{16} \rightarrow Li^7_\Lambda + 2He^4 + H^1 + \pi^- + Qc \\ Li^7 \rightarrow Be^7 + \pi^- \end{array}\right\} \text{ Event 2}$$

In event 1 as shown in the plate 16 K^--particle is captured by O^{16} nucleus at the point A. Li^7_Λ h.f. produced decays at rest and gives the Be^7 track AB. Prongs ($T1$) and ($T3$) represent the negative pions. ($T4$) and ($T5$) represent the He^4 particles and prong ($T2$) the H^1 particle. Also during the production of new particles some energy is lapsed in the formation of δ-rays which is represented by Qc in the above reaction. These data are given in table 1.

Table 1

Track	Identity	Range (microns)	Energy (Mev)	Momentum (Mev/c)
($T2$)	H^1	1112.10	14.45	28.738
($T1$)	π^-	480.10	4.08	2.399
($T3$)	π^-	648.20	4.80	2.760
($T4$)	He^4	1492 11	38.85	51.899
($T5$)	He^4	488 00	20 43	27.931

The identities of different prongs were obtained from ionization, range measurements and from end point of each prong

The above reaction satisfies (a) conservation of charge and (b) conservation of energy. The momentum unbalance of the reaction is 45.93 ± 1.2. Mev/c.

The binding energy is most conveniently computed from the equation

$$m_f' + m_\Lambda - B_\Lambda = \sum_i m_i + Q = m_f \qquad \dots \quad (1)$$

where the various m's are the rest energies of particles involved in the event. and Q is the total kinetic energy release. f' represents the core of nucleus in which the particle Λ^0 is bound, f is the h.f. whose binding energy we want to find out and i labels as decay particles.

$$\begin{aligned} f &= m_f' + m_\Lambda - m(\pi^-) \\ &= 5562.30 + 1091.92 - 120\text{-}50 \\ &= 6533.72 \end{aligned} \qquad (2)$$

$$\begin{aligned} Q_0 &= f - \sum_i m_i \\ &= 6533.72 - 6466.16 \\ &= 67.56 \text{ Mev.} \end{aligned}$$

$$\begin{aligned} B_\Lambda &= Q - Q_0 \\ &= 73.20 - 67.56 \\ &= 5.64 \text{ Mev} \end{aligned}$$

The binding energy found from other events has been found in the same manner and is as follows.

Possible identification	Expected B(Mev)	Experimental B(Mev)
$Li^7{}_\Lambda$	5.5	5.64, 6.49, 5.65

Average binding energy of $Li^7{}_\Lambda$ is found to be 5.92 Mev.

$$\left.\begin{array}{c} K^- + {}^{12}C \rightarrow Be^{10} + 2H^1 + \pi^- + Qc \\ Be^{10}{}_\Lambda \rightarrow \pi^- + B^{10} \end{array}\right\} \text{Event 2.}$$

The event 2 as shown in plate is the case of $Be^{10}{}_\Lambda$ which is produced when a K^--particle beam is captured by the C^{12} nucleus in the emulsion and decays at rest to give B^{10} and negative π-meson. Prongs (B) and (C) represent the π^- mesons. (D) and (F) are H^1 particles, and prong (HE) represents the B^{10} nucleus. The data are given below.

Table 2

Track	Identity	Range (microns)	Energy (Mev)	Momentum (Mev/c)
(B)	π^-	2368.01	10.31	6.4139
(C)	π^-	188 00	2 36	0.9536
(D)	H^1	2312.00	22 52	44.1926
(F)	H^1	7496 01	44 39	86 8433

The above reaction obeys the energy and charge conservation. The momentum unbalance has been found to be 58.51 ± 1.2.

The binding energy is found in the same manner as in the previous case. binding energy turns out to be 8.64 Mev.

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REFERENCES

Gilbert C. 1956 *Phys. Rev* **103**, 248.
Levisetti R. & Slater W. E. 1963 *Nuovo Cimento* **15**, 181.
Slater W. E. 1958 *Nuovo Cimento Supp.* **10**, 1.
1959 *Nuovo Cimento* **21**, 213.

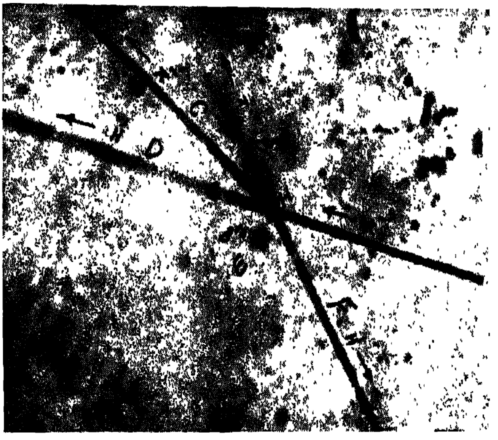

Figure 1. Event 1.

Figure 2. Event 2.