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DOUBLE DIFFERENTIAL NEUTRON EMISSION CROSS SECTIONS OF Pb, Cu AND Al FOR 14.6 MeV NEUTRONS

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Abstract: The double differential neutron emission cross sections of Pb, Cu and Al have been measured at 14.6 MeV incident neutron energy. The energies of emitted neutrons have been measured with time-of-flight technique based on the associated particle method. These measurements were carried out at several angles in the 30-130 degree angular range for the 3-14 MeV emitted neutron energy range. The integrated cross sections have been compared with previous measurements.

I. INTRODUCTION

The future first generation fusion reactors are to be based on deuterium--tritium fuel whose burning is accompanied by the generation of 14 MeV neutrons. Thus the knowledge of the various aspects of the interaction of 14 MeV neutrons with materials to be used in fusion reactors is of considerable interest to the designer of fusion reactors. Therefore the information on the double differential neutron emission cross sections which plays an important role in the neutronics and design calculations of fusion reactors is highly desirable. The present measurements were carried out as a part of the IAEA Coordinated Research Program under Contract No. 3310/RB. The report gives the details of measurements and numerical values of the double differential cross sections of Pb, Cu and Al for the 14.6 MeV incident neutrons. It also provides information on the integrated cross sections and comparison with previous meaurements.

II. EXPERIMENTAL DETAILS

The measurements were carried out using the 14 MeV neutron generator facility at PINSTECH[1]. The 14 MeV neutrons were generated through $^{2}H(^{3}H,n)^{4}He$ reaction using 120 keV incident deuterons. The energies of the emitted neutrons were measured by the time-of-flight technique based on the associated particle method. A flight path of 2.3 meters was used for scattering angles below 90 degree and it was extended to 3.3 meters beyond it. The neutrons were detected with a NE213 liquid scintillator of size 12.7 cm diameter and 12.7 cm thickness coupled to a XP1040 photomulitiplier tube. The background due to gamma-rays was suppressed by using the standard pulse shape discrimination technique. The bias of the detector was set at about 2 MeV. The efficiency of the detector

was measured by degrading the energy of the incident neutrons using a NE102 scintillation crystal. The meausrements were compared with Monte Carlo calculations[2-]). The energy calibration was done with the help of the gamma-ray peak in the spectrum as well as by using the spectrum of 14.6 MeV neutrons scattered from a carbon sample. The angular distributions were normalized with respect to a long counter. Both the cross sections of the ground state and first excited state of ^{12}C were used for the determination of the neutron emission cross sections. The cross section values reported by Haouat et al[2)] were used for this purpose. The flux attenuation corrections for both incident as well as exit channels and inscattering corrections were done which were based on Monte Carlo Calculations. The percentage statistical errors were calcualted with the help of the following expression

$$\Delta E = \frac{(N + \text{background})^{1/2}}{(N + \text{background})} \times 100$$

Where N is the total number of neutrons including the background. The other errors are of the following order:

Flux normalization	3%
Inscattering	4%
Neutron detector efficiency	5%
The cross section normalization	6%

The error due to the cross section normalization will appear as a systematic error. The rest of the 7% error together with the statistical error listed in the tables gives the total random uncertainty. The details of data reduction have been published earlier[4,5)].

III. RESULTS AND DISCUSSION

The double differential neutron emission cross sections of Al, Cu and Pb have been tabulated in the Appendix. The data of each angle were integrated over 1 MeV energy interval in the 3-14 MeV energy range thus determining the average value for several consecutive energy bins. The energy integrated cross section of the corresponding bins at several angles in the 30-130° angular range were integrated with respect to angle by making a Legendre polynomial fit. The angle integrated data for different energy bins or groups is shown in Tables 1-3. The neutron emission cross section for the 6-11 MeV energy group contained in these tables was derived in two ways. Firstly we simply added up the cross section values for energy bins lying in the 6-11 MeV energy range. Secondly we first integrated the double differential emission cross sections with respect to energy in the 6-11 MeV energy range at

several angles and then integrated these values with respect to the angle using Legendre polynomial method. This also provided the angular distribution of this group. The value obtained in this way is indicated by a star.

Several measurements of neutron emission cross sections for Al are available for comparison. Most of the information has been taken from Hansen et al[5]. The comparison is summarised in table 4. Our present measurements on Al are in agreement with our previous measurements within experimental errors. We have given for comparison our recent measurements on Al.

The results on Al, Cu and Pb for the 6-11 MeV energy group have been summarized in table 5. The values of f_1 and f_2 which define the angular distribution of the 6-11 MeV group are given by the equation

$$\sigma(\theta) = \frac{\sigma}{4\pi}[\ 1 + 3f_1P_1\ (\cos\theta) + 5f_2P_2\ (\cos\theta)\ ]$$

The upper value of cross section of the present work were derived through the Legendre polynomial fit to the 6-11 MeV energy cross sections at different angles. The agreement is very good. The double differential cross sections of Al, Cu and Pb for smaller emitted energy intervals are shown in tables 6-8. The data has not been corrected for the effect of the tail of elastic peak.

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TABLE 1. Neutron emission cross sections of Pb for 14.6 MeV incident neutrons

Energy (MeV)	Cross section (mb)
3 - 4	402 ± 18
4 - 5	177 ± 8
5 - 6	104 ± 4
6 - 7	71 ± 3
7 - 8	52 ± 2
8 - 9	54 ± 4
9 - 10	52 ± 4
10 - 11	47 ± 4
11 - 12	46 ± 4
12 - 13	51 ± 7
6 - 11	276 ± 17
	306 ± 16*

*f_1=0.18 ± 0.02 *f_2=0.04 ± 0.03

TABLE 2. Neutron emission cross sections of Cu for 14.6 MeV incident neutrons.

Energy (MeV)	Cross section (mb/MeV)
3 - 4	184 ± 10
4 - 5	115 ± 4
5 - 6	81 ± 3
6 - 7	61 ± 3
7 - 8	44 ± 2
8 - 9	32 ± 2
9 - 10	28 ± 2
10 - 11	29 ± 2
11 - 12	30 ± 2
12 - 13	37 ± 2
6 - 11	194 ± 11
	198 ± 10*

*f_1 = 0.13 ± 0.03 *f_2 = 0.04 ± 0.03

TABLE 3. Neutron emission cross sections of ^{27}Al for 14.6 MeV incident neutron energy.

Energy Interval (MeV)	Cross section (mb/MeV)
3 - 4	136 ± 12
4 - 5	81 ± 9
5 - 6	65 ± 6
6 - 7	57 ± 6
7 - 8	43 ± 3
8 - 9	32 ± 3
9 - 10	30 ± 3
10 - 11	33 ± 3
11 - 12	39 ± 3
6 - 11	195 ± 18
	196 ± 17*

*f_1 = 0.1 ± 0.08 *f_2 = 0.07 ± 0.05

TABLE 4. Comparison of the present integral neutron emission cross sections of ^{27}Al with previously published results.

Energy interval (MeV)	Present measurements	Kammerdiener[6]	Clayeaux & Voignier[7]	Hansen et al[5]
3.08 - 5.42	235 ± 24	-	215 ± 21	-
3 - 5	217 ± 21	-	-	247
3.5 - 5.5	181 ± 18	206 ± 21	-	220
5.42 - 8.75	150 ± 13	-	147 ± 13	-
5.5 - 8.5	149 ± 13	192 ± 19	-	172

TABLE 5. The neutron emission cross section of Al, Cu and Pb for the 6-11 MeV energy region and its angular distribution parameters as defined by the equation

$$\sigma(\theta) = \frac{\sigma}{4\pi}[\,1+3f_1P_1(\cos\theta)+5f_2P_2(\cos\theta)\,]$$

Reference	Al			Cu			Pb		
	Cross section (mb)	f_1	f_2	Cross section (mb)	f_1	f_2	Cross section (mb)	f_1	f_2
Present Work	196 ± 17 195 ± 18	0.10 ± 0.08 -	0.07 ± 0.05 -	198 ± 10 194 ± 11	0.13 ± 0.03 -	0.04 ± .03 -	306 ± 16 276 ± 17	0.18 ± .02 -	0.04 ± .03 -
Hermsdorf et al[8]	167 ± 3 -	0.18 ± .02 -	0.07 ± 0.01 -	131 ± 7 -	0.09 ± 0.03 -	0.12 ± .03 -	350 ± 21 -	0.27 ± .03 -	0.13 ± .04 -
Akkermans et al[9]	196	0.27	0.027	192	0.33	0.039	386	0.38	0.045
Pearlstein[10]	190 ± 11	-	-	186 ± 10	-	-	261 ± 20	-	-

TABLE 6. NEUTRON EMISSION CROSS SECTIONS FOR Al AT 14.6 MeV INCIDENT NEUTRON ENERGY.

E_n (MeV)	$\frac{d\sigma}{dE}$ (mb/MeV)	E_n (MeV)	$\frac{d\sigma}{dE}$ (mb/MeV)	E_n (MeV)	$\frac{d\sigma}{dE}$ (mb/MeV)
3.1	150±11	5.3	69±5	8.9	29±3
3.2	157±11	5.4	62±5	9.1	30±3
3.3	146±16	5.5	68±5	9.3	29±3
3.4	138±7	5.6	60±4	9.5	32±2
3.5	145±8	5.7	64±5	9.7	33±2
3.6	143±7	5.8	61±5	9.9	32±3
3.7	135±6	5.9	67±6	10.1	33±3
3.8	120±6	6.0	65±5	10.3	35±3
3.9	122±6	6.1	62±6	10.4	33±3
4.0	111±5	6.3	76±5	10.6	33±2
4.1	96±5	6.5	58±5	10.8	36±3
4.2	92±5	6.7	55±5	11.0	36±2
4.3	89±6	6.9	57±4	11.2	31±2
4.4	80±5	7.1	54±4	11.4	35±2
4.5	83±8	7.3	43±3	11.6	37±2
4.6	83±7	7.5	42±3	11.8	47±3
4.7	75±5	7.7	44±3	12.0	54±3
4.8	74±5	7.9	41±2	12.2	61±5
4.9	76±5	8.1	40±3	12.4	66±5
5.0	75±5	8.3	36±4	12.6	77±8
5.1	74±5	8.5	31±3	12.8	80±8
5.2	70±4	8.7	29±3		

TABLE 7. NEUTRON EMISSION CROSS SECTIONS FOR Cu AT 14.6 MeV INCIDENT NEUTRON ENERGY.

E_n (MeV)	$\frac{d\sigma}{dE}$ (mb/MeV)	E_n (MeV)	$\frac{d\sigma}{dE}$ (mb/MeV)	E_n (MeV)	$\frac{d\sigma}{dE}$ (mb/MeV)
3.1	215±14	5.5	80±3	8.7	30±3
3.2	218±15	5.6	73±3	8.9	28±3
3.3	206±12	5.7	77±3	9.1	30±3
3.4	192±12	5.8	71±4	9.3	28±3
3.5	187±12	5.9	76±4	9.5	30±3
3.6	175±11	6.0	70±4	9.7	29±3
3.7	172±8	6.1	69±4	9.9	28±3
3.8	155±7	6.2	67±3	10.1	26±2
3.9	159±6	6.3	72±3	10.3	28±2
4.0	150±5	6.4	62±3	10.4	28±2
4.1	133±5	6.5	59±3	10.6	29±2
4.2	129±5	6.6	59±3	10.8	33±3
4.3	128±5	6.7	60±3	11.0	30±3
4.4	114±4	6.8	55±3	11.2	29±2
4.5	119±4	6.9	56±3	11.4	29±2
4.6	120±4	7.0	54±3	11.6	29±2
4.7	108±4	7.1	55±3	11.8	30±2
4.8	103±4	7.3	47±3	12.0	31±2
4.9	101±4	7.5	47±3	12.2	33±3
5.0	97±3	7.7	44±3	12.4	35±3
5.1	91±3	7.9	35±3	12.6	36±2
5.2	85±3	8.1	37±3	12.8	38±3
5.3	88±3	8.3	35±3	13.0	42±4
5.4	79±3	8.5	31±3		

TABLE 8. NEUTRON EMISSION CROSS SECTION FOR Pb AT 14.6 MeV INCIDENT NEUTRON ENERGY.

E_n (MeV)	$\frac{d\sigma}{dE}$ (mb/MeV)	E_n (MeV)	$\frac{d\sigma}{dE}$ (mb/MeV)	E_n (MeV)	$\frac{d\sigma}{dE}$ (mb/MeV)
3.1	564±21	5.2	119±5	8.5	54±3
3.2	565±21	5.3	120±5	8.7	53±6
3.3	482±19	5.4	105±4	8.9	52±4
3.4	440±22	5.5	106±4	9.1	59±5
3.5	414±20	5.6	98±4	9.3	57±6
3.6	367±21	5.7	99±4	9.5	58±6
3.7	331±17	5.8	91±3	9.7	58±6
3.8	299±15	5.9	91±4	9.9	57±6
3.9	284±13	6.0	86±4	10.1	50±6
4.0	264±13	6.1	84±3	10.3	50±6
4.1	231±12	6.3	79±4	10.4	49±5
4.2	217±11	6.5	64±4	10.6	50±5
4.3	210±11	6.7	68±3	10.8	55±5
4.4	179±9	6.9	65±3	11.0	50±5
4.5	178±9	7.1	68±3	11.2	50±5
4.6	176±9	7.3	54±2	11.4	52±6
4.7	157±8	7.5	52±2	11.6	52±5
4.8	141±6	7.7	52±4	11.8	52±3
4.9	140±6	7.9	46±4	12.0	53±4
5.0	138±5	8.1	52±3	12.2	53±4
5.1	125±5	8.3	55±3		

APPENDIX

Table. Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 30° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	10.99	10.7	5.4	8.01	
3.2	12.10		5.5	8.56	6.2
3.3	12.08		5.6	7.04	
3.4	11.91		5.7	8.35	
3.5	12.21	7.5	5.8	7.41	
3.6	12.33		5.9	8.46	
3.7	12.03		6.0	8.43	6.3
3.8	10.55		6.1	8.20	
3.9	10.83		6.2	8.25	
4.0	10.36	7.3	6.3	9.88	
4.1	9.03		6.4	6.78	
4.2	9.73		6.5	6.57	7.0
4.3	10.13		6.6	5.08	
4.4	8.93		6.7	5.70	
4.5	9.95	6.6	6.8	5.71	
4.6	10.20		6.9	6.11	
4.7	8.73		7.0	6.33	7.7
4.8	7.76		7.1	6.44	
4.9	7.69		7.2	5.74	
5.0	8.22	6.4	7.3	5.27	
5.1	8.44		7.4	5.36	
5.2	7.72		7.5	5.91	8.0
5.3	8.72		7.6	5.99	

Table Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 30° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	6.01		10.1	3.57	
7.8	6.15		10.2	3.92	
7.9	5.35		10.3	3.60	
8.0	4.85	7.0	10.4	3.56	7.4
8.1	5.18		10.6	3.47	
8.2	5.13		10.8	3.50	
8.3	5.08		11.0	3.07	8.4
8.4	4.78		11.2	3.49	
8.5	4.17	7.3	11.4	3.86	
8.6	4.03		11.6	4.34	
8.7	4.07		11.8	5.05	
8.8	4.06		12.0	5.59	5.3
8.9	3.68		12.2	6.18	
9.0	4.29	7.4	12.4 12.6	6.68 7.17	
9.1	4.34		12.8	7.8	
9.2	3.89		13.0	8.6	4.4
9.3	3.92		13.2	7.7	
9.4	4.03		13.4	9.05	
9.5	3.86	7.1	13.6	10.70	
9.6 9.7	3.97 4.07		13.8	12.36	
9.8	3.52		14.0	14.98	2.6
9.9	4.11		14.2	14.41	
10.0	3.99	7.0	14.4	17.22	

Table . Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 40° Scattering Angle (Lab.)

E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	11.79	9.0	5.4	6.94	
3.2	11.89		5.5	7.86	6.2
3.3	12.36		5.6	6.73	
3.4	11.47		5.7	7.61	
3.5	12.11	8.0	5.8	6.59	
3.6	11.51		5.9	7.1	
3.7	11.23		6.0	6.28	7.2
3.8	9.86		6.1	6.00	
3.9	10.90		6.2	6.6	
4.0	10.12	6.5	6.3	8.37	
4.1	8.77		6.4	6.38	
4.2	8.97		6.5	6.56	6.6
4.3	9.20		6.6	6.59	
4.4	7.8		6.7	5.98	
4.5	8.27	6.7	6.8	5.96	
4.6	8.30		6.9	6.33	
4.7	7.48		7.0	6.20	7.0
4.8	6.89		7.1	5.93	
4.9	7.34		7.2	5.15	
5.0	7.35	6.4	7.3	4.67	
5.1	7.55		7.4	4.46	
5.2	6.80		7.5	4.54	8.8
5.3	7.61		7.6	4.51	

Table Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 40° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	4.54		10.1	3.57	
7.8	4.88		10.2	4.00	
7.9	4.24		10.3	3.68	
8.0	4.20	6.5	10.4	3.65	8.0
8.1	4.57		10.6	3.60	
8.2	4.53		10.8	3.78	
8.3	4.55		11.0	3.29	7.2
8.4	4.39		11.2	3.47	
8.5	3.98	6.8	11.4	3.56	
8.6	4.03		11.6	3.74	
8.7	3.83		11.8	4.16	
8.8	3.78		12.0	4.63	5.3
8.9	3.40		12.2	5.23	
9.0	3.99	7.2	12.4 12.6	5.62 6.00	
9.1	3.92		12.8	6.48	
9.2	3.50		13.0	6.84	4.7
9.3	3.59		13.2	5.92	
9.4	3.72		13.4	6.30	
9.5	3.92	7.2	13.6	6.68	
9.6	3.91		13.8	7.00	
9.7 9.8	3.92 3.34		14.0	7.79	4
9.9	3.96		14.2	7.50	
10.0	4.05	7.0	14.4	8.24	

Table Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 50° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	11.01	10.1	5.4	5.73	
3.2	10.54		5.5	6.34	7.4
3.3	10.30		5.6	5.31	
3.4	9.75		5.7	6.21	
3.5	11.12	8.1	5.8	5.52	
3.6	11.19		5.9	6.56	
3.7	11.15		6.0	6.2	7.3
3.8	9.85		6.1	5.92	
3.9	10.61		6.2	6.31	
4.0	8.95	7.2	6.3	7.94	
4.1	7.53		6.4	5.72	
4.2	7.33		6.5	5.93	7.4
4.3	7.49		6.6	6.03	
4.4	6.66		6.7	5.95	
4.5	7.11	7.7	6.8	6.15	
4.6	6.77		6.9	6.67	
4.7	6.37		7.0	6.74	6.8
4.8	6.19		7.1	6.47	
4.9	6.41		7.2	5.58	
5.0	6.70	6.9	7.3	5.08	
5.1	6.93		7.4	4.99	
5.2	6.08		7.5	4.97	8.3
5.3	6.39		7.6	4.91	

Table Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 50° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	4.94		10.1	3.57	
7.8	5.22		10.2	3.86	
7.9	4.48		10.3	3.48	
8.0	4.17	8.6	10.4	3.27	8.1
8.1	4.57		10.6	3.06	
8.2	4.58		10.8	3.02	
8.3	4.54		11.0	2.42	10.3
8.4	4.22		11.2	2.45	
8.5	3.82	7.0	11.4	2.68	
8.6	3.71		11.6	3.14	
8.7	3.49		11.8	4.04	
8.8	3.60		12.0	4.73	6.3
8.9	3.29		12.2	5.46	
9.0	3.95	7.2	12.4 12.6	6.05 6.44	
9.1	3.97		12.8	6.65	
9.2	3.47		13.0	6.85	4.7
9.3	3.49		13.2	5.89	
9.4	3.64		13.4	6.82	
9.5	3.93	7.5	13.6	7.69	
9.6 9.7	4.06 4.12		13.8	8.48	
9.8	3.59		14.0	10.1	3.3
9.9	4.34		14.2	9.7	
10.0	4.05	7.1	14.4	12.0	

Table Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 70° Scattering Angle (Lab.)

E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	8.11	11	5.4	4.19	
3.2	8.40		5.5	4.64	8
3.3	8.53		5.6	3.89	
3.4	8.44		5.7	4.44	
3.5	8.29	9	5.8	4.10	
3.6	8.39		5.9	4.64	
3.7	8.40		6.0	4.52	8
3.8	8.07		6.1	4.22	
3.9	7.62		6.2	4.57	
4.0	6.76	8	6.3	5.97	
4.1	6.04		6.4	4.55	
4.2	6.36		6.5	4.63	8
4.3	6.68		6.6	4.57	
4.4	6.18		6.7	4.27	
4.5	6.83	7.4	6.8	4.20	
4.6	6.81		6.9	4.34	
4.7	6.03		7.0	4.32	8
4.8	5.48		7.1	4.36	
4.9	5.36		7.2	4.16	
5.0	4.95	7.9	7.3	4.09	
5.1	5.02		7.4	4.10	
5.2	4.28		7.5	3.94	9
5.3	4.52		7.6	3.60	

Table Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 70° Scattering Angle (Lab.)

E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	3.49		10.1	1.36	
7.8	3.48		10.2	1.61	
7.9	3.52		10.3	1.45	
8.0	2.82	8	10.4	1.50	13
8.1	2.85		10.6	1.50	
8.2	2.63		10.8	1.62	
8.3	2.57		11.0	1.67	11
8.4	2.44		11.2	1.87	
8.5	2.17	8	11.4	1.97	
8.6	2.11		11.6	2.21	
8.7	1.95		11.8	2.62	
8.8	2.01		12.0	2.91	8
8.9	1.82		12.2	3.23	
9.0	2.14	10	12.4 12.6	3.59 3.98	
9.1	2.10		12.8	4.31	
9.2	1.90		13.0	4.78	5
9.3	1.96		13.2	4.29	
9.4	1.99		13.4	5.31	
9.5	2.10	10	13.6	6.63	
9.6	2.04		13.8	8.01	
9.7 9.8	1.92 1.61		14.0	9.92	
9.9	1.77		14.2	9.52	
10.0	1.63	12	14.4	11.1	3

Table Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 80° Scattering Angle (Lab)

E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	12.79	8.3	5.4	6.22	
3.2	12.48		5.5	6.47	6.5
3.3	11.51		5.6	5.51	
3.4	10.94		5.7	6.63	
3.5	11.42	6.9	5.8	5.87	
3.6	10.32		5.9	6.51	
3.7	9.67		6.0	6.27	6.6
3.8	8.46		6.1	6.11	
3.9	8.91		6.2	6.16	
4.0	7.82	7.1	6.3	7.35	
4.1	7.45		6.4	5.39	
4.2	7.99		6.5	5.43	7.2
4.3	8.62		6.6	5.29	
4.4	8.02		6.7	4.83	
4.5	8.74	5.7	6.8	5.02	
4.6	8.72		6.9	5.57	
4.7	7.47		7.0	5.70	7.0
4.8	6.89		7.1	5.76	
4.9	7.03		7.2	5.37	
5.0	6.97	6.1	7.3	5.02	
5.1	7.08		7.4	4.92	
5.2	6.09		7.5	5.06	7.5
5.3	6.71		7.6	4.91	

Table Neutron double differencial emission cross sections for Alumanium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 80° Scattering Angle (Lab.)

E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	4.72		10.1	2.24	
7.8	4.75		10.2	2.45	
7.9	4.02		10.3	2.18	
8.0	4.15	6.1	10.4	2.08	
8.1	4.40		10.6	2.12	
8.2	4.24		10.8	2.34	
8.3	4.27		11.0	2.19	9.8
8.4	4.15		11.2	2.38	
8.5	3.72	6.6	11.4	2.55	
8.6	3.77		11.6	2.84	
8.7	3.52		11.8	3.22	
8.8	3.39		12.0	3.64	6.9
8.9	3.01		12.2	4.04	
9.0	3.42	7.2	12.4 12.6	4.56 4.94	
9.1	3.29		12.8	5.38	
9.2	2.89		13.0	6.14	5.1
9.3	2.89		13.2	5.42	
9.4	2.79		13.4	6.25	
9.5	2.93	8.4	13.6	7.18	
9.6	2.68		13.8	8.06	
9.7 9.8	2.55 2.16		14.0	9.43	3.5
9.9	2.52		14.2	9.06	
10.0	2.54	9.2	14.4	10.05	

Table Neutron double differencial emission cross sections for Aluminum in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 90° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	11.31	9.8	5.4	4.29	
3.2	11.61		5.5	4.71	9.0
3.3	10.79		5.6	4.13	
3.4	9.85		5.7	5.20	
3.5	9.92	8.3	5.8	4.84	
3.6	9.38		5.9	5.56	
3.7	9.15		6.0	5.50	7.8
3.8	7.95		6.1	5.21	
3.9	8.59		6.2	5.18	
4.0	7.72	7.7	6.3	6.22	
4.1	6.65		6.4	4.30	
4.2	6.67		6.5	4.15	9.4
4.3	7.18		6.6	4.03	
4.4	6.39		6.7	3.79	
4.5	6.64	7.6	6.8	4.0	
4.6	6.68		6.9	4.37	
4.7	6.13		7.0	4.44	9.0
4.8	5.72		7.1	4.32	
4.9	5.73		7.2	4.20	
5.0	5.49	7.9	7.3	4.00	
5.1	5.43		7.4	3.90	
5.2	4.64		7.5	3.97	9.7
5.3	4.95		7.6	3.91	

Table Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 90° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	3.97		10.1	1.18	
7.8	4.11		10.2	1.45	
7.9	3.47		10.3	1.29	
8.0	3.18	7.9	10.4	1.38	17.6
8.1	3.41		10.6	1.55	
8.2	3.34		10.8	1.88	
8.3	3.27		11.0	2.10	11.1
8.4	3.09		11.2	2.33	
8.5	2.84	8.5	11.4	2.41	
8.6	2.79		11.6	2.60	
8.7	2.63		11.8	2.82	
8.8	2.69		12.0	2.86	9.1
8.9	2.46		12.2	2.95	
			12.4	3.14	
9.0	2.82	9.2	12.6	3.42	
9.1	2.68		12.8	3.65	
9.2	2.36		13.0	4.01	7.1
9.3	2.21		13.2	3.61	
9.4	2.05		13.4	4.30	
9.5	2.16	11.8	13.6	4.85	
9.6	1.94		13.8	5.25	
9.7	1.74				
9.8	1.38		14.0	6.02	4.9
9.9	1.55		14.2	5.78	
10.0	1.46	16.2	14.4	6.28	

Table Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 100° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	11.66	10.9	5.4	5.11	
3.2	11.79		5.5	5.77	8.3
3.3	11.28		5.6	4.71	
3.4	10.83		5.7	5.30	
3.5	9.98	9.3	5.8	4.89	
3.6	9.83		5.9	5.14	
3.7	9.53		6.0	4.48	10.2
3.8	8.07		6.1	4.30	
3.9	8.52		6.2	4.84	
4.0	8.13	8.1	6.3	6.12	
4.1	7.80		6.4	4.53	
4.2	8.11		6.5	4.76	9.3
4.3	8.45		6.6	4.86	
4.4	7.30		6.7	4.42	
4.5	7.61	7.5	6.8	4.32	
4.6	7.10		6.9	4.42	
4.7	5.50		7.0	4.25	10.3
4.8	5.09		7.1	4.07	
4.9	5.09		7.2	3.47	
5.0	5.29	8.9	7.3	3.30	
5.1	5.27		7.4	3.50	
5.2	4.54		7.5	3.68	11.4
5.3	5.21		7.6	3.76	

Table. Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 100° Scattering Angle (Lab)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	3.83		10.1	1.68	
7.8	3.96		10.2	1.85	
7.9	3.30		10.3	1.72	
8.0	2.96	9.4	10.4	1.78	
8.1	3.07		10.6	1.91	
8.2	2.96		10.8	2.06	
8.3	2.89		11.0	1.84	13.4
8.4	2.68		11.2	2.06	
8.5	2.35	11.4	11.4	2.28	
8.6	2.29		11.6	2.55	
8.7	2.12		11.8	2.80	
8.8	2.06		12.0	2.98	9.3
8.9	1.87		12.2	3.13	
9.0	2.13	12.9	12.4 12.6	3.15 3.21	
9.1	2.12		12.8	3.49	
9.2	1.92		13.0	3.93	7.5
9.3	1.81		13.2	3.57	
9.4	1.72		13.4	4.55	
9.5	1.81	15	13.6	5.54	
9.6	1.81		13.8	6.08	
9.7 9.8	1.81 1.51		14.0	6.82	4.7
9.9	1.72		14.2	6.55	
10.0	1.85	14.2	14.4	7.02	

Table Neutron double differencial emission cross sections for 'Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 110° Scattering Angle

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	10.97	11.6	5.4	3.99	
3.2	10.69		5.5	4.53	10.2
3.3	9.52		5.6	4.31	
3.4	9.40		5.7	3.49	
3.5	10.18	9.3	5.8	3.38	
3.6	10.73		5.9	3.35	
3.7	10.00		6.0	3.56	12.6
3.8	8.39		6.1	3.32	
3.9	8.30		6.2	3.12	
4.0	7.36	9.0	6.3	4.09	
4.1	6.31		6.4	3.11	
4.2	6.13		6.5	2.67	
4.3	5.85		6.6	2.70	
4.4	5.25		6.7	3.05	
4.5	4.96	10.9	6.8	2.95	
4.6	4.88		6.9	3.15	
4.7	4.29		7.0	3.12	
4.8	4.48		7.1	2.98	14.0
4.9	4.72		7.2	2.55	
5.0	4.40	10.6	7.3	2.29	
5.1	4.43		7.4	2.18	
5.2	4.79		7.5	2.32	17.5
5.3	4.36		7.6	2.32	

Table Neutron double differencial emission cross sections for Aluminum in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 110° Scattering Angle

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	2.49		10.1	1.96	
7.8	2.56		10.2	2.0	
7.9	2.33		10.3	2.10	
8.0	1.83	14.0	10.4	1.82	
8.1	2.12		10.6	1.97	
8.2	1.90		10.8	2.36	
8.3	1.79		11.0	2.19	12.7
8.4	1.65		11.2	2.03	
8.5	1.63	16.3	11.4	2.24	
8.6	1.50		11.6	2.13	
8.7	1.49		11.8	2.86	
8.8	1.57		12.0	3.31	9.0
8.9	1.56		12.2	3.92	
			12.4	4.41	
9.0	1.54	17.9	12.6	6.51	
9.1	1.40		12.8	6.42	
9.2	1.46		13.0	6.53	5.2
9.3	1.55		13.2	6.73	
9.4	1.61		13.4	6.79	
9.5	1.74	16.3	13.6	5.11	
9.6	1.80		13.8	3.98	
9.7	1.84				
9.8	1.60		14.0	3.60	
9.9	1.69		14.2	2.82	
10.0	1.84	4.4	14.4	2.12	

Table Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 120° Scattering Angle

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	13.22	11.8	5.4	3.69	
3.2	14.71		5.5	3.92	13.8
3.3	13.17		5.6	3.76	
3.4	11.75		5.7	3.89	
3.5	11.90	9.7	5.8	4.40	
3.6	11.71		5.9	4.69	
3.7	10.58		6.0	4.84	11.5
3.8	10.11		6.1	4.46	
3.9	9.73		6.2	4.18	
4.0	8.87	9.1	6.3	4.93	
4.1	7.47		6.4	3.75	
4.2	6.60		6.5	3.71	13.7
4.3	5.91		6.6	4.09	
4.4	5.39		6.7	4.06	
4.5	5.96	11.0	6.8	3.74	
4.6	6.10		6.9	4.07	
4.7	5.79		7.0	4.04	13.3
4.8	6.50		7.1	3.44	
4.9	6.28		7.2	3.03	
5.0	5.82	9.8	7.3	2.82	
5.1	5.24		7.4	2.49	
5.2	4.88		7.5	2.45	19.9
5.3	4.25		7.6	2.11	

Table Neutron double differencial emission cross sections for Aluminium in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 120° Scattering Angle

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	2.64		10.1	2.38	
7.8	2.82		10.2	2.55	
7.9	2.49		10.3	2.78	
8.0	2.00	15.8	10.4	2.58	
8.1	2.35		10.6	2.42	13.0
8.2	2.09		10.8	2.73	
8.3	1.96		11.0	2.56	
8.4	1.77		11.2	2.15	11.7
8.5	1.72	18.7	11.4	2.62	
8.6	1.58		11.6	2.75	
8.7	1.58		11.8	4.03	
8.8	1.68		12.0	4.62	7.9
8.9	1.72		12.2	5.37	
9.0	1.70	19.6	12.4 12.6	5.31 7.61	
9.1	1.50		12.8	7.47	
9.2	1.49		13.0	7.7	5.2
9.3	1.54		13.2	8.04	
9.4	1.67		13.4	8.28	
9.5	1.91		13.6	6.51	5.8
9.6 9.7	1.97 2.01		13.8	5.53	
9.8	1.83		14.0	4.91	
9.9	1.96		14.2	3.86	
10.0	2.12	15.1	14.4	2.90	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 30° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	20.03	6.6	5.4	8.10	
3.2	19.2		5.5	8.15	7.3
3.3	18.00		5.6	7.39	
3.4	17.92		5.7	8.36	
3.5	18.37	6.2	5.8	7.33	
3.6	17.52		5.9	8.48	
3.7	17.74		6.0	7.32	7.8
3.8	15.96		6.1	7.50	
3.9	15.56		6.2	7.55	
4.0	14.16	6.4	6.3	8.00	
4.1	12.58		6.4	6.97	
4.2	12.05		6.5	6.84	8.5
4.3	11.92		6.6	6.99	
4.4	10.76		6.7	6.50	
4.5	10.71	6.7	6.8	5.88	
4.6	10.71		6.9	5.87	
4.7	9.68		7.0	5.87	9.7
4.8	9.08		7.1	6.08	
4.9	9.03		7.2	5.05	
5.0	9.20	6.9	7.3	5.15	
5.1	9.25		7.4	5.18	
5.2	8.45		7.5	5.46	10.2
5.3	8.31		7.6	5.43	

Table Neutron double differencial emission cross sections for Copper! in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 30°/ Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	5.31		10.1	4.35	
7.8	4.97		10.2	5.17	
7.9	4.04		10.3	4.88	
8.0	4.12	8.6	10.4	5.15	8.1
8.1	4.01		10.6	5.34	
8.2	4.08		10.8	5.79	
8.3	4.24		11.0	4.94	9.0
8.4	4.18		11.2	4.71	
8.5	3.83	9.2	11.4	4.41	
8.6	4.00		11.6	4.37	
8.7	4.12		11.8	4.62	
8.8	4.29		12.0	5.10	8.3
8.9	3.4		12.2	5.80	
			12.4	6.39	
9.0	4.69	8.6	12.6	6.63	
9.1	4.75		12.8	7.07	
9.2	4.30		13.0	7.53	6.1
9.3	4.50		13.2	6.73	
9.4	4.43		13.4	7.64	
9.5	4.47	8.7	13.6	8.66	
9.6	4.39		13.8	10.0	
9.7	4.28				
9.8	3.73		14.0	12.43	5.0
9.9	4.34		14.2	12.05	
10.0	4.61	8.8	14.4	14.48	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 40° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	15.62	6.7	5.4	6.83	
3.2	15.91		5.5	7.00	7.4
3.3	15.43		5.6	6.18	
3.4	14.42		5.7	7.02	
3.5	13.66	6.6	5.8	6.17	
3.6	13.06		5.9	6.74	
3.7	13.61		6.0	5.76	8.2
3.8	12.26		6.1	5.74	
3.9	12.84		6.2	5.91	
4.0	12.56	6.2	6.3	6.14	
4.1	10.96		6.4	5.28	
4.2	10.56		6.5	5.15	9.4
4.3	10.66		6.6	5.17	
4.4	8.50		6.7	5.06	
4.5	8.24	6.8	6.8	4.88	
4.6	8.65		6.9	4.87	
4.7	7.78		7.0	4.98	9.2
4.8	6.78		7.1	5.38	
4.9	6.84		7.2	4.75	
5.0	7.11	7.1	7.3	4.80	
5.1	7.14		7.4	4.68	
5.2	6.75		7.5	4.84	10.3
5.3	7.70		7.6	4.77	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 40° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	4.73		10.1	3.25	
7.8	4.55				
7.9	3.73		10.2 10.3	3.62 3.86	
8.0	3.99	8.2	10.4	3.44	
8.1	3.94		10.6	3.65	
8.2	3.95		10.8	4.15	8.1
8.3	3.67		11.0	3.68	
8.4	3.53		11.2	3.72	
8.5	3.22	8.7	11.4	3.82	
8.6	3.26		11.6	3.95	
8.7	3.27		11.8	4.22	7.7
8.8	3.27		12.0	4.18	
8.9	2.91		12.2	4.33	
9.0	3.40	8.9	12.4 12.6	4.41 4.49	
9.1	3.32		12.8	4.99	4.5
9.2	2.93		13.0	5.33	
9.3	3.10		13.2	5.38	
9.4	3.10		13.4	6.91	
9.5	3.13	9.1	13.6	8.62	
9.6	3.16		13.8	10.79	2.4
9.7	3.19				
9.8	2.84		14.0	14.38	
9.9	3.53		14.2	13.95	
10.0	3.65	8.7	14.4	17.50	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 55° Scattering Angle (Lab).

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	15.0	6.4	5.4	6.65	
3.2	15.44		5.5	6.50	7.0
3.3	14.87		5.6	5.71	
3.4	14.90		5.7	6.53	
3.5	15.37	5.5	5.8	5.51	
3.6	14.24		5.9	6.30	
3.7	13.45		6.0	6.03	7.4
3.8	12.58		6.1	6.19	
3.9	13.02		6.2	6.12	
4.0	12.43	5.6	6.3	6.35	
4.1	11.21		6.4	5.17	
4.2	11.07		6.5	4.84	8.9
4.3	11.07		6.6	4.62	
4.4	9.34		6.7	4.47	
4.5	9.60	5.8	6.8	4.30	
4.6	9.38		6.9	4.42	
4.7	8.28		7.0	4.51	9.4
4.8	7.52		7.1	4.82	
4.9	7.23		7.2	4.22	
5.0	7.26	6.5	7.3	4.22	
5.1	7.11		7.4	4.26	
5.2	6.69		7.5	4.63	9.2
5.3	7.49		7.6	4.71	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 55° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	4.66		10.1	3.10	
7.8	4.67		10.2	3.44	
7.9	3.77		10.3	3.11	
8.0	3.72	7.4	10.4	3.26	
8.1	3.79		10.6	3.35	
8.2	3.86		10.8	3.63	
8.3	3.76		11.0	3.30	8.9
8.4	3.59		11.2	3.59	
8.5	3.31	8.1	11.4	3.69	
8.6	3.42		11.6	3.99	
8.7	3.31		11.8	4.19	
8.8	3.36		12.0	4.35	7.7
8.9	3.12		12.2	4.44	
			12.4	4.21	
9.0	3.71	7.8	12.6	3.86	
9.1	3.72		12.8	3.92	
9.2	3.31		13.0	4.36	7.6
9.3	3.43		13.2	3.90	
9.4	3.48		13.4	4.62	
9.5	3.61	8.3	13.6	5.52	
9.6	3.63		13.8	6.23	
9.7	3.61				
9.8	3.24		14.0	7.14	5.5
9.9	3.73		14.2	7.0	
10.0	3.66	8.2	14.4	7.77	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 60° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	14.67	5.2	5.4	6.53	
3.2	14.61		5.5	6.67	
3.3	14.02		5.6	5.95	
3.4	13.24		5.7	7.11	
3.5	14.23	4.6	5.8	6.36	
3.6	12.40		5.9	6.35	
3.7	12.82		6.0	6.22	5.7
3.8	11.77		6.1	6.19	
3.9	12.15		6.2	5.93	
4.0	11.21	4.7	6.3	5.94	
4.1	9.79		6.4	4.73	
4.2	10.14		6.5	4.62	7.2
4.3	9.80		6.6	4.62	
4.4	8.74		6.7	4.55	
4.5	8.91	4.8	6.8	4.36	
4.6	8.92		6.9	4.52	
4.7	7.97		7.0	4.66	7.1
4.8	7.19		7.1	4.81	
4.9	7.14		7.2	4.06	
5.0	7.21	5.1	7.3	3.98	
5.1	7.21		7.4	4.00	
5.2	6.54		7.5	3.98	8.1
5.3	7.23		7.6	3.94	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 60° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	4.09		10.1	2.50	
7.8	4.24		10.2	2.80	
7.9	3.50		10.3	2.53	
8.0	3.22		10.4	2.64	8.0
8.1	3.26		10.6	2.65	
8.2	3.29		10.8	2.85	
8.3	3.22		11.0	2.52	8.5
8.4	3.02	5.4	11.2	2.61	
8.5	2.71	7.3	11.4	2.65	
8.6	2.60		11.6	2.60	
8.7	2.43		11.8	2.69	
8.8	2.43		12.0	2.85	8.3
8.9	2.28		12.2	3.09	
9.0	2.76	7.6	12.4 12.6	3.23 3.15	
9.1	2.85		12.8	3.06	
9.2	2.56		13.0	3.00	7.8
9.3	2.71		13.2	2.64	
9.4	2.74		13.4	2.69	
9.5	2.86	7.7	13.6	2.86	
9.6	2.95		13.8	3.23	
9.7	2.92				
9.8	2.64		14.0	3.75	6.8
9.9	3.00		14.2	3.63	
10.0	2.93	7.6	14.4	4.11	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 70° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	12.87	6.2	5.4	6.69	
3.2	13.59		5.5	6.57	6.3
3.3	13.36		5.6	5.79	
3.4	12.87		5.7	6.22	
3.5	13.68	5.2	5.8	5.11	
3.6	12.33		5.9	5.71	
3.7	11.61		6.0	5.42	7.2
3.8	10.29		6.1	5.45	
3.9	11.13		6.2	5.18	
4.0	10.91	5.6	6.3	5.45	
4.1	10.03		6.4	4.85	
4.2	10.34		6.5	4.93	7.9
4.3	10.34		6.6	4.97	
4.4	9.06		6.7	5.33	
4.5	9.13	5.5	6.8	5.39	
4.6	9.19		6.9	5.56	
4.7	8.15		7.0	5.49	7.3
4.8	7.51		7.1	5.49	
4.9	7.71		7.2	4.61	
5.0	7.91	5.7	7.3	4.42	
5.1	7.50		7.4	4.23	
5.2	7.16		7.5	4.17	8.8
5.3	7.87		7.6	4.00	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 70° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	4.13		10.1	2.28	
7.8	4.20		10.2	2.52	
7.9	3.38		10.3	2.26	
8.0	3.59	6.9	10.4	2.20	10.2
8.1	3.61		10.6	2.18	
8.2	3.61		10.8	2.42	
8.3	3.59		11.0	2.33	10.2
8.4	3.57		11.2	2.49	
8.5	3.32	7.3	11.4	2.53	
8.6	3.26		11.6	2.58	
8.7	2.99		11.8	2.73	
8.8	2.75		12.0	2.80	9.5
8.9	2.45		12.2	2.84	
9.0	2.78	8.6	12.4 12.6	2.76 2.75	
9.1	2.71		12.8	2.88	
9.2	2.39		13.0	3.07	8.8
9.3	2.51		13.2	2.70	
9.4	2.53		13.4	2.97	
9.5	2.61	9.3	13.6	3.30	
9.6	2.48		13.8	3.69	
9.7 9.8	2.33 2.11		14.0	4.28	6.8
9.9	2.38		14.2	4.15	
10.0	2.49	9.5	14.4	4.64	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 80° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	16.42	5.4	5.4	6.38	
3.2	17.11		5.5	6.22	3.63
3.3	15.95		5.6	5.65	
3.4	14.26		5.7	6.51	
3.5	14.15	5.1	5.8	5.98	
3.6	13.06		5.9	6.35	
3.7	12.83		6.0	5.58	6.9
3.8	11.28		6.1	5.64	
3.9	11.18		6.2	5.44	
4.0	10.40	5.4	6.3	5.71	
4.1	8.97		6.4	4.92	
4.2	9.07		6.5	4.83	7.9
4.3	9.21		6.6	4.67	
4.4	8.49		6.7	4.45	
4.5	8.82	5.3	6.8	4.20	
4.6	9.04		6.9	4.15	
4.7	8.50		7.0	4.12	9.2
4.8	7.49		7.1	4.36	
4.9	7.44		7.2	3.96	
5.0	7.66	5.6	7.3	3.80	
5.1	7.37		7.4	3.51	
5.2	6.62		7.5	3.48	10.2
5.3	7.07		7.6	3.37	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 80° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	3.23		10.1	2.26	
7.8	3.06		10.2	2.48	
7.9	2.48		10.3	2.18	
8.0	2.75	8.5	10.4	2.07	10.2
8.1	2.81		10.6	2.02	
8.2	2.92		10.8	2.26	
8.3	3.04		11.0	2.18	10.8
8.4	3.10		11.2	2.15	
8.5	2.94	8.1	11.4	2.19	
8.6	3.14		11.6	2.60	
8.7	3.18		11.8	2.49	
8.8	3.30		12.0	2.60	9.6
8.9	3.11		12.2	2.69	
			12.4	2.73	
9.0	3.60	7.2	12.6	2.79	
9.1	3.61		12.8	3.06	
9.2	3.23		13.0	3.33	8.1
9.3	3.36		13.2	3.21	
9.4	3.30		13.4	3.70	
9.5	3.40	7.7	13.6	4.74	
9.6	3.18		13.8	5.84	
9.7	2.84				
9.8	2.40		14.0	7.2	5.6
9.9	2.68		14.2	6.99	
10.0	2.64	9.1	14.4	8.21	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 90° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	15.23	7.8	5.4	5.60	
3.2	15.00		5.5	5.53	11.1
3.3	13.47		5.6	4.36	
3.4	11.56		5.7	5.05	
3.5	11.14	8.0	5.8	4.34	
3.6	10.93		5.9	5.12	
3.7	10.12		6.0	5.08	11.1
3.8	9.33		6.1	5.27	
3.9	10.48		6.2	5.50	
4.0	9.68	8.6	6.3	6.67	
4.1	8.48		6.4	4.63	
4.2	8.65		6.5	4.42	12.7
4.3	8.87		6.6	4.41	
4.4	7.96		6.7	3.57	
4.5	8.49	8.0	6.8	3.54	
4.6	9.12		6.9	3.99	
4.7	7.87		7.0	3.92	14.6
4.8	7.42		7.1	3.83	
4.9	7.29		7.2	3.29	
5.0	7.37	8.4	7.3	3.33	
5.1	7.34		7.4	3.35	
5.2	6.25		7.5	3.31	16.2
5.3	6.55		7.6	3.31	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 90° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	3.31		10.1	1.60	
7.8	3.31		10.2	1.93	
7.9	2.72		10.3	1.68	
8.0	2.60	13.5	10.4	1.89	17.0
8.1	2.51		10.6	2.03	
8.2	2.21		10.8	2.06	
8.3	2.10		11.0	1.84	17.7
8.4	1.92		11.2	1.74	
8.5	1.68	19.4	11.4	1.57	
8.6	1.67		11.6	1.43	
8.7	1.60		11.8	1.52	
8.8	1.63		12.0	1.63	19.8
8.9	1.44		12.2	1.82	
9.0	1.76	19.4	12.4 12.6	2.10 2.39	
9.1	1.85		12.8	2.78	
9.2	1.79		13.0	3.24	12.97
9.3	1.88		13.2	2.93	
9.4	1.80		13.4	3.47	
9.5	1.89	18.4	13.6	4.03	
9.6	1.82		13.8	4.38	
9.7	1.78				
9.8	1.46		14.0	5.14	8.3
9.9	1.77		14.2	4.94	
10.0	1.90	18.2	14.4	5.72	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 100° Scattering Angle (Lab.)

E_n (MeV)	$\frac{^2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{^2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	13.36	8.2	5.4	5.92	
3.2	12.66		5.5	6.29	8.8
3.3	12.36		5.6	5.41	
3.4	11.43		5.7	5.94	
3.5	11.24	7.9	5.8	5.00	
3.6	11.42		5.9	5.13	
3.7	11.32		6.0	3.91	11.8
3.8	10.54		6.1	3.59	
3.9	10.90		6.2	3.39	
4.0	10.15	7.7	6.3	4.42	
4.1	8.59		6.4	3.20	
4.2	9.16		6.5	3.35	13.5
4.3	9.00		6.6	3.41	
4.4	7.54		6.7	3.58	
4.5	8.21	7.9	6.8	3.88	
4.6	7.86		6.9	4.12	
4.7	7.19		7.0	3.77	12.3
4.8	6.84		7.1	3.60	
4.9	7.11		7.2	3.38	
5.0	6.97	8.0	7.3	3.41	
5.1	7.04		7.4	3.52	
5.2	6.08		7.5	3.74	11.98
5.3	6.69		7.6	3.88	

Table Neutron double differencial emission cross sections for Copper in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 100° Scattering Angle (Lab.)

E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	3.97		10.1	1.83	
7.8	4.12		10.2	2.07	
7.9	3.41		10.3	1.90	
8.0	3.16	9.2	10.4	1.92	14.1
8.1	3.38		10.6	1.87	
8.2	3.26		10.8	1.86	
8.3	3.19		11.0	1.80	14.8
8.4	2.96		11.2	1.90	
8.5	2.65	10.3	11.4	1.79	
8.6	2.53		11.6	1.91	
8.7	2.44		11.8	1.92	
8.8	2.36		12.0	2.02	14.2
8.9	2.15		12.2	2.18	
			12.4	2.14	
9.0	2.46	11.4	12.6	2.09	
9.1	2.51		12.8	2.07	
9.2	2.22		13.0	2.31	13.3
9.3	2.15		13.2	3.49	
9.4	2.20		13.4	2.37	
9.5	2.32	12.7	13.6	2.77	
9.6	2.36		13.8	3.06	
9.7	2.15				
9.8	2.00		14.0	3.64	9.2
9.9	2.17		14.2	3.50	
10.0	2.10	13.6	14.4	3.72	

Table Neutron double differencial emission cross sections for Cu in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 110° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	22.48	6.8	5.4	6.40	
3.2	23.34		5.5	7.03	8.7
3.3	21.12		5.6	6.64	
3.4	20.71		5.7	6.85	
3.5	19.61	6.3	5.8	6.45	
3.6	18.36		5.9	6.19	
3.7	16.76		6.0	6.15	9.0
3.8	14.88		6.1	5.58	
3.9	14.92		6.2	4.71	
4.0	13.65	6.4	6.3	5.91	
4.1	11.63		6.4	4.81	
4.2	11.25		6.5	4.66	11.2
4.3	11.04		6.6	5.30	
4.4	9.18		6.7	5.59	
4.5	10.22	7.1	6.8	5.28	
4.6	9.90		6.9	5.47	
4.7	8.85		7.0	4.86	10.8
4.8	9.50		7.1	4.06	
4.9	9.17		7.2	3.49	
5.0	8.20	7.6	7.3	3.26	
5.1	7.84		7.4	3.22	
5.2	7.76		7.5	3.51	13.9
5.3	6.70		7.6	3.34	

Table Neutron double differencial emission cross sections for Cu in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 110° Scattering Angle (Lab.)

E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	3.65		10.1	2.52	
7.8	3.77		10.2	2.43	
7.9	3.57		10.3	2.53	
8.0	3.02	10.4	10.4	2.21	
8.1	3.54		10.6	2.16	
8.2	3.17		10.8	2.38	
8.3	3.04		11.0	2.02	15.4
8.4	2.86		11.2	1.89	
8.5	2.92	10.8	11.4	2.12	
8.6	2.88		11.6	2.00	
8.7	2.69		11.8	2.11	
8.8	2.60		12.0	2.32	14.6
8.9	2.66		12.2	2.50	
9.0	2.81	11.3	12.4 12.6	2.12 2.66	
9.1	2.91		12.8	2.76	
9.2	2.91		13.0	3.29	10.8
9.3	2.93		13.2	3.81	
9.4	3.00		13.4	4.50	
9.5	3.11	11.7	13.6	4.86	
9.6	2.97		13.8	5.67	
9.7 9.8	2.86 2.59		14.0	7.38	6.0
9.9	2.62		14.2	7.30	
10.0	2.54	13.2	14.4	7.06	

Table Neutron double differencial emission cross sections for : Cu in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 120° Scattering Angle (Lab)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	24.1	5.8	5.4	6.32	
3.2	25.07		5.5	6.06	9.8
3.3	22.26		5.6	5.78	
3.4	20.10		5.7	6.05	
3.5	18.08	5.7	5.8	6.58	
3.6	17.71		5.9	6.65	
3.7	15.34		6.0	6.59	8.4
3.8	13.10		6.1	6.61	
3.9	13.27		6.2	5.80	
4.0	12.54	5.9	6.3	5.84	
4.1	10.98		6.4	5.81	
4.2	10.48		6.5	5.43	9.9
4.3	10.69		6.6	5.16	
4.4	10.15		6.7	5.11	
4.5	10.49	6.4	6.8	4.61	
4.6	10.24		6.9	4.74	
4.7	9.17		7.0	4.70	11.3
4.8	8.88		7.1	4.80	
4.9	8.58		7.2	4.68	
5.0	7.93	7.3	7.3	4.35	
5.1	7.31		7.4	4.04	
5.2	7.03		7.5	3.83	13.1
5.3	6.04		7.6	2.69	

Table Neutron double differencial emission cross sections for Cu in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 120° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	2.99		10.1	2.10	
7.8	3.10		10.2	2.11	
7.9	2.68		10.3	2.28	
8.0	2.36	13.7	10.4	2.18	14.8
8.1	2.90		10.6	2.20	
8.2	2.72		10.8	2.57	
8.3	2.74		11.0	2.38	14.4
8.4	2.60		11.2	1.90	
8.5	2.62	12.8	11.4	2.11	
8.6	2.40		11.6	1.92	
8.7	2.35		11.8	2.10	
8.8	2.52		12.0	2.14	16.5
8.9	2.74		12.2	2.50	
			12.4	2.43	
9.0	2.89	12.6	12.6	1.92	
9.1	2.59		12.8	3.58	
9.2	2.47		13.0	4.40	9.0
9.3	2.39		13.2	3.81	
9.4	2.41		13.4	6.89	
9.5	2.57	13.5	13.6	7.42	
9.6	2.47		13.8	7.95	
9.7	2.43				
9.8	2.16		14.0	10.22	4.7
9.9	2.12		14.2	10.07	
10.0	2.10	15.2	14.4	9.65	

Table Neutron double differencial emission cross sections for Cu in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 130° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	16.53		5.4	5.3	
3.2	17.3	8	5.5	5.4	17
3.3	16.2		5.6	5.1	
3.4	14.8		5.7	4.8	
3.5	14.2	9	5.8	4.8	
3.6	12.8		5.9	4.9	
3.7	12.92		6.0	4.9	18
3.8	11.70		6.1	4.8	
3.9	12.02		6.2	4.6	
4.0	11.33	10	6.3	4.8	
4.1	10.22		6.4	4.4	
4.2	9.69		6.5	3.9	20
4.3	9.36		6.6	3.8	
4.4	8.85		6.7	4.6	
4.5	9.63	10	6.8	3.7	
4.6	9.89		6.9	3.6	
4.7	9.00		7.0	3.3	22
4.8	8.83		7.1	3.3	
4.9	8.58		7.2	2.8	
5.0	7.63	11	7.3	2.7	
5.1	6.4		7.4	2.6	
5.2	6.5		7.5	2.6	24
5.3	6.10		7.6	2.2	

Table Neutron double differencial emission cross sections for Cu in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 130° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	2.2		10.1	1.1	
7.8	2.0		10.2	1.1	
7.9	1.5		10.3	1.2	
8.0	1.6	26	10.4	1.1	
8.1	1.9		10.6	1.2	
8.2	1.6		10.8	1.46	
8.3	1.6		11.0	1.39	28
8.4	1.5		11.2	1.15	
8.5	1.5	27	11.4	1.19	
8.6	1.5		11.6	1.17	
8.7	1.4		11.8	1.1	
8.8	1.4		12.0	1.1	30
8.9	1.4		12.2	1.16	
9.0	1.4	28	12.4 12.6	1.4 1.65	
9.1	1.1		12.8	1.72	
9.2	1.0		13.0	2.1	24
9.3	0.97		13.2	2.70	
9.4	0.94		13.4	3.35	
9.5	1.2	30	13.6	3.52	
9.6	1.2		13.8	3.90	
9.7	1.2				
9.8	1.0		14.0	4.9	16
9.9	1.0		14.2	4.5	
10.0	1.1	30	14.4	4.1	

Table Neutron double differencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 30° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	58.67	4.8	5.4	13.47	
3.2	58.04		5.5	12.52	9.4
3.3	51.19		5.6	10.48	
3.4	47.09		5.7	11.99	
3.5	44.80	5.0	5.8	11.26	
3.6	40.22		5.9	12.00	
3.7	38.27		6.0	10.31	10.8
3.8	34.96		6.1	10.21	
3.9	33.36		6.2	9.56	
4.0	31.45	5.2	6.3	9.45	
4.1	28.30		6.4	7.48	
4.2	27.21		6.5	7.26	15
4.3	25.39		6.6	7.11	
4.4	22.05		6.7	7.23	
4.5	20.80	6.5	6.8	7.10	
4.6	19.64		6.9	7.50	
4.7	16.85		7.0	8.32	14
4.8	13.91		7.1	8.79	
4.9	14.51		7.2	7.53	
5.0	15.40	8.3	7.3	7.23	
5.1	15.19		7.4	6.64	
5.2	13.93		7.5	6.07	17.8
5.3	15.34		7.6	5.37	

Table Neutron double differencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 30° Scattering Angle (Lal.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	5.32		10.1	9.41	
7.8	6.06		10.2	10.51	
7.9	5.11	12.6	10.3	9.35	
8.0	5.69		10.4	9.49	
8.1	6.15		10.6	9.46	
8.2	6.73		10.8	10.30	
8.3	7.51		11.0	9.48	8.0
8.4	8.26		11.2	9.62	
8.5	7.94	9.5	11.4	9.75	
8.6	8.63		11.6	9.75	
8.7	8.76		11.8	10.41	
8.8	9.02		12.0	11.13	7.4
8.9	8.48		12.2	11.79	
			12.4	12.05	
9.0	9.82	7.9	12.6	12.45	
9.1	10.48		12.8	14.0	
9.2	9.73		13.0	16.19	5.6
9.3	10.33		13.2	14.52	
9.4	10.50		13.4	16.95	
9.5	10.79	7.4	13.6	21.62	
9.6	10.60		13.8	29.89	
9.7	10.14				
9.8	8.95		14.0	41.1	
9.9	10.28		14.2	39.93	
10.0	10.86	7.3	14.4	53.47	

Table Neutron double differencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 50° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	47.31	3.3	5.4	9.37	
3.2	47.67		5.5	9.26	6.3
3.3	41.57		5.6	8.33	
3.4	36.88		5.7	9.11	
3.5	35.50	3.4	5.8	7.56	
3.6	30.06		5.9	8.14	
3.7	27.66		6.0	7.94	7.3
3.8	23.51		6.1	8.07	
3.9	22.94		6.2	7.66	
4.0	21.93	3.9	6.3	8.23	
4.1	19.14		6.4	7.73	
4.2	18.54		6.5	7.73	7.7
4.3	17.85		6.6	7.48	
4.4	15.81		6.7	7.48	
4.5	15.25	4.5	6.8	7.48	
4.6	14.91		6.9	7.68	
4.7	13.38		7.0	7.82	8.0
4.8	11.55		7.1	7.93	
4.9	11.39		7.2	6.53	
5.0	11.68	5.6	7.3	6.59	
5.1	11.20		7.4	6.57	
5.2	10.00		7.5	6.62	8.5
5.3	10.81		7.6	6.78	

Table Neutron double differencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 50° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	7.18		10.1	7.15	7.0
7.8	7.35		10.2	7.91	
7.9	6.02		10.3	7.23	
8.0	5.77	9.0	10.4	7.35	
8.1	5.90		10.6	7.46	
8.2	6.13		10.8	7.73	
8.3	6.23		11.0	6.55	
8.4	6.14		11.2	6.55	
8.5	5.62		11.4	6.73	
8.6	5.59	9.0	11.6	6.67	
8.7	5.58		11.8	6.46	
8.8	5.86		12.0	6.46	6.5
8.9	5.46		12.2	6.47	
			12.4	6.53	
9.0	6.63	8.5	12.6	6.34	
9.1	6.96		12.8	6.49	
9.2	6.38		13.0	6.88	6.3
9.3	6.78		13.2	6.26	
9.4	7.09		13.4	6.81	
9.5	7.29	7.0	13.6	7.43	
9.6	7.68		13.8	8.23	
9.7	7.78				
9.8	6.94		14.0	10.4	5
9.9	8.02		14.2	10.1	
10.0	8.10		14.4	12.83	

Table Neutron double diffenencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 55° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	43.3	3.6	5.4	9.35	
3.2	43.3		5.5	9.59	6.1
3.3	40.88		5.6	8.70	
3.4	35.89		5.7	9.50	
3.5	34.36	3.5	5.8	8.06	
3.6	30.17		5.9	7.99	
3.7	28.32		6.0	7.05	8.1
3.8	23.39		6.1	6.79	
3.9	21.78		6.2	6.06	
4.0	19.52	4.3	6.3	6.03	
4.1	17.08		6.4	5.15	
4.2	16.22		6.5	5.08	
4.3	15.51		6.6	5.08	
4.4	13.68		6.7	5.31	
4.5	13.86	4.9	6.8	5.13	
4.6	13.97		6.9	5.24	
4.7	12.92		7.0	5.58	10.6
4.8	11.56		7.1	6.04	
4.9	11.89		7.2	5.43	
5.0	11.77	5.6	7.3	5.69	
5.1	10.88		7.4	5.89	
5.2	9.46		7.5	6.21	9.5
5.3	10.47		7.6	6.30	

Table Neutron double differencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 55° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	6.54		10.1	5.70	
7.8	6.34		10.2	6.34	
7.9	4.94		10.3	5.76	
8.0	5.43	7.2	10.4	5.89	
8.1	5.56		10.6	6.07	
8.2	5.70		10.8	6.53	
8.3	5.84		11.0	5.91	6.4
8.4	5.95		11.2	6.31	
8.5	5.57	7.1	11.4	6.54	
8.6	5.73		11.6	6.63	
8.7	5.77		11.8	6.92	
8.8	5.93		12.0	7.43	6.0
8.9	5.45		12.2	7.88	
9.0	6.38	6.5	12.4	7.97	
9.1	6.60		12.6 12.8	7.95 8.26	
9.2	5.97		13.0	8.49	5.4
9.3	6.19		13.2	7.38	
9.4	6.26		13.4	7.58	
9.5	6.42	6.6	13.6	8.01	
9.6	6.54		13.8	8.47	
9.7	6.47				
9.8	5.73		14.0	9.93	4.7
9.9	6.53		14.2	9.63	
10.0	6.61	6.3	14.4	11.63	

Table Neutron double differencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 70° Scattering Angle (Lab.)

E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{2d\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	33.81	4.6	5.4	7.67	
3.2	32.61		5.5	7.94	8.1
3.3	29.82		5.6	7.20	
3.4	26.20		5.7	8.04	
3.5	25.25	4.8	5.8	6.72	
3.6	22.12		5.9	7.36	
3.7	21.34		6.0	6.38	9.4
3.8	19.14		6.1	6.56	
3.9	18.50		6.2	6.93	
4.0	16.87	5.0	6.3	6.64	
4.1	14.59		6.4	5.93	
4.2	13.69		6.5	5.94	10.7
4.3	13.22		6.6	6.26	
4.4	11.58		6.7	5.83	
4.5	11.41	6.0	6.8	5.72	
4.6	11.52		6.9	6.02	
4.7	10.44		7.0	6.16	10.8
4.8	9.84		7.1	6.37	
4.9	9.91		7.2	5.57	
5.0	9.83	7.1	7.3	5.77	
5.1	9.00		7.4	5.22	12.9
5.2	8.02		7.5	4.76	
5.3	8.85		7.6	4.36	

Table Neutron double differencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 70° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	4.33		10.1	4.40	
7.8	4.26		10.2	4.98	
7.9	3.35		10.3	4.47	
8.0	3.82	10.2	10.4	4.45	
8.1	4.03		10.6	4.68	
8.2	4.30		10.8	4.96	
8.3	4.58		11.0	4.55	8.9
8.4	4.78		11.2	4.70	
8.5	4.58	8.8	11.4	4.73	
8.6	4.61		11.6	4.67	
8.7	4.54		11.8	4.80	
8.8	4.76		12.0	5.00	8.7
8.9	4.49		12.2	4.99	
			12.4	4.71	
9.0	5.26	8.0	12.6	4.51	
9.1	5.38		12.8	4.29	
9.2	4.71		13.0	4.42	9.7
9.3	4.82		13.2	3.76	
9.4	4.84		13.4	4.21	
9.5	4.97	8.5	13.6	4.86	
9.6	4.99		13.8	5.68	
9.7	4.92				
9.8	4.35		14.0	7.08	7.5
9.9	4.95		14.2	6.86	
10.0	5.08	8.3	14.4	8.18	

Table Neutron double differencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 80° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	43.1	3.4	5.4	9.15	
3.2	42.52		5.5	9.44	6.1
3.3	37.7		5.6	8.61	
3.4	32.82		5.7	9.42	
3.5	32.15	3.5	5.8	8.02	
3.6	28.82		5.9	8.20	
3.7	27.21		6.0	7.32	7.6
3.8	23.19		6.1	7.22	
3.9	22.49		6.2	6.85	
4.0	20.09	4.1	6.3	6.84	
4.1	17.33		6.4	5.90	
4.2	16.11		6.5	5.99	9.3
4.3	15.73		6.6	5.88	
4.4	13.54		6.7	5.54	
4.5	13.72	4.9	6.8	5.46	
4.6	13.93		6.9	5.61	
4.7	12.41		7.0	5.78	9.3
4.8	11.38		7.1	5.65	
4.9	11.69		7.2	4.37	
5.0	11.24	5.7	7.3	4.30	
5.1	10.74		7.4	4.40	
5.2	09.21		7.5	4.66	11.2
5.3	10.57		7.6	4.67	

Table Neutron double differencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 80° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	4.99		10.1	4.34	
7.8	5.23		10.2	4.96	
7.9	4.28		10.3	4.56	
8.0	4.09	8.2	10.4	4.10	7.4
8.1	4.38		10.6	4.95	
8.2	4.63		10.8	5.30	
8.3	4.86		11.0	4.74	7.2
8.4	4.84		11.2	4.78	
8.5	4.60	7.8	11.4	4.66	
8.6	4.74		11.6	4.61	
8.7	4.75		11.8	4.57	
8.8	4.94		12.0	4.52	8.4
8.9	4.58		12.2	4.52	
			~~12.4~~ 12.4	4.54	
9.0	5.28	7.2	12.6	4.30	
9.1	5.33		12.8	4.25	
9.2	4.82		13.0	4.07	9.0
9.3	4.96		13.2	3.68	
9.4	4.91		13.4	3.60	
9.5	5.05	7.5	13.6	3.85	
9.6	5.08		13.8	3.60	
9.7	5.03				
9.8	4.44		14.0	3.77	
9.9	5.01		14.2	3.92	
10.0	4.95	7.6	14.4	4.47	

Table Neutron double differencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 90° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	34.8	3.9	5.4	7.92	
3.2	33.37		5.5	7.81	7.4
3.3	28.72		5.6	5.86	
3.4	25.45		5.7	6.47	
3.5	23.08	4.3	5.8	5.40	
3.6	20.53		5.9	6.11	
3.7	19.17		6.0	5.57	9.0
3.8	16.87		6.1	5.53	
3.9	17.01		6.2	6.04	
4.0	15.06	4.8	6.3	7.66	
4.1	13.02		6.4	5.57	
4.2	12.83		6.5	5.44	9.7
4.3	12.25		6.6	5.44	
4.4	10.08		6.7	5.02	
4.5	9.89	6.3	6.8	4.75	
4.6	9.46		6.9	4.61	
4.7	8.18		7.0	4.48	11.9
4.8	7.89		7.1	4.54	
4.9	8.27		7.2	4.27	
5.0	8.74	6.7	7.3	4.03	
5.1	9.73		7.4	4.03	
5.2	8.78		7.5	4.07	11.7
5.3	9.06		7.6	4.36	

Table Neutron double differencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 90° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	4.16		10.1	3.88	
7.8	4.20		10.2	4.24	
7.9	3.50		10.3	3.94	
8.0	3.34	9.7	10.4	3.76	
8.1	3.46		10.6	3.50	
8.2	3.38		10.8	3.54	
8.3	3.48		11.0	3.09	10.2
8.4	3.45		11.2	3.06	
8.5	3.13	10.2	11.4	2.94	
8.6	3.35		11.6	2.96	
8.7	3.27		11.8	3.02	
8.8	3.40		12.0	2.87	11.3
8.9	3.19		12.2	2.78	
			12.4	2.83	
9.0	3.69	9.2	12.6	2.89	
9.1	3.82		12.8	2.94	
9.2	3.56		13.0	3.18	10.8
9.3	3.78		13.2	2.84	
9.4	4.04		13.4	3.24	
9.5	4.25	8.4	13.6	3.61	
9.6	4.29		13.8	4.15	
9.7	4.24				
9.8	3.66		14.0	4.84	8.6
9.9	4.20		14.2	4.65	
10.0	4.27	8.2	14.4	5.02	

Table Neutron double differencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 100° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	36.0	4.9	5.4	7.83	
3.2	34.42		5.5	8.21	9.6
3.3	31.66		5.6	6.38	
3.4	27.90		5.7	7.48	
3.5	26.67	5.0	5.8	6.73	
3.6	24.85		5.9	7.55	
3.7	23.85		6.0	6.59	10.9
3.8	20.92		6.1	6.35	
3.9	20.96		6.2	5.97	
4.0	17.94	5.5	6.3	6.66	
4.1	14.70		6.4	4.24	
4.2	14.36		6.5	3.86	18.1
4.3	14.49		6.6	3.84	
4.4	11.92		6.7	4.15	
4.5	12.70	6.7	6.8	4.32	
4.6	12.86		6.9	4.87	
4.7	10.78		7.0	5.35	14.0
4.8	9.82		7.1	5.21	
4.9	9.47		7.2	3.81	
5.0	9.94	7.9	7.3	3.33	
5.1	9.93		7.4	3.30	
5.2	8.02		7.5	3.36	20.7
5.3	8.29		7.6	3.54	

Table Neutron double differencial emission cross sections for Lead in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 100° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	3.72		10.1	2.78	
7.8	4.12		10.2	3.17	
7.9	3.56		10.3	2.85	
8.0	3.26	13.7	10.4	2.75	22
8.1	3.71		10.6	2.69	
8.2	3.70		10.8	2.79	
8.3	3.72		11.0	2.34	18.8
8.4	3.56		11.2	2.21	
8.5	3.23	13.8	11.4	1.93	
8.6	3.39		11.6	1.81	
8.7	3.43		11.8	1.89	
8.8	3.58		12.0	1.97	23
8.9	3.26		12.2	2.13	
9.0	3.88	12.0	12.4 12.6	2.31 2.33	
9.1	3.90		12.8	2.53	
9.2	3.53		13.0	2.46	18.6
9.3	3.60		13.2	2.08	
9.4	3.60		13.4	1.95	
9.5	3.79	12.4	13.6	1.68	
9.6 9.7 9.8	3.68 3.60 3.00		13.8 14.0	1.77 2.13	19.9
9.9	3.44		14.2	2.04	
10.0	3.28	13.5	14.4	2.70	

Table Neutron double differencial emission cross sections for Pb in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 110° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	42.49	7	5.4	5.36	
3.2	44.20		5.5	5.71	20
3.3	39.96		5.6	6.19	
3.4	36.30		5.7	6.12	
3.5	33.91	7	5.8	5.96	
3.6	29.83		5.9	5.30	
3.7	25.60		6.0	5.0	23
3.8	22.82		6.1	4.98	
3.9	22.19		6.2	4.02	
4.0	21.05	8	6.3	5.00	
4.1	19.02		6.4	5.23	
4.2	18.00		6.5	5.32	21
4.3	17.39		6.6	5.49	
4.4	14.19		6.7	6.24	
4.5	13.70	10	6.8	5.52	
4.6	13.38		6.9	5.18	
4.7	11.64		7.0	5.10	22
4.8	9.93		7.1	4.41	
4.9	10.13		7.2	3.37	
5.0	8.70	14	7.3	3.02	
5.1	7.34		7.4	3.07	
5.2	6.81		7.5	2.80	32
5.3	6.31		7.6	3.29	

Table Neutron double differencial emission cross sections for Pb in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 110° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	4.95		10.1	4.22	
7.8	5.11		10.2	3.73	
7.9	4.80		10.3	3.64	
8.0	4.38	16	10.4	3.10	24
8.1	4.56		10.6	2.81	
8.2	4.58		10.8	3.43	
8.3	4.54		11.0	3.19	23
8.4	4.19		11.2	2.85	
8.5	3.86	19	11.4	4.02	
8.6	3.56		11.6	2.21	
8.7	7.64		11.8	2.45	
8.8	3.91		12.0	2.26	34
8.9	4.22		12.2	2.10	
9.0	4.47		12.4 12.6	1.96 2.0	36
9.1	4.30	17	12.8	1.71	
9.2	4.67		13.0	2.26	32
9.3	5.04		13.2	2.83	
9.4	5.25		13.4	3.43	
9.5	5.58		13.6	4.33	17
9.6	5.70		13.8	5.39	13
9.7	5.61				
9.8	5.31		14.0	8.08	
9.9	4.93		14.2	9.91	9.0
10.0	4.57	16	14.4	9.1	

Table Neutron double differencial emission cross sections for Pb in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 120° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	42.5	3	5.4	7.46	
3.2	45.5		5.5	7.48	6
3.3	40.69		5.6	7.10	
3.4	37.28		5.7	6.26	
3.5	35.07	3	5.8	6.01	
3.6	30.24		5.9	5.64	
3.7	26.21		6.0	5.98	6
3.8	22.40		6.1	5.88	
3.9	22.33		6.2	5.2	
4.0	21.41	4	6.3	5.40	
4.1	18.75		6.4	5.08	
4.2	16.66		6.5	4.40	7
4.3	16.58		6.6	4.09	
4.4	14.78		6.7	4.37	
4.5	14.38	5	6.8	3.67	
4.6	14.28		6.9	3.61	
4.7	13.12		7.0	3.75	9
4.8	12.60		7.1	3.67	
4.9	11.93		7.2	3.15	
5.0	11.24	5.5	7.3	3.12	
5.1	9.70		7.4	2.71	
5.2	9.84		7.5	2.68	11
5.3	8.55		7.6	2.17	

Table Neutron double differencial emission cross sections for Pb in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 120° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistic Error %
7.7	2.46		10.1	1.3	
7.8	2.47		10.2	1.3	
7.9	2.06		10.3	1.3	
8.0	2.15	8.5	10.4	1.1	
8.1	2.35		10.6	1.0	14
8.2	2.26		10.8	1.2	
8.3	2.44		11.0	1.2	14
8.4	2.22		11.2	1.1	
8.5	2.30	8.5	11.4	1.1	
8.6	2.10		11.6	1.1	
8.7	2.0		11.8	1.1	
8.8	2.0		12.0	1.2	14
8.9	2.0		12.2	1.2	
			12.4	1.0	
9.0	2.0	9	12.6	1.0	
9.1	1.8		12.8	1.0	
9.2	1.7		13.0	0.7	21
9.3	1.8		13.2	0.7	
9.4	1.8		13.4		
9.5	1.8	10	13.6		
9.6	1.8		13.8		
9.7	1.8				
9.8	1.6		14.0		
9.9	1.5		14.2		
10.0	1.4	12	14.4		

Table Neutron double differencial emission cross sections for Pb in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 130° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
3.1	45.87	5	5.4	7.46	
3.2	45.14		5.5	7.63	13
3.3	36.90		5.6	7.58	
3.4	32.19		5.7	6.30	
3.5	28.82	6	5.8	6.57	
3.6	24.85		5.9	6.31	
3.7	22.78		6.0	6.34	15
3.8	20.49		6.1	5.80	
3.9	20.40		6.2	5.06	
4.0	19.10	7	6.3	5.00	
4.1	16.62		6.4	3.85	
4.2	15.39		6.5	3.64	26
4.3	14.96		6.6	3.98	
4.4	12.18		6.7	4.51	
4.5	12.40	8	6.8	3.94	
4.6	12.50		6.9	4.12	
4.7	11.27		7.0	4.34	22
4.8	10.62		7.1	3.82	
4.9	10.17		7.2	2.75	
5.0	9.67	11	7.3	2.55	
5.1	8.20		7.4	2.56	
5.2	8.93		7.5	2.54	
5.3	8.44		7.6	2.09	

Table Neutron double differencial emission cross sections for Pb in the Centre of Mass System for 14.6 MeV incident Neutron Energy at 130° Scattering Angle (Lab.)

E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %	E_n (MeV)	$\frac{d^2\sigma}{d\Omega dE}$ (mb/Sr-MeV)	Statistical Error %
7.7	2.74		10.1	2.24	
7.8	3.22		10.2	2.02	28
7.9	3.02		10.3	1.88	
8.0	2.65	22	10.4	1.57	34
8.1	3.28		10.6	1.68	
8.2	3.21		10.8	1.87	
8.3	3.28		11.0	1.78	32
8.4	3.38		11.2	1.80	
8.5	3.60	17	11.4	2.37	
8.6	3.21		11.6	2.15	
8.7	2.97		11.8	1.70	
8.8	2.98		12.0	1.66	
8.9	3.21		12.2	1.43	
9.0	3.36	18	12.4 12.6	0.60 0.60	90
9.1	3.04		12.8	0.70	76
9.2	2.94		13.0	1.2	47
9.3	2.99		13.2	1.8	
9.4	2.88		13.4	2.6	24
9.5	2.78	22	13.6	3.4	17
9.6	2.66		13.8	4.66	9
9.7	2.57				
9.8	2.45		14.0	7.1	
9.9	2.41	25	14.2	7.2	
10.0	2.34		14.4	7.1	