Principal cross sections

Cross section (barns)

Energy (MeV)

total
absorption
elastic
gamma production
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+ resonance total cross section
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
resonance total cross section

Energy (MeV)

Cross section (barns)

total
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
resonance total cross section

![Graph showing the total cross section vs. energy (MeV) on a logarithmic scale. The y-axis represents the cross section in barns, ranging from $10^{-1}$ to $10^1$, and the x-axis represents energy in MeV, ranging from $10^{-1}$ to $10^0$. The graph shows a line labeled 'total' with fluctuations and peaks across the energy spectrum.]
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
resonance absorption cross sections

![Graph showing cross section vs. energy. The graph has a log-log scale with the x-axis representing energy in MeV ranging from $10^{-3}$ to $10^{-2}$ and the y-axis representing cross section in barns ranging from $10^{-1}$ to $10^{0}$. The graph includes a line labeled "capture." ]
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
resonance absorption cross sections

![Graph showing cross section (barns) vs. Energy (MeV) on a logarithmic scale with capture data.](image-url)
Damage

Energy (MeV)

Damage (MeV-barns)

-10^{-11} 10^{-9} 10^{-7} 10^{-5} 10^{-3} 10^{-1} 10^{1}

-10^{-4} 10^{-3} 10^{-2} 10^{-1} 10^{0}

-10^{-2} 10^{-3} 10^{-4} 10^{-5} 10^{-6} 10^{-7} 10^{-8}
Non-threshold reactions

Energy (MeV) vs. Cross section (barns)

- Reaction: (n,gma)

Energy range: $10^{-11}$ to $10^1$ MeV

Cross section range: $10^{-3}$ to $10^3$ barns
Principal cross sections

- Total
- Absorption
- Elastic
- Gamma production

Energy (MeV) vs. Cross section (barns)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+

Heating

![Graph showing the relationship between Energy (MeV) and Heating (MeV/reaction). The line starts near the origin and rises gradually to the top right corner of the graph.](image-url)
24-CR-53 FOR FENDL-3.2 FROM INDen-1.0 BY NJOY2016.60+
Non-threshold reactions

Energy (MeV)

Cross section (barns)

$10^{-3}$

$10^{-4}$

$10^{-5}$

$10^{-6}$

$10^{-7}$

Energy (MeV)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
Inelastic levels

Energy (MeV)

Cross section (barns)

- (n,n*1)
- (n,n*2)
- (n,n*3)
- (n,n*4)
- (n,n*5)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
Inelastic levels

![Graph showing inelastic levels for different neutron scattering events at various energies.](image_url)
Threshold reactions

Cross section (barns)

Energy (MeV)
Threshold reactions

24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+

Energy (MeV)

Cross section (barns)

- (n,2np)
- (n,n*^c)
- (n,p)
- (n,d)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
Threshold reactions

Energy (MeV) vs. Cross section (barns) for various reactions:
- (n,t)
- (n,he3)
- (n,a)
- (n,2p)
- (n,pd)

The graph shows the cross-section behavior for different reactions as a function of energy.
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
Threshold reactions

Cross section (barns)

Energy (MeV)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
Threshold reactions

![Graph showing cross-sections for various reactions vs energy]

- (n,xp)
- (n,xd)
- (n,xt)
- (n,xhe3)
- (n,xa)
Threshold reactions

Cross section (barns) vs. Energy (MeV)

- (n,p*0)
- (n,p*1)
- (n,p*2)
- (n,p*3)
- (n,p*4)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
Threshold reactions

![Graph showing cross section vs. energy for different threshold reactions.](image)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
Threshold reactions

Energy (MeV)

Cross section (barns)

(n,a*8)
(n,a*9)
(n,a*10)
(n,a*11)
(n,a*12)
Threshold reactions

Cross section (barns) vs. Energy (MeV)

- (n,a*13)
- (n,a*14)
- (n,a*15)
- (n,a*16)
- (n,a*17)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
Threshold reactions

Energy (MeV)

Cross section (barns)

(n,a*18)
(n,a*19)
(n,a*20)
(n,a*21)
(n,a*22)

Energy (MeV)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
Threshold reactions

Energy (MeV)

Cross section (barns)

(n,a*23)
(n,a*24)
(n,a*25)
(n,a*26)
(n,a*27)
Threshold reactions

Cross section (barns) vs. Energy (MeV)

- (n,a^38)
- (n,a^39)
- (n,a^c)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for elastic
angular distribution for elastic
angular distribution for (n,n*1)
angular distribution for $(n,n^*1)$
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,n*2)
angular distribution for (n,n*2)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,n*3)
angular distribution for \((n,n^*3)\)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,n*4)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,n*4)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,n*5)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,n*5)
angular distribution for (n,n*6)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,n*6)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,n*7)
angular distribution for \((n,n^*7)\)
angular distribution for \((n,n^*8)\)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,n*8)
angular distribution for \((n, n^{\ast}9)\)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for $(n,n*9)$
angular distribution for (n,n*10)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for \((n,n^{*10})\)
Neutron emission for \((n,x)\)
Neutron emission for (n,n*)p
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
Neutron emission for (n,n*)d
24-CR-53 FOR FENDL-3.2 FROM INDEL-1.0 BY NJOY2016.60+
Neutron emission for \((n,n^*)\)he3
Neutron emission for (n,2np)
Neutron emission for \((n,n^*c)\)
Photon emission for (n,x)

![3D plot of photon emission](image-url)
Photon emission for (n,2n)
Photon emission for \((n,n^*)d\)
Photon emission for (n,n*)he3
Photon emission for (n,2np)
Photon emission for (n,2np)
Photon emission for (n,n*c)
Photon emission for (n,gma)
Photon emission for (n,d)
Photon emission for (n,t)
Photon emission for (n,he3)
Photon emission for (n,2p)
Photon emission for (n,pd)
Photon emission for (n,pt)
Photon emission for (n,a*c)

24-CR-53 FOR FENDL-3.2 FROM INDEN 1.0 BY NJOY2016.60+

Prob/MeV

$E_\gamma$ (MeV)

$E_n$ (MeV)

$10^{-3}$

$10^{-1}$
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
thermal capture photon spectrum
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
14 MeV photon spectrum
Particle heating contributions

- Protons
- Deuterons
- Tritons
- He-3
- Alphas

Energy (MeV) vs. Energy (MeV/collision) for different particles.
Particle production cross sections

Energy (MeV) vs. Cross section (barns)

- Protons
- Deuterons
- Tritons
- He-3
- Alphas
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
protons from (n,x)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
protons from \((n,n^*)p\)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
protons from (n,2np)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
protons from (n,2p)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
protons from (n,pd)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
protons from (n,pt)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,p*0) proton
angular distribution for (n,p*1) proton
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,p*1) proton
angular distribution for (n,p*2) proton
angular distribution for (n,p*2) proton
angular distribution for (n,p*3) proton
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,p*3) proton
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angural distribution for (n,p*4) proton
angular distribution for (n,p*4) proton
angular distribution for (n,p*5) proton
angular distribution for (n,p*5) proton
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for \((n,p^*6)\) proton
angular distribution for (n,p*6) proton
Angular distribution for (n,p*7) proton
angular distribution for (n,p*7) proton

24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,p*8) proton
angular distribution for (n,p*8) proton
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,p*9) proton
angular distribution for (n,p*9) proton
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,p*10) proton

---

Proba/Cos

10^0 10^-1 10^-2 10^-3 10^-4 10^-5 10^-6 10^-7 10^-8 10^-9 10^-10 10^-11 10^-12

Cosine

1.0 0.5 0.0 -0.5 -1.0

Energy (MeV)

4 6 8 10 12 14 16 18 20
angular distribution for (n,p*10) proton
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
protons from (n,p^c)

![Graph showing the probability per MeV as a function of secondary energy and energy in MeV.](image-url)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
deuterons from (n,x)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
deuterons from (n,d)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
deuterons from (n, pd)
24-CR-53 FOR FENDL-3.2 FROM INDEN 1.0 BY NJOY2016.60+
tritons from (n,x)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
tritons from (n,t)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
tritons from (n,pt)
he3s from \((n,n^*)\)he3
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
he3s from (n,he3)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+ alphas from (n,x)
angular distribution for (n,a*0) alpha
angular distribution for (n,a*0) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*) alpha
angular distribution for (n,a^1) alpha

Energy (MeV) vs. Cosine vs. Probability
angular distribution for \((n,a^*2)\) alpha
angular distribution for (n,a^2) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*3) alpha
angular distribution for (n,a*3) alpha
angular distribution for (n, α*4) alpha
Angular distribution for (n,a*4) alpha
angular distribution for (n,a*5) alpha
angular distribution for \((n,a^*5)\) alpha

\[
\begin{align*}
\text{Prob|Cos} & \quad 10^0 & \quad 10^{-2} & \quad 10^{-4} & \quad 10^{-6} \\
\text{Cosine} & \quad 0.0 & \quad 0.5 & \quad 0.0 & \quad 0.5 & \quad 1.0
\end{align*}
\]

\[
\begin{align*}
\text{Energy (MeV)} & \quad 20 & \quad 30 & \quad 40 & \quad 50 & \quad 60 & \quad 70
\end{align*}
\]
angular distribution for (n,a*6) alpha
angular distribution for (n,a*6) alpha
angular distribution for (n,a*7) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for \((n,a^7)\) alpha

![Angular distribution plot](attachment:image)
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for \((n,a^8)\) alpha

\[
\text{Prob}(\cos) \quad 10^{-0} \quad 10^{-2} \quad 10^{-4} \\
\text{Cosine} \quad 0.5 \quad 0.0 \quad -0.5 \quad -1.0 \\
\text{Energy (MeV)} \quad 20 \quad 30 \quad 40 \quad 50 \quad 60 \quad 70
\]
angular distribution for (n,a*9) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for \((n,a^{*9})\) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*10) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*10) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
arbitrary distribution for (n,a*11) alpha
angular distribution for (n,a*11) alpha
angular distribution for (n,a^12) alpha
angular distribution for (n,α*13) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*13) alpha
angular distribution for (n,a*14) alpha
angular distribution for (n,a*14) alpha
angular distribution for \((n,a^*15)\) alpha
angular distribution for (n,a*15) alpha
angular distribution for (n,a*16) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*16) alpha

Prob|Cos

10^0
10^-2
10^-4
10^-6
10^-8

Cosine

Energy (MeV)
angular distribution for (n,a*17) alpha
angular distribution for (n,a*17) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*18) alpha
angular distribution for \((n, a^{*18})\) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*19) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*19) alpha
angular distribution for (n,a*20) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*20) alpha
angular distribution for (n,a*21) alpha
angular distribution for (n, a*21) alpha
angular distribution for (n,a*22) alpha
angular distribution for (n,a*23) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*23) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*24) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEMN-1.0 BY NJOY2016.60+
angular distribution for \((n,a^*24)\) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*25) alpha
angular distribution for $(n,a^*25)$ alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*26) alpha
angular distribution for (n,a*26) alpha
angular distribution for (n,a*27) alpha
angular distribution for (n, a*27) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*28) alpha
angular distribution for \((n,a^*28)\) alpha
angular distribution for \((n,a*29)\) alpha
angular distribution for \((n,a^*29)\) alpha
angular distribution for (n,a*30) alpha
angular distribution for (n,a*30) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*31) alpha
angular distribution for (n,a*31) alpha
angular distribution for (n,a*32) alpha
angular distribution for (n,a*32) alpha
angular distribution for (n, a*33) alpha
angular distribution for (n,a*33) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for \((n,a^\ast 34)\) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*34) alpha
angular distribution for (n,α*35) alpha
angular distribution for (n,a*35) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*36) alpha
angular distribution for (n,a*36) alpha

Prob/Cos

10^0

10^-2

10^-4

10^-6

Energy (MeV)

Cosine

0 0.5 1.0

20 30 40 50 60 70
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for \((n,a^*37)\) alpha
angular distribution for (n,a*37) alpha

Energy (MeV)

Cosine

Prob/Cos
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*38) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEMN-1.0 BY NJOY2016.60+
angular distribution for \((n,a^*38)\) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
angular distribution for (n,a*39) alpha
angular distribution for \((n,a^*39)\) alpha
24-CR-53 FOR FENDL-3.2 FROM INDEN-1.0 BY NJOY2016.60+
alphas from (n,a*c)