



|                                      |                                       |                                        |                                        |                                      |                                          |                                          |                                       |                                       |
|--------------------------------------|---------------------------------------|----------------------------------------|----------------------------------------|--------------------------------------|------------------------------------------|------------------------------------------|---------------------------------------|---------------------------------------|
| La-126<br>(5.18m)<br>EC <sup>+</sup> | La-127<br>(11.6m)<br>ECB <sup>+</sup> | La-129<br>(8.7m)<br>ECB <sup>+</sup>   | La-130<br>(59m)<br>ECB <sup>+</sup>    | La-131<br>(4.8h)<br>ECB <sup>+</sup> | La-132<br>(3.912h)<br>ECB <sup>+</sup>   | La-133<br>(6.45m)<br>ECB <sup>+</sup>    | La-134<br>(19.5h)<br>ECB <sup>+</sup> | La-135<br>(9.87m)<br>ECB <sup>+</sup> |
| Ba-127<br>(2.7m)<br>CB <sup>+</sup>  | Ba-128<br>(2.43d)<br>EC               | Ba-129<br>(2.23h)<br>ECB <sup>+</sup>  | Ba-130<br>(11.50d)<br>EC               | Ba-131<br>(11.50d)<br>EC             | Ba-132<br>(10.52y)<br>EC                 | Ba-133<br>(10.52y)<br>EC                 | Ba-134<br>(STABLE)                    | Ba-135<br>(STABLE)                    |
| Cs-126<br>(1.64m)<br>CB <sup>+</sup> | Cs-127<br>(6.25h)<br>ECB <sup>+</sup> | Cs-128<br>(3.640m)<br>ECB <sup>+</sup> | Cs-129<br>(32.06h)<br>ECB <sup>+</sup> | Cs-130<br>(9.68h)<br>EC              | Cs-131<br>(6.479d)<br>ECB+B <sup>-</sup> | Cs-132<br>(6.479d)<br>ECB+B <sup>-</sup> | Cs-133<br>(STABLE)                    | Cs-134<br>(2.0648y)<br>B-EC           |

# BARIUM-131

## SUMMARY DATA

### GENERAL

### CLASSIFICATION

Isotope: Ba-131  
Atomic number (Z): 56  
Mass number (A): 131  
Neutron number (N): 75

### RADIOACTIVE DECAY

Decay modes: Electron capture  
Half-life: 11.5 [d]  
Decay constant:  $6.9761 \times 10^{-7}$  [1/s]  
Daughters: Cs-131 (100.0%)  
Radioactive daughters: Cs-131

### DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]  
Mean electron energy: 0.04551 [MeV]  
Mean photon energy: 0.47634 [MeV]  
Air kerma rate constant,  $\Gamma_{10}$ :  $2.151 \times 10^{-17}$  [Gy·m<sup>2</sup>/Bq·s]  
Air kerma coefficient,  $K_{\text{air}}$ :  $2.151 \times 10^{-17}$  [Gy·m<sup>2</sup>/Bq·s]  
Equilibrium dose constant for weakly-penetrating radiations ( $\alpha$  and/or electrons),  $\Delta_{\text{wp}}$ :  $7.292 \times 10^{-15}$  [Gy·kg/Bq·s]  
Equilibrium dose constant for alphas,  $\Delta_{\alpha}$ : 0.000e+00 [Gy·kg/Bq·s]

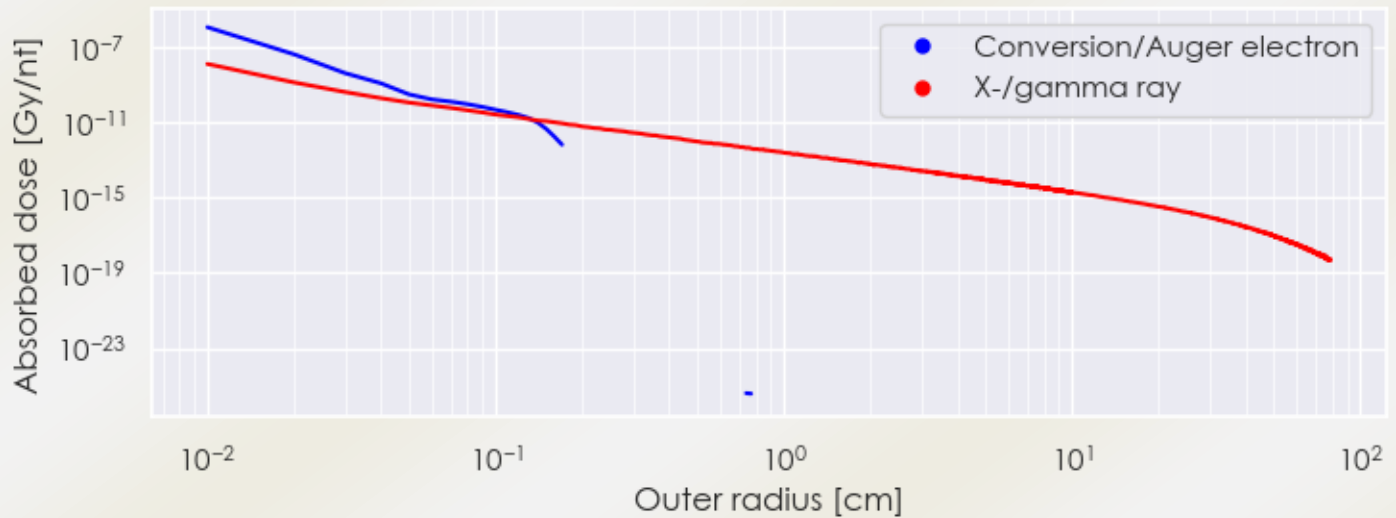
Equilibrium dose constant for betas/electrons,  $\Delta_{\beta,\beta^+,e^-}$ :  $7.292\text{e-15}$  [Gy·kg/Bq·s]

Equilibrium dose constant for photons,  $\Delta_p$ :  $7.632\text{e-14}$  [Gy·kg/Bq·s]

### DOSE POINT KERNELS (PLOT)

Dose point kernel source: **Graves, et al. Medical Physics. 2019 Nov.; 46(11):5284-5293.**

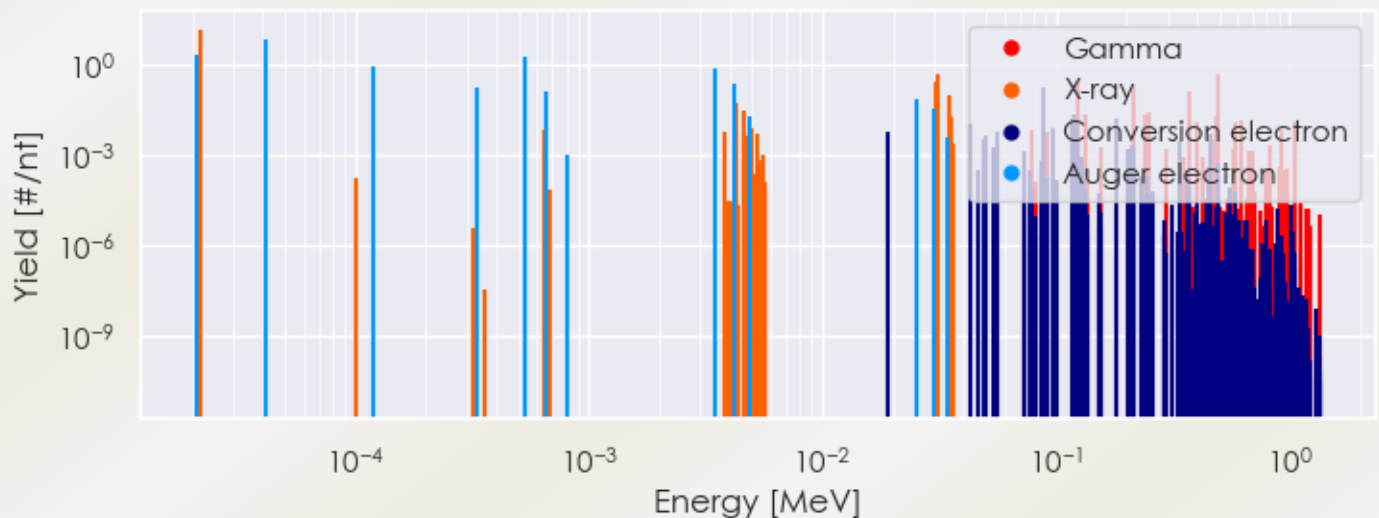
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: [www.mirdsoft.org/products/MIRDspecs/Ba-131 DPK.csv](http://www.mirdsoft.org/products/MIRDspecs/Ba-131 DPK.csv)

### SUMMARY SPECTRA (PLOT)

Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: [www.mirdsoft.org/products/MIRDspecs/Ba-131 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Ba-131 Summary Spectrum.csv)

## TABULATED DATA

## SUMMARY SPECTRA (TABLE)

Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**

Note: Radiations with yield < 0.01 are excluded from the table, but are available in the linked \*.csv data.

Download tabulated summary spectra file here: [www.mirdsoft.org/products/MIRDspecs/Ba-131 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Ba-131%20Summary%20Spectrum.csv)

| Energy [MeV] | Yield [# /nt] if > 0.01 | Radiation type |
|--------------|-------------------------|----------------|
| 2.18868e-05  | 1.543e+01               | X-ray          |
| 4.27312e-03  | 5.320e-02               | X-ray          |
| 4.61551e-03  | 3.169e-02               | X-ray          |
| 3.06218e-02  | 2.802e-01               | X-ray          |
| 3.09789e-02  | 5.175e-01               | X-ray          |
| 3.49256e-02  | 4.903e-02               | X-ray          |
| 3.49944e-02  | 9.503e-02               | X-ray          |
| 3.58031e-02  | 1.032e-02               | X-ray          |
| 3.58172e-02  | 2.011e-02               | X-ray          |
| 1.23805e-01  | 2.897e-01               | Gamma          |
| 1.33609e-01  | 2.125e-02               | Gamma          |
| 2.16078e-01  | 1.966e-01               | Gamma          |
| 2.39629e-01  | 2.410e-02               | Gamma          |
| 2.49432e-01  | 2.813e-02               | Gamma          |
| 3.73246e-01  | 1.404e-01               | Gamma          |
| 4.04046e-01  | 1.310e-02               | Gamma          |
| 4.86522e-01  | 2.087e-02               | Gamma          |
| 4.96326e-01  | 4.680e-01               | Gamma          |
| 5.85041e-01  | 1.193e-02               | Gamma          |
| 6.20111e-01  | 1.437e-02               | Gamma          |
| 1.04760e+00  | 1.324e-02               | Gamma          |
| 2.09266e-05  | 2.056e+00               | Auger electron |
| 4.14416e-05  | 7.324e+00               | Auger electron |
| 1.19617e-04  | 9.008e-01               | Auger electron |
| 3.29106e-04  | 1.738e-01               | Auger electron |
| 5.28304e-04  | 2.014e+00               | Auger electron |
| 6.52853e-04  | 1.321e-01               | Auger electron |

|                    |           |                                     |
|--------------------|-----------|-------------------------------------|
| <b>3.44594e-03</b> | 7.914e-01 | <a href="#">Auger electron</a>      |
| <b>4.16699e-03</b> | 2.441e-01 | <a href="#">Auger electron</a>      |
| <b>4.91673e-03</b> | 1.880e-02 | <a href="#">Auger electron</a>      |
| <b>2.53980e-02</b> | 7.350e-02 | <a href="#">Auger electron</a>      |
| <b>2.98089e-02</b> | 3.340e-02 | <a href="#">Auger electron</a>      |
| <b>4.27480e-02</b> | 1.151e-02 | <a href="#">Conversion electron</a> |
| <b>8.78200e-02</b> | 1.790e-01 | <a href="#">Conversion electron</a> |
| <b>1.18120e-01</b> | 1.696e-02 | <a href="#">Conversion electron</a> |
| <b>1.18442e-01</b> | 2.115e-02 | <a href="#">Conversion electron</a> |
| <b>1.18799e-01</b> | 2.264e-02 | <a href="#">Conversion electron</a> |
| <b>1.22814e-01</b> | 1.307e-02 | <a href="#">Conversion electron</a> |
| <b>1.80093e-01</b> | 1.829e-02 | <a href="#">Conversion electron</a> |

## USEFUL LINKS

Isotope decay characteristics are periodically updated as better measurements can be made - changes that may not be reflected on this page. Please see useful links:

National Nuclear Data Center (NNDC): <https://www.nndc.bnl.gov/nudat3/mird/>

International Atomic Energy Agency (IAEA) Livechart: <https://www-nds.iaea.org/relnsd/vcharthtml/VChartHTML.html>

## REFERENCE LINKS

ICRP Report 107: <https://www.icrp.org/publication.asp?id=ICRP%20Publication%20107>

Graves et al. Dose Point Kernels: <https://doi.org/10.1002/mp.13789>

MIRD Decay Schemes 2nd Edition: [https://sites.snmmi.org/SNMMI-MAIN/iCore/Store/StoreLayouts/Item\\_Detail.aspx?iProductCode=0-932004-80-6](https://sites.snmmi.org/SNMMI-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6)