

¹⁰³Rh(n,n'γ) 1991Ab03,1978Ba36

| Type | Author | History Citation | Literature Cutoff Date |
|-----------------|--------------|----------------------|------------------------|
| Full Evaluation | D. De Frenne | NDS 110, 2081 (2009) | 1-Mar-2009 |

1991Ab03: E not given; measured σ(E, Eγ), Eγ, Iγ. ¹⁰³Rh deduced levels.

1978Ba36: ¹⁰³Rh(n,n), E=0.2-1.3 MeV; measured σ(E,τ). ¹⁰³Rh(n,n'), E=0.55-1.5 MeV; measured σ(E,En'). ¹⁰³Rh(n,n'γ),

E=1.1-1.93 MeV; measured Eγ, Iγ, σ(E,Eγ). ¹⁰³Rh deduced levels, branching ratios, J, π, activation of isomeric state. Natural target, time of flight, Ge(Li) detector.

Other: 1994De20.

¹⁰³Rh Levels

| E(level) [‡] | Jπ [†] | E(level) [‡] | Jπ [†] | E(level) [‡] |
|-----------------------|---------------------------------------|-----------------------|---|-----------------------|
| 0.0 | 1/2 ⁻ | 1252.3 4 | | 1600.1 7 |
| 39.66 25 | 7/2 ⁺ | 1256.7 4 | | 1605.3 6 |
| 92.9 3 | 9/2 ⁺ | 1277.86 25 | 3/2 ⁻ | 1611.9 9 |
| 295.19 15 | 3/2 ⁻ | 1294.20 25 | (1/2 ⁻ ,3/2,5/2 ⁻) | 1685.5 4 |
| 357.78 16 | 5/2 ⁻ | 1326.9 6 | | 1706.5 4 |
| 537.25 23 | 5/2 ⁺ | 1344.9 5 | (7/2 ⁺ ,9/2 ⁺) | 1706.6 6 |
| 607.5 4 | (5/2 ⁺ ,7/2,9/2) | 1403.9 7 | | 1731.6 6 |
| 650.51 24 | 5/2 ⁺ | 1411.43 20 | (3/2 ⁻ ,5/2 ⁻) | 1778.2 9 |
| 651.9 3 | (3/2 ⁺) | 1429.1 7 | | 1842.4 9 |
| 657.9 5 | 11/2 ⁺ | 1438.5 5 | | 1968.2 8 |
| 781.0 4 | (9/2 ⁺) | 1443.83 25 | | 1970.0 11 |
| 803.46 23 | 1/2 ⁻ | 1466.7 4 | | 1999.5 6 |
| 848.39 24 | 7/2 ⁻ | 1480.0 8 | | 2008.8 5 |
| 881.36 20 | 5/2 ⁻ | 1482.62 18 | | 2059.2 10 |
| 920.9 4 | 9/2 ⁻ | 1491.9 4 | | 2103.5 13 |
| 1078.6 3 | (5/2 ⁺ ,7/2 ⁺) | 1516.0 8 | | 2136.8 12 |
| 1107.9 3 | 5/2 ⁻ | 1530.9 4 | | 2234.9 7 |
| 1135.9 4 | (1/2,3/2,5/2 ⁻) | 1580.0 5 | | |

[†] From Adopted Levels.

[‡] Calculated from the gamma energies using a least-squares procedure.

γ(¹⁰³Rh)

ΔIγ: Uncertainty not given by authors.

| E _γ [†] | I _γ [‡] | E _i (level) | J _i [†] | E _f | J _f [†] |
|-----------------------------|-----------------------------|------------------------|---------------------------------------|----------------|-----------------------------|
| 39.76 | 100 | 39.66 | 7/2 ⁺ | 0.0 | 1/2 ⁻ |
| 53.29 | 100 | 92.9 | 9/2 ⁺ | 39.66 | 7/2 ⁺ |
| 62.4 4 | 5 | 357.78 | 5/2 ⁻ | 295.19 | 3/2 ⁻ |
| 72.6 5 | 9 | 920.9 | 9/2 ⁻ | 848.39 | 7/2 ⁻ |
| 114.9 4 | 16 | 651.9 | (3/2 ⁺) | 537.25 | 5/2 ⁺ |
| 242.3 4 | 16 | 537.25 | 5/2 ⁺ | 295.19 | 3/2 ⁻ |
| 295.6 4 | 100 | 295.19 | 3/2 ⁻ | 0.0 | 1/2 ⁻ |
| 357.9 4 | 95 | 357.78 | 5/2 ⁻ | 0.0 | 1/2 ⁻ |
| 428.5 4 | 44 | 1078.6 | (5/2 ⁺ ,7/2 ⁺) | 650.51 | 5/2 ⁺ |
| 445.8 4 | 5 | 803.46 | 1/2 ⁻ | 357.78 | 5/2 ⁻ |
| 490.8 4 | 86 | 848.39 | 7/2 ⁻ | 357.78 | 5/2 ⁻ |
| 497.6 4 | 84 | 537.25 | 5/2 ⁺ | 39.66 | 7/2 ⁺ |
| 500.6 @ 4 | 14 | 1107.9 | 5/2 ⁻ | 607.5 | (5/2 ⁺ ,7/2,9/2) |

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$^{103}\text{Rh}(n,n'\gamma)$ **1991Ab03,1978Ba36** (continued) $\gamma(^{103}\text{Rh})$ (continued)

| E_γ † | I_γ ‡ | $E_i(\text{level})$ | J_i^π | E_f | J_f^π |
|--------------|--------------|---------------------|---|--------|---------------------|
| 508 1 | 29 | 803.46 | 1/2 ⁻ | 295.19 | 3/2 ⁻ |
| 514 1 | 70 | 607.5 | (5/2 ⁺ ,7/2,9/2) | 92.9 | 9/2 ⁺ |
| 523.8 3 | 50 | 881.36 | 5/2 ⁻ | 357.78 | 5/2 ⁻ |
| 541.6 4 | 21 | 1078.6 | (5/2 ⁺ ,7/2 ⁺) | 537.25 | 5/2 ⁺ |
| 553.0 4 | 14 | 848.39 | 7/2 ⁻ | 295.19 | 3/2 ⁻ |
| 557.5 3 | 12 | 650.51 | 5/2 ⁺ | 92.9 | 9/2 ⁺ |
| 563.0 5 | 91 | 920.9 | 9/2 ⁻ | 357.78 | 5/2 ⁻ |
| 563.0 3 | 29 | 1411.43 | (3/2 ⁻ ,5/2 ⁻) | 848.39 | 7/2 ⁻ |
| 564.9 4 | 100 | 657.9 | 11/2 ⁺ | 92.9 | 9/2 ⁺ |
| 568.2 4 | 30 | 607.5 | (5/2 ⁺ ,7/2,9/2) | 39.66 | 7/2 ⁺ |
| 586.2 3 | 44 | 881.36 | 5/2 ⁻ | 295.19 | 3/2 ⁻ |
| 601.9 4 | 33 | 1252.3 | | 650.51 | 5/2 ⁺ |
| 604.7 4 | 84 | 1256.7 | | 651.9 | (3/2 ⁺) |
| 610.9 3 | 88 | 650.51 | 5/2 ⁺ | 39.66 | 7/2 ⁺ |
| 612.4 4 | 84 | 651.9 | (3/2 ⁺) | 39.66 | 7/2 ⁺ |
| 679.4 3 | 23 | 1482.62 | | 803.46 | 1/2 ⁻ |
| 686.8 6 | 33 | 1344.9 | (7/2 ⁺ ,9/2 ⁺) | 657.9 | 11/2 ⁺ |
| 688.2 3 | 61 | 781.0 | (9/2 ⁺) | 92.9 | 9/2 ⁺ |
| 720.3 4 | 19 | 1078.6 | (5/2 ⁺ ,7/2 ⁺) | 357.78 | 5/2 ⁻ |
| 741.3 3 | 39 | 781.0 | (9/2 ⁺) | 39.66 | 7/2 ⁺ |
| 750.1 4 | 51 | 1107.9 | 5/2 ⁻ | 357.78 | 5/2 ⁻ |
| 760.6 3 | 14 | 1411.43 | (3/2 ⁻ ,5/2 ⁻) | 650.51 | 5/2 ⁺ |
| 763.5 8 | 100 | 1611.9 | | 848.39 | 7/2 ⁻ |
| 786.9 5 | 35 | 1438.5 | | 651.9 | (3/2 ⁺) |
| 803.8 4 | 66 | 803.46 | 1/2 ⁻ | 0.0 | 1/2 ⁻ |
| 807.9 6 | 67 | 1344.9 | (7/2 ⁺ ,9/2 ⁺) | 537.25 | 5/2 ⁺ |
| 812.5 4 | 34 | 1107.9 | 5/2 ⁻ | 295.19 | 3/2 ⁻ |
| 840.3 5 | 90 | 1135.9 | (1/2,3/2,5/2 ⁻) | 295.19 | 3/2 ⁻ |
| 881.1 3 | 7 | 881.36 | 5/2 ⁻ | 0.0 | 1/2 ⁻ |
| 920.3 4 | 8 | 1277.86 | 3/2 ⁻ | 357.78 | 5/2 ⁻ |
| 928.5 5 | 30 | 1580.0 | | 651.9 | (3/2 ⁺) |
| 936.5 4 | 18 | 1294.20 | (1/2 ⁻ ,3/2,5/2 ⁻) | 357.78 | 5/2 ⁻ |
| 945.2 3 | 13 | 1482.62 | | 537.25 | 5/2 ⁺ |
| 949.6 6 | 100 | 1600.1 | | 650.51 | 5/2 ⁺ |
| 961.6 4 | 16 | 1256.7 | | 295.19 | 3/2 ⁻ |
| 982.7 4 | 14 | 1277.86 | 3/2 ⁻ | 295.19 | 3/2 ⁻ |
| 985.5 4 | 16 | 1078.6 | (5/2 ⁺ ,7/2 ⁺) | 92.9 | 9/2 ⁺ |
| 993.6 5 | 60 | 1530.9 | | 537.25 | 5/2 ⁺ |
| 999.2 4 | 45 | 1294.20 | (1/2 ⁻ ,3/2,5/2 ⁻) | 295.19 | 3/2 ⁻ |
| 1046.1 6 | 100 | 1403.9 | | 357.78 | 5/2 ⁻ |
| 1071.3 6 | 100 | 1429.1 | | 357.78 | 5/2 ⁻ |
| 1080.9 7 | 49 | 1731.6 | | 650.51 | 5/2 ⁺ |
| 1086.1 4 | 26 | 1443.83 | | 357.78 | 5/2 ⁻ |
| 1108.7 5 | 83 | 1466.7 | | 357.78 | 5/2 ⁻ |
| 1116.6 3 | 13 | 1411.43 | (3/2 ⁻ ,5/2 ⁻) | 295.19 | 3/2 ⁻ |
| 1124.7 3 | 39 | 1482.62 | | 357.78 | 5/2 ⁻ |
| 1126.3 8 | 100 | 1778.2 | | 651.9 | (3/2 ⁺) |
| 1134.0 5 | 25 | 1491.9 | | 357.78 | 5/2 ⁻ |
| 1136.3 5 | 10 | 1135.9 | (1/2,3/2,5/2 ⁻) | 0.0 | 1/2 ⁻ |
| 1148.5 4 | 64 | 1443.83 | | 295.19 | 3/2 ⁻ |
| 1158.2 7 | 100 | 1516.0 | | 357.78 | 5/2 ⁻ |
| 1171.8 5 | 17 | 1466.7 | | 295.19 | 3/2 ⁻ |
| 1187.5 3 | 12 | 1482.62 | | 295.19 | 3/2 ⁻ |
| 1196.9 5 | 75 | 1491.9 | | 295.19 | 3/2 ⁻ |
| 1212.5 4 | 67 | 1252.3 | | 39.66 | 7/2 ⁺ |
| 1247.5 7 | 45 | 1605.3 | | 357.78 | 5/2 ⁻ |

Continued on next page (footnotes at end of table)

$^{103}\text{Rh}(n,n'\gamma)$ **1991Ab03,1978Ba36** (continued) $\gamma(^{103}\text{Rh})$ (continued)

| E_γ^\dagger | I_γ^\ddagger | $E_i(\text{level})$ | J_i^π | E_f | J_f^π |
|--------------------|---------------------|---------------------|-----------------------|--------|-----------|
| 1277.6 4 | 78 | 1277.86 | $3/2^-$ | 0.0 | $1/2^-$ |
| 1287.2 5 | 100 | 1326.9 | | 39.66 | $7/2^+$ |
| 1293.9 4 | 37 | 1294.20 | $(1/2^-, 3/2, 5/2^-)$ | 0.0 | $1/2^-$ |
| 1310.1 7 | 55 | 1605.3 | | 295.19 | $3/2^-$ |
| 1328.0 5 | 56 | 1685.5 | | 357.78 | $5/2^-$ |
| 1348.7 5 | 100 | 1706.6 | | 357.78 | $5/2^-$ |
| 1390.1 5 | 44 | 1685.5 | | 295.19 | $3/2^-$ |
| 1398.5 5 | 65 | 1438.5 | | 39.66 | $7/2^+$ |
| 1408.7 9 | 100 | 2059.2 | | 650.51 | $5/2^+$ |
| 1411.4 3 | 44 | 1411.43 | $(3/2^-, 5/2^-)$ | 0.0 | $1/2^-$ |
| 1440.3 7 | 100 | 1480.0 | | 39.66 | $7/2^+$ |
| 1443.9 4 | 10 | 1443.83 | | 0.0 | $1/2^-$ |
| 1482.6 3 | 13 | 1482.62 | | 0.0 | $1/2^-$ |
| 1491.3 5 | 40 | 1530.9 | | 39.66 | $7/2^+$ |
| 1539.9 5 | 70 | 1580.0 | | 39.66 | $7/2^+$ |
| 1547.2 8 | 100 | 1842.4 | | 295.19 | $3/2^-$ |
| 1582.9 9 | 40 | 2234.9 | | 651.9 | $(3/2^+)$ |
| 1614.3 5 | 55 | 1706.5 | | 92.9 | $9/2^+$ |
| 1641.1 8 | 56 | 1999.5 | | 357.78 | $5/2^-$ |
| 1674.8 10 | 100 | 1970.0 | | 295.19 | $3/2^-$ |
| 1692.2 7 | 51 | 1731.6 | | 39.66 | $7/2^+$ |
| 1697.8 9 | 60 | 2234.9 | | 537.25 | $5/2^+$ |
| 1705.7 5 | 45 | 1706.5 | | 0.0 | $1/2^-$ |
| 1713.1 7 | 68 | 2008.8 | | 295.19 | $3/2^-$ |
| 1779.0 11 | 100 | 2136.8 | | 357.78 | $5/2^-$ |
| 1968.2 8 | 100 | 1968.2 | | 0.0 | $1/2^-$ |
| 2000.0 8 | 44 | 1999.5 | | 0.0 | $1/2^-$ |
| 2009.2 7 | 32 | 2008.8 | | 0.0 | $1/2^-$ |
| 2103.5 13 | 100 | 2103.5 | | 0.0 | $1/2^-$ |

† From **1991Ab03**, ΔE taken from $\Delta E(\text{levels})$ given by **1991Ab03**. Other: **1978Ba36**.

‡ % photon branchings from each level (**1991Ab03**).

Uncertainty not given by authors.

@ If energy is correct no final level within 1.3 keV.

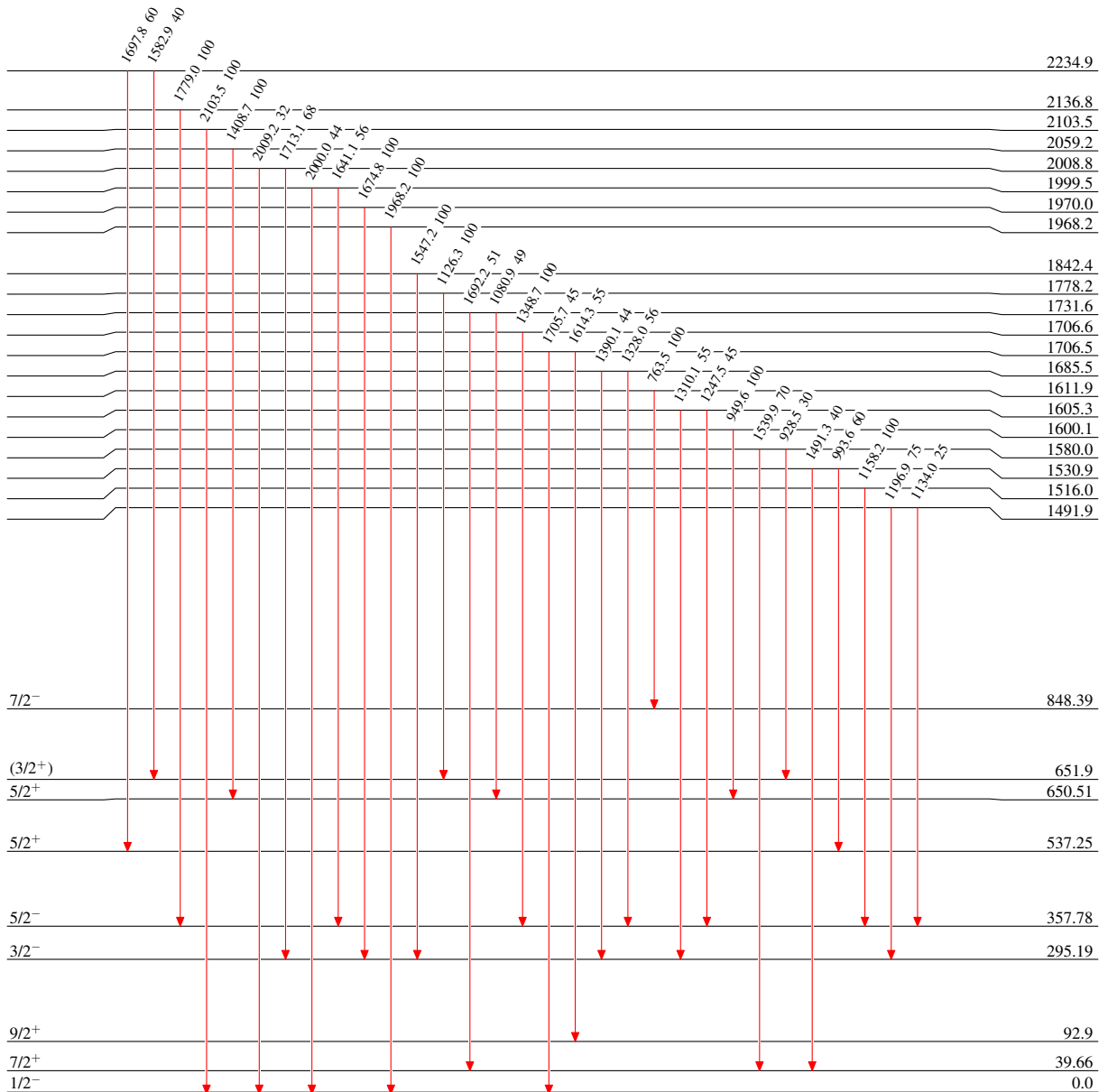
$^{103}\text{Rh}(n,n'\gamma)$ 1991Ab03,1978Ba36

Level Scheme

Intensities: Type not specified

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$



$^{103}_{45}\text{Rh}_{58}$

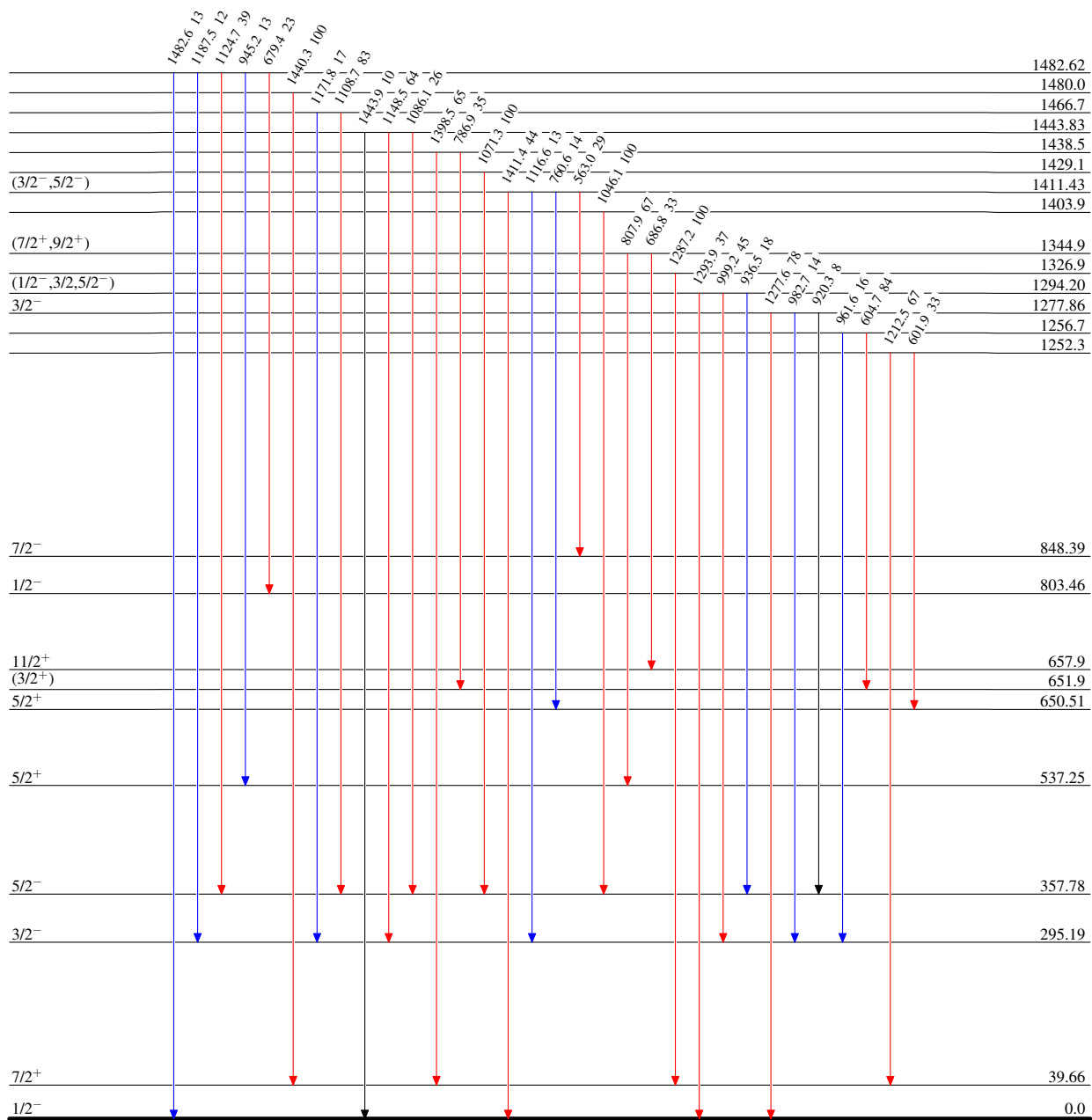
$^{103}\text{Rh}(n,n'\gamma)$ 1991Ab03,1978Ba36

Level Scheme (continued)

Intensities: Type not specified

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$



$^{103}_{45}\text{Rh}_{58}$

$^{103}\text{Rh}(n,n'\gamma)$ 1991Ab03,1978Ba36

Level Scheme (continued)

Intensities: Type not specified

Legend

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$

