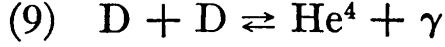
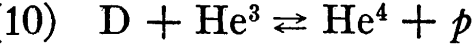


- (1) $p + n \rightleftharpoons D + \gamma$ 2 225
 $[pn] = 2.5 \times 10^4 \rho_b$
 $\lambda_\gamma(D) = 4.68 \times 10^9 [pn] \rho_b^{-1} T_9^{3/2} \exp(-25.82 T_9^{-1})$
- (2) $p + D \rightleftharpoons He^3 + \gamma$ 5 494
 $[pD] = 2.23 \times 10^3 \rho_b T_9^{-2/3} \exp(-3.72 T_9^{-1/3})(1 + 0.112 T_9^{1/3} + 3.38 T_9^{2/3} + 2.65 T_9)$
 $\lambda_\gamma(He^3) = 1.63 \times 10^{10} [pD] \rho_b^{-1} T_9^{3/2} \exp(-63.75 T_9^{-1})$
- (3) $n + D \rightleftharpoons T + \gamma$ 6 257
 $[nD] = \rho_b (75.5 + 1250 T_9)$
 $\lambda_\gamma(T) = 1.63 \times 10^{10} [nD] \rho_b^{-1} T_9^{3/2} \exp(-72.62 T_9^{-1})$
- (4) $n + He^3 \rightleftharpoons p + T$ 0 7638
 $[nHe^3]_p = 7.06 \times 10^8 \rho_b$
 $[pT]_n = [nHe^3]_p \exp(-8.864 T_9^{-1})$
- (5) $p + T \rightleftharpoons He^4 + \gamma$ 19 81
 $[pT]_\gamma = 2.87 \times 10^4 \rho_b T_9^{-2/3} \exp(-3.87 T_9^{-1/3})(1 + 0.108 T_9^{1/3} + 0.466 T_9^{2/3} + 0.352 T_9 + 0.300 T_9^{4/3} + 0.576 T_9^{5/3})$
 $\lambda_\gamma(He^4)_p = 2.59 \times 10^{10} [pT]_\gamma \rho_b^{-1} T_9^{3/2} \exp(-229.9 T_9^{-1})$
- (6) $n + He^3 \rightleftharpoons He^4 + \gamma$ 20 58
 $[nHe^3]_\gamma = 6.0 \times 10^3 \rho_b T_9$
 $\lambda_\gamma(He^4)_n = 2.60 \times 10^{10} [nHe^3]_\gamma \rho_b^{-1} T_9^{3/2} \exp(-238.8 T_9^{-1})$
- (7) $D + D \rightleftharpoons n + He^3$ 3 269
 $[DD]_n = 3.9 \times 10^8 \rho_b T_9^{-2/3} \exp(-4.26 T_9^{-1/3})(1 + 0.0979 T_9^{1/3} + 0.642 T_9^{2/3} + 0.440 T_9)$
 $[nHe^3]_D = 1.73 [DD]_n \exp(-37.94 T_9^{-1})$
- (8) $D + D \rightleftharpoons p + T$ 4.033
 $[DD]_p = [DD]_n$
 $[pT]_D = 1.73 [DD]_p \exp(-46.80 T_9^{-1})$



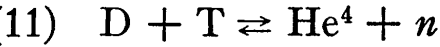
$$[\text{DD}]_\gamma = 24.1 \rho_b T_9^{-2/3} \exp(-4.26 T_9^{-1/3}) (T_9^{2/3} + 0.685 T_9 + 0.152 T_9^{4/3} + 0.265 T_9^{5/3})$$

$$\lambda_\gamma(\text{He}^4)_\text{D} = 4.50 \times 10^{10} [\text{DD}]_\gamma \rho_b^{-1} T_9^{3/2} \exp(-276.7 T_9^{-1})$$



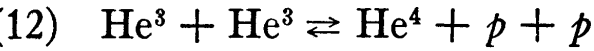
$$[\text{DHe}^3] = 2.60 \times 10^9 \rho_b T_9^{-3/2} \exp(-2.99 T_9^{-1})$$

$$[\text{He}^4 p] = 5.50 [\text{DHe}^3] \exp(-213.0 T_9^{-1})$$



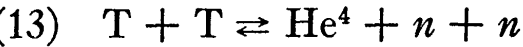
$$[\text{DT}] = 1.38 \times 10^9 \rho_b T_9^{-3/2} \exp(-0.745 T_9^{-1})$$

$$[\text{He}^4 n] = 5.50 [\text{DT}] \exp(-204.1 T_9^{-1})$$



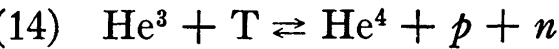
$$[\text{He}^3 \text{He}^3] = 1.19 \times 10^{10} \rho_b T_9^{-2/3} \exp(-12.25 T_9^{-1/3}) (1 + 0.0340 T_9^{1/3})$$

$$[\text{He}^4 pp] = 3.37 \times 10^{-10} [\text{He}^3 \text{He}^3] \rho_b T_9^{-3/2} \exp(-149.2 T_9^{-1})$$



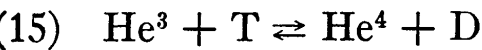
$$[\text{TT}] = 1.10 \times 10^9 \rho_b T_9^{-2/3} \exp(-4.87 T_9^{-1/3}) (1 + 0.0857 T_9^{1/3})$$

$$[\text{He}^4 nn] = 3.37 \times 10^{-10} [\text{TT}] \rho_b T_9^{-3/2} \exp(-131.5 T_9^{-1})$$



$$[\text{He}^3 \text{T}]_{pn} = 5.60 \times 10^9 \rho_b T_9^{-2/3} \exp(-7.72 T_9^{-1/3}) (1 + 0.0540 T_9^{1/3})$$

$$[\text{He}^4 pn] = 3.37 \times 10^{-10} [\text{He}^3 \text{T}]_{pn} \rho_b T_9^{-3/2} \exp(-140.4 T_9^{-1})$$



$$[\text{He}^3 \text{T}]_\text{D} = 3.88 \times 10^9 \rho_b T_9^{-2/3} \exp(-7.72 T_9^{-1/3}) (1 + 0.0540 T_9^{1/3})$$

$$[\text{He}^4 \text{D}] = 1.59 [\text{He}^3 \text{T}]_\text{D} \exp(-166.2 T_9^{-1})$$