something something cross sections:

$$\sigma_{31}^{s} + \sigma_{32}^{s} = \sigma_{3}^{d} - \sigma_{31}^{f} - \sigma_{32}^{f} \tag{1}$$

$$\sigma_{21}^{s} = 0.5(\sigma_{21}^{fn} + \sigma_{21}^{f}) - \sigma_{2}^{d} \tag{2}$$

$$f_i(r) = exp\Big\{ -\int_{r}^{b} n_{gas}\sigma_i^d[E(r')]dr' \Big\} \tag{3}$$

$$A_i^s(r) = \frac{b^2}{r^2} n_{gas}\Gamma_0 \sum_{j=1}^{3} h_j \sigma_{ji}^s[E(r)] \Big[ f_j(r) + T_c^2 \frac{f_i^{cp}}{f_j(r)} \Big] \tag{4}$$

where $f_i^{cp} = f_i^2(0)$