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3.1

A
Appêndice

Neste appêndice são apresentados as tabelas e equações referentes aos átomos estudados por nesta dissertação. O appêndice está dividido em seções referentes a cada átomo estudado. E cada seção dividida em subc{cões referentes às tabelas e as equações utilizadas para cada átomo. Por questão de espaço apresentaremos somente as primeiras e últimas versões calculadas para cada elemento químico estudado.

A.1
O átomo de Ne

A.1.1
Tabelas

Tabela A.1: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 1$, ionização simples, com $n_{\rm pos} = 0$ para o Ne.

$1s$	$2s$	$2p$	
n_1	n_2	n_3	$n_{\rm pos}$
1	0	0	0
0	1	0	0
0	0	1	0

A.1.2
Equções

Para $(P_1)_{V_1}$ temos

$$\begin{aligned}
& (P_1)_{V_1}(b) = 2p_{1s}(b)[1-p_{1s}(b)][1-p_{2s}(b)]^2[1-p_{2p}(b)]^6\mathcal{P}(1,0,0,0) \\
+ \;& 2p_{2s}(b)[1-p_{1s}(b)]^2[1-p_{2s}(b)][1-p_{2p}(b)]^6\mathcal{P}(0,1,0,0) \\
+ \;& 6p_{2p}(b)[1-p_{1s}(b)]^2[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5\mathcal{P}(0,0,1,0); \qquad \text{(A-1)}
\end{aligned}$$

Tabela A.2: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 2$, ionização dupla, com $n_{\text{pos}} = 0, 1$ para o Ne.

$1s$	$2s$	$2p$	
n_1	n_2	n_3	n_{pos}
2	0	0	0
1	1	0	0
1	0	1	0
1	0	0	1
0	2	0	0
0	1	1	0
0	0	2	0

Tabela A.3: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 3$, ionização tripla, com $n_{\text{pos}} = 0, 1, 2$ para o Ne.

$1s$	$2s$	$2p$	
n_1	n_2	n_3	n_{pos}
2	1	0	0
2	0	1	0
2	0	0	1
1	2	0	0
1	0	2	0
1	0	0	2
1	1	1	0
1	0	1	1
0	2	1	0
0	1	2	0
0	0	3	0

Para $(P_1)_{V_4}$ temos

$$\begin{aligned}(P_1)_{V_4}(b) &= 2p_{1s}(b)\mathcal{P}(1,0,0,0) + 2p_{2s}(b)\mathcal{P}(0,1,0,0)\\ +\ & 6p_{2p}(b)\mathcal{P}(0,0,1,0);\end{aligned} \tag{A-2}$$

Para $(P_2)_{V_1}$ temos

$$\begin{aligned}(P_2)_{V_1}(b) &= p_{1s}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6\mathcal{P}(2,0,0,0)\\ +\ & 4p_{1s}(b)p_{2s}(b)[1-p_{1s}(b)][1-p_{2s}(b)][1-p_{2p}(b)]^6\mathcal{P}(1,1,0,0)\\ +\ & 12p_{1s}(b)p_{2p}(b)[1-p_{1s}(b)][1-p_{2s}(b)]^2[1-p_{2p}(b)]^5\mathcal{P}(1,0,1,0)\\ +\ & 2p_{1s}(b)[1-p_{1s}(b)][1-p_{2s}(b)]^2[1-p_{2p}(b)]^6\mathcal{P}(1,0,0,1)\\ +\ & p_{2s}^2(b)[1-p_{1s}(b)]^2[1-p_{2p}(b)]^6\mathcal{P}(0,2,0,0)\\ +\ & 12p_{2s}(b)p_{2p}(b)[1-p_{1s}(b)]^2[1-p_{2s}(b)][1-p_{2p}(b)]^5\mathcal{P}(0,1,1,0)\\ +\ & 2p_{2s}(b)[1-p_{1s}(b)]^2[1-p_{2s}(b)][1-p_{2p}(b)]^6\mathcal{P}(0,1,0,1)\\ +\ & 15p_{2p}^2(b)[1-p_{1s}(b)]^2[1-p_{2s}(b)]^2[1-p_{2p}(b)]^4\mathcal{P}(0,0,2,0)\\ +\ & 6p_{2p}(b)[1-p_{1s}(b)]^2[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5\mathcal{P}(0,0,1,1);\end{aligned} \tag{A-3}$$

Para $(P_2)_{V_4}$ temos

$$\begin{aligned}(P_2)_{V_1}(b) &= p_{1s}^2(b)\mathcal{P}(2,0,0,0) + 4p_{1s}(b)p_{2s}(b)\mathcal{P}(1,1,0,0)\\ +\ & 12p_{1s}(b)p_{2p}(b)\mathcal{P}(1,0,1,0) + 2p_{1s}(b)\mathcal{P}(1,0,0,1)\\ +\ & p_{2s}^2(b)\mathcal{P}(0,2,0,0) + 12p_{2s}(b)p_{2p}(b)\mathcal{P}(0,1,1,0)\\ +\ & 2p_{2s}(b)\mathcal{P}(0,1,0,1) + 15p_{2p}^2(b)\mathcal{P}(0,0,2,0)\\ +\ & 6p_{2p}(b)\mathcal{P}(0,0,1,1);\end{aligned} \tag{A-4}$$

Para $(P_3)_{V_1}$ temos

$$\begin{aligned}(P_3)_{V_1}(b) &= 2p_{1s}^2(b)p_{2s}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6\mathcal{P}(2,1,0,0)\\ +\ & 6p_{1s}^2(b)p_{2p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5\mathcal{P}(2,0,1,0)\\ +\ & p_{1s}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6\mathcal{P}(2,0,0,1)\\ +\ & 2p_{1s}(b)p_{2s}^2(b)[1-p_{1s}(b)][1-p_{2p}(b)]^6\mathcal{P}(1,2,0,0)\\ +\ & 30p_{1s}(b)p_{2p}^2(b)[1-p_{1s}(b)][1-p_{2s}(b)]^2[1-p_{2p}(b)]^4\mathcal{P}(1,0,2,0)\\ +\ & 2p_{1s}(b)[1-p_{1s}(b)][1-p_{2s}(b)]^2[1-p_{2p}(b)]^6\mathcal{P}(1,0,0,2)\\ +\ & 24p_{1s}(b)p_{2s}(b)p_{2p}(b)[1-p_{1s}(b)][1-p_{2s}(b)][1-p_{2p}(b)]^5\mathcal{P}(1,1,1,0)\\ +\ & 4p_{1s}(b)p_{2s}(b)[1-p_{1s}(b)][1-p_{2s}(b)]^2[1-p_{2p}(b)]^6\mathcal{P}(1,1,0,1)\\ +\ & 12p_{1s}(b)p_{2p}(b)[1-p_{1s}(b)][1-p_{2s}(b)]^2[1-p_{2p}(b)]^5\mathcal{P}(1,0,1,1)\\ +\ & 6p_{2s}^2(b)p_{2p}(b)[1-p_{1s}(b)]^2[1-p_{2p}(b)]^5\mathcal{P}(0,2,1,0)\end{aligned}$$

$$
\begin{aligned}
&+ \quad 30p_{2s}(b)p_{2p}^2(b)[1-p_{1s}(b)]^2[1-p_{2s}(b)][1-p_{2p}(b)]^4\mathcal{P}(0,1,2,0)\\
&+ \quad 20p_{2p}^3(b)[1-p_{1s}(b)]^2[1-p_{2s}(b)]^2[1-p_{2p}(b)]^3\mathcal{P}(0,0,3,0); \qquad \text{(A-5)}
\end{aligned}
$$

Para $(P_3)_{V_4}$ temos

$$
\begin{aligned}
&(P_3)_{V_4}(b) = 2p_{1s}^2(b)p_{2s}(b)\mathcal{P}(2,1,0,0) + 6p_{1s}^2(b)p_{2p}(b)\mathcal{P}(2,0,1,0)\\
&+ \quad p_{1s}^2(b)\mathcal{P}(2,0,0,1) + 2p_{1s}(b)p_{2s}^2(b)\mathcal{P}(1,2,0,0)\\
&+ \quad 30p_{1s}(b)p_{2p}^2(b)\mathcal{P}(1,0,2,0) + 2p_{1s}(b)\mathcal{P}(1,0,0,2)\\
&+ \quad 24p_{1s}(b)p_{2s}(b)p_{2p}(b)\mathcal{P}(1,1,1,0) + 4p_{1s}(b)p_{2s}(b)\mathcal{P}(1,1,0,1)\\
&+ \quad 12p_{1s}(b)p_{2p}(b)\mathcal{P}(1,0,1,1) + 6p_{2s}^2(b)p_{2p}(b)\mathcal{P}(0,2,1,0)\\
&+ \quad 30p_{2s}(b)p_{2p}^2(b)\mathcal{P}(0,1,2,0) + 20p_{2p}^3(b)\mathcal{P}(0,0,3,0); \qquad \text{(A-6)}
\end{aligned}
$$

A.2
O átomo de Ar

A.2.1
Tabelas

Tabela A.4: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 1$, ionização simples, com $n_{\text{pos}} = 0$ para o Ar.

$2s$	$2p$	$3s$	$3p$	
n_2	n_3	n_4	n_5	n_{pos}
1	0	0	0	0
0	1	0	0	0
0	0	1	0	0
0	0	0	1	0

A.2.2
Equações

Para $(P_1)_{V_1}$ temos

$$
\begin{aligned}
&(P_1)_{V_1}(b) = 6p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5\mathcal{P}(0,0,0,1,0)\\
&+ \quad 2p_{3s}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(0,0,1,0,0)\\
&+ \quad 6p_{2p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(0,1,0,0,0)\\
&+ \quad 2p_{2s}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(1,0,0,0,0) \qquad \text{(A-7)}
\end{aligned}
$$

Tabela A.5: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 2$, ionização dupla, com $n_{\rm pos} = 0, 1$ para o Ar.

$2s$	$2p$	$3s$	$3p$	
n_2	n_3	n_4	n_5	$n_{\rm pos}$
2	0	0	0	0
0	2	0	0	0
0	0	2	0	0
0	0	0	2	0
1	1	0	0	0
1	0	1	0	0
1	0	0	1	0
1	0	0	0	1
0	1	1	0	0
0	1	0	1	0
0	1	0	0	1
0	0	1	1	0

Para $(P_1)_{V_5}$ temos

$$\begin{aligned}(P_1)_{V_5}(b) &= 6p_{3p}(b)\mathcal{P}(0,0,0,1,0) + 2p_{3s}(b)\mathcal{P}(0,0,1,0,0) \\ + \quad & 6p_{2p}(b)\mathcal{P}(0,1,0,0,0) + 2p_{2s}(b)\mathcal{P}(1,0,0,0,0) \end{aligned} \tag{A-8}$$

Para $(P_2)_{V_1}$ temos

$$\begin{aligned}&(P_2)_{V_1}(b) = p_{2s}^2(b)[1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(2,0,0,0,0) \\ + \quad & 15p_{2p}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^4[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(0,2,0,0,0) \\ + \quad & 1p_{3s}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3p}(b)]^6\mathcal{P}(0,0,2,0,0) \\ + \quad & 15p_{3p}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4\mathcal{P}(0,0,0,2,0)\end{aligned} \tag{A-9}$$

Para $(P_2)_{V_5}$ temos

$$\begin{aligned}(P_2)_{V_5}(b) &= p_{2s}^2(b)\mathcal{P}(2,0,0,0,0) + 15p_{2p}^2(b)\mathcal{P}(0,2,0,0,0) \\ + \quad & 1p_{3s}^2(b)\mathcal{P}(0,0,2,0,0) + 15p_{3p}^2(b)\mathcal{P}(0,0,0,2,0)\end{aligned} \tag{A-10}$$

Para $(P_3)_{V_1}$ temos

$$\begin{aligned}&(P_3)_{V_1}(b) = 6p_{2s}^2(b)p_{2p}(b)[1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(2,1,0,0,0) \\ + \quad & 2p_{2s}^2(b)p_{3s}(b)[1-p_{2p}(b)]^6[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(2,0,1,0,0)\end{aligned}$$

Tabela A.6: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 3$, ionização tripla, com $n_{\text{pos}} = 0, 1, 2$ para o Ar.

$2s$	$2p$	$3s$	$3p$	
n_2	n_3	n_4	n_5	n_{pos}
2	1	0	0	0
2	0	1	0	0
2	0	0	1	0
2	0	0	0	1
1	2	0	0	0
1	0	2	0	0
1	0	0	2	0
1	0	0	0	2
1	1	1	0	0
1	1	0	1	0
1	1	0	0	1
1	0	1	1	0
1	0	1	0	1
1	0	0	1	1
0	3	0	0	0
0	2	1	0	0
0	2	0	1	0
0	2	0	0	1
0	1	2	0	0
0	1	0	2	0
0	1	0	0	2
0	1	1	1	0
0	1	1	0	1
0	1	0	1	1
0	0	2	1	0
0	0	1	2	0
0	0	0	3	0

Tabela A.7: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 4$, ionização quádrupla, com $n_{\text{pos}} = 0, 1, 2, 3$ para o Ar.

$2s$	$2p$	$3s$	$3p$		$2s$	$2p$	$3s$	$3p$	
n_2	n_3	n_4	n_5	n_{pos}	n_2	n_3	n_4	n_5	n_{pos}
2	2	0	0	0	0	3	0	1	0
2	0	2	0	0	0	3	0	0	1
2	0	0	2	0	0	2	2	0	0
2	0	0	0	2	0	2	0	2	0
2	1	1	0	0	0	2	0	0	2
2	1	0	1	0	0	2	1	1	0
2	1	0	0	1	0	2	1	0	1
1	3	0	0	0	0	2	0	1	1
1	0	0	3	0	0	1	0	3	0
1	0	0	0	3	0	1	0	0	3
1	2	1	0	0	0	1	2	1	0
1	2	0	1	0	0	1	2	0	1
1	2	0	0	1	0	1	0	2	1
1	0	2	1	0	0	1	1	2	0
1	0	2	0	1	0	1	1	0	2
1	0	0	2	1	0	1	0	1	2
1	1	2	0	0	0	1	1	1	1
1	1	0	2	0	0	0	2	2	0
1	1	0	0	2	0	0	0	4	0
1	0	1	2	0					
1	0	1	0	2					
1	1	1	1	0					
1	1	1	0	1					
1	1	0	1	1					
1	0	1	1	1					
0	4	0	0	0					
0	0	0	4	0					
0	3	1	0	0					

$$
\begin{aligned}
&+ \; 6p_{2s}^2(b)p_{3p}(b)[1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5\mathcal{P}(2,0,0,1,0)\\
&+ \; p_{2s}^2(b)[1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(2,0,0,0,1)\\
&+ \; 30p_{2s}(b)p_{2p}^2(b)[1-p_{2s}(b)][1-p_{2p}(b)]^4[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(1,2,0,0,0)\\
&+ \; 4p_{2s}(b)p_{3s}^2(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3p}(b)]^6\mathcal{P}(1,0,2,0,0)\\
&+ \; 30p_{2s}(b)p_{3p}^2(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4\mathcal{P}(1,0,0,2,0)\\
&+ \; 2p_{2s}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(1,0,0,0,2)\\
&+ \; 24p_{2s}(b)p_{2p}(b)p_{3s}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^5[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(1,1,1,0,0)\\
&+ \; 72p_{2s}(b)p_{2p}(b)p_{3p}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^5[1-p_{3s}(b)^2][1-p_{3p}(b)]^5\mathcal{P}(1,1,0,1,0)\\
&+ \; 12p_{2s}(b)p_{2p}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(1,1,0,0,1)\\
&+ \; 24p_{2s}(b)p_{3s}(b)p_{3p}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3s}(b)][1-p_{3p}(b)]^5\mathcal{P}(1,0,1,1,0)\\
&+ \; 4p_{2s}(b)p_{3s}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(1,0,1,0,1)\\
&+ \; 12p_{2s}(b)p_{3p}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5\mathcal{P}(1,0,0,1,1)\\
&+ \; 20p_{2p}^3(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^3[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(0,3,0,0,0)\\
&+ \; 30p_{2p}^2(b)p_{3s}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^4[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(0,2,1,0,0)\\
&+ \; 90p_{2p}^2(b)p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^4[1-p_{3s}(b)][1-p_{3p}(b)]^5\mathcal{P}(0,2,0,1,0)\\
&+ \; 15p_{2p}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^4[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(0,2,0,0,1)\\
&+ \; 6p_{2p}(b)p_{3s}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3p}(b)]^6\mathcal{P}(0,1,2,0,0)\\
&+ \; 90p_{2p}(b)p_{3p}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4\mathcal{P}(0,1,0,2,0)\\
&+ \; 6p_{2p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(0,1,0,0,2)\\
&+ \; 72p_{2p}(b)p_{3s}(b)p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3s}(b)][1-p_{3p}(b)]^5\mathcal{P}(0,1,1,1,0)\\
&+ \; 12p_{2p}(b)p_{3s}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(0,1,1,0,1)\\
&+ \; 36p_{2p}(b)p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5\mathcal{P}(0,1,0,1,1)\\
&+ \; 6p_{3s}^2(b)p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3p}(b)]^5\mathcal{P}(0,0,2,1,0)\\
&+ \; p_{3s}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3p}(b)]^6\mathcal{P}(0,0,2,0,1)\\
&+ \; 30p_{3s}(b)p_{3p}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)][1-p_{3p}(b)]^4\mathcal{P}(0,0,1,2,0)\\
&+ \; 2p_{3s}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(0,0,1,0,2)\\
&+ \; 12p_{3s}(b)p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)][1-p_{3p}(b)]^5\mathcal{P}(0,0,1,1,1)\\
&+ \; 15p_{3p}^3(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4\mathcal{P}(0,0,0,3,0) \qquad \text{(A-11)}
\end{aligned}
$$

Para $(P_3)_{V_5}$ temos

$$
\begin{aligned}
&(P_3)_{V_5}(b) = 6p_{2s}^2(b)p_{2p}(b)\mathcal{P}(2,1,0,0,0) + 2p_{2s}^2(b)p_{3s}(b)\mathcal{P}(2,0,1,0,0)\\
&+ \; 6p_{2s}^2(b)p_{3p}(b)\mathcal{P}(2,0,0,1,0) + p_{2s}^2(b)\mathcal{P}(2,0,0,0,1)\\
&+ \; 30p_{2s}(b)p_{2p}^2(b)\mathcal{P}(1,2,0,0,0) + 4p_{2s}(b)p_{3s}^2(b)\mathcal{P}(1,0,2,0,0)
\end{aligned}
$$

$$
\begin{aligned}
&+ \quad 30p_{2s}(b)p_{3p}^2(b)\mathcal{P}(1,0,0,2,0) + 2p_{2s}(b)\mathcal{P}(1,0,0,0,2)\\
&+ \quad 24p_{2s}(b)p_{2p}(b)p_{3s}(b)\mathcal{P}(1,1,1,0,0) + 72p_{2s}(b)p_{2p}(b)p_{3p}(b)\mathcal{P}(1,1,0,1,0)\\
&+ \quad 12p_{2s}(b)p_{2p}(b)\mathcal{P}(1,1,0,0,1) + 24p_{2s}(b)p_{3s}(b)p_{3p}(b)\mathcal{P}(1,0,1,1,0)\\
&+ \quad 4p_{2s}(b)p_{3s}(b)\mathcal{P}(1,0,1,0,1) + 12p_{2s}(b)p_{3p}(b)\mathcal{P}(1,0,0,1,1)\\
&+ \quad 20p_{2p}^3(b)\mathcal{P}(0,3,0,0,0) + 30p_{2p}^2(b)p_{3s}(b)\mathcal{P}(0,2,1,0,0)\\
&+ \quad 90p_{2p}^2(b)p_{3p}(b)\mathcal{P}(0,2,0,1,0) + 15p_{2p}^2(b)\mathcal{P}(0,2,0,0,1)\\
&+ \quad 6p_{2p}(b)p_{3s}^2(b)\mathcal{P}(0,1,2,0,0) + 90p_{2p}(b)p_{3p}^2(b)\mathcal{P}(0,1,0,2,0)\\
&+ \quad 6p_{2p}(b)\mathcal{P}(0,1,0,0,2) + 72p_{2p}(b)p_{3s}(b)p_{3p}(b)\mathcal{P}(0,1,1,1,0)\\
&+ \quad 12p_{2p}(b)p_{3s}(b)\mathcal{P}(0,1,1,0,1) + 36p_{2p}(b)p_{3p}(b)\mathcal{P}(0,1,0,1,1)\\
&+ \quad 6p_{3s}^2(b)p_{3p}(b)\mathcal{P}(0,0,2,1,0) + p_{3s}^2(b)\mathcal{P}(0,0,2,0,1)\\
&+ \quad 30p_{3s}(b)p_{3p}^2(b)\mathcal{P}(0,0,1,2,0) + 2p_{3s}(b)\mathcal{P}(0,0,1,0,2)\\
&+ \quad 12p_{3s}(b)p_{3p}(b)\mathcal{P}(0,0,1,1,1) + 15p_{3p}^3(b)\mathcal{P}(0,0,0,3,0) \qquad \text{(A-12)}
\end{aligned}
$$

Para $(P_4)_{V_1}$ temos

$$
\begin{aligned}
&(P_4)_{V_1}(b) = 15p_{2s}^2(b)p_{2p}^2(b)[1-p_{2p}(b)]^4[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(2,2,0,0,0)\\
&+ \quad p_{2s}^2(b)p_{3s}^2(b)[1-p_{2p}(b)]^6[1-p_{3p}(b)]^6\mathcal{P}(2,0,2,0,0)\\
&+ \quad 15p_{2s}^2(b)p_{3p}^2(b)[1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4\mathcal{P}(2,0,0,2,0)\\
&+ \quad p_{2s}^2(b)[1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(2,0,0,0,2)\\
&+ \quad 12p_{2s}^2(b)p_{2p}(b)p_{3s}(b)[1-p_{2p}(b)]^5[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(2,1,1,0,0)\\
&+ \quad 36p_{2s}^2(b)p_{2p}(b)p_{3p}(b)[1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5\mathcal{P}(2,1,0,1,0)\\
&+ \quad 6p_{2s}^2(b)p_{2p}(b)[1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(2,1,0,0,1)\\
&+ \quad 40p_{2s}(b)p_{2p}^3(b)[1-p_{2s}(b)][1-p_{2p}(b)]^3[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(1,3,0,0,0)\\
&+ \quad 40p_{2s}(b)p_{3p}^3(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^3\mathcal{P}(1,0,0,3,0)\\
&+ \quad 2p_{2s}(b)(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(1,0,0,0,3)\\
&+ \quad 60p_{2s}(b)p_{2p}^2(b)p_{3s}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^4[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(1,2,1,0,0)\\
&+ \quad 180p_{2s}(b)p_{2p}^2(b)p_{3p}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^4[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5\mathcal{P}(1,2,0,1,0)\\
&+ \quad 30p_{2s}(b)p_{2p}^2(b)[1-p_{2s}(b)][1-p_{2p}(b)]^4[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(1,2,0,0,1)\\
&+ \quad 12p_{2s}(b)p_{3s}^2(b)p_{3p}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3p}(b)]^5\mathcal{P}(1,0,2,1,0)\\
&+ \quad 2p_{2s}(b)p_{3s}^2(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3p}(b)]^6\mathcal{P}(1,0,2,0,1)\\
&+ \quad 12p_{2s}(b)p_{3p}^2(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4\mathcal{P}(1,0,0,2,1)\\
&+ \quad 12p_{2s}(b)p_{2p}(b)p_{3s}^2(b)[1-p_{2s}(b)][1-p_{2p}(b)]^5[1-p_{3p}(b)]^6\mathcal{P}(1,1,2,0,0)\\
&+ \quad 180p_{2s}(b)p_{2p}(b)p_{3p}^2(b)[1-p_{2s}(b)][1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4\mathcal{P}(1,1,0,2,0)\\
&+ \quad 12p_{2s}(b)p_{2p}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(1,1,0,0,2)
\end{aligned}
$$

$$
\begin{aligned}
&+ \; 60p_{2s}(b)p_{3s}(b)p_{3p}^2(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3s}(b)][1-p_{3p}(b)]^4\mathcal{P}(1,0,1,2,0)\\
&+ \; 4p_{2s}(b)p_{3s}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(1,0,1,0,2)\\
&+ \; 144p_{2s}(b)p_{2p}(b)p_{3s}(b)p_{3p}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^5[1-p_{3s}(b)][1-p_{3p}(b)]^5\mathcal{P}(1,1,1,1,0)\\
&+ \; 24p_{2s}(b)p_{2p}(b)p_{3s}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^5[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(1,1,1,0,1)\\
&+ \; 72p_{2s}(b)p_{2p}(b)p_{3p}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5\mathcal{P}(1,1,0,1,1)\\
&+ \; 24p_{2s}(b)p_{3s}(b)p_{3p}(b)[1-p_{2s}(b)][1-p_{2p}(b)]^6[1-p_{3s}(b)][1-p_{3p}(b)]^5\mathcal{P}(1,0,1,1,1)\\
&+ \; 15p_{2p}^4(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^2[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(0,4,0,0,0)\\
&+ \; 20p_{3p}^4(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^2\mathcal{P}(0,0,0,4,0)\\
&+ \; 40p_{2p}^3(b)p_{3s}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^3[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(0,3,1,0,0)\\
&+ \; 120p_{2p}^3(b)p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^3[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5\mathcal{P}(0,3,0,1,0)\\
&+ \; 20p_{2p}^3(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^3[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(0,3,0,0,1)\\
&+ \; 15p_{2p}^2(b)p_{3s}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^4[1-p_{3p}(b)]^6\mathcal{P}(0,2,2,0,0)\\
&+ \; 225p_{2p}^2(b)p_{3p}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^4[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4\mathcal{P}(0,2,0,2,0)\\
&+ \; 15p_{2p}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^4[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(0,2,0,0,2)\\
&+ \; 180p_{2p}^2(b)p_{3s}(b)p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^4[1-p_{3s}(b)][1-p_{3p}(b)]^5\mathcal{P}(0,2,1,1,0)\\
&+ \; 30p_{2p}^2(b)p_{3s}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^4[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(0,2,1,0,1)\\
&+ \; 90p_{2p}^2(b)p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^4[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5\mathcal{P}(0,2,0,1,1)\\
&+ \; 120p_{2p}(b)p_{3p}^3(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^3\mathcal{P}(0,1,0,3,0)\\
&+ \; 6p_{2p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6\mathcal{P}(0,1,0,0,3)\\
&+ \; 36p_{2p}(b)p_{3s}^2(b)p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3p}(b)]^5\mathcal{P}(0,1,2,1,0)\\
&+ \; 6p_{2p}(b)p_{3s}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3p}(b)]^6\mathcal{P}(0,1,2,0,1)\\
&+ \; 90p_{2p}(b)p_{3p}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4\mathcal{P}(0,1,0,2,1)\\
&+ \; 180p_{2p}(b)p_{3s}(b)p_{3p}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3s}(b)][1-p_{3p}(b)]^4\mathcal{P}(0,1,1,2,0)\\
&+ \; 12p_{2p}(b)p_{3s}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(0,1,1,0,2)\\
&+ \; 36p_{2p}(b)p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5\mathcal{P}(0,1,0,1,2)\\
&+ \; 72p_{2p}(b)p_{3s}(b)p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^5[1-p_{3s}(b)][1-p_{3p}(b)]^5\mathcal{P}(0,1,1,1,1)\\
&+ \; 15p_{3s}^2(b)p_{3p}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3p}(b)]^4\mathcal{P}(0,0,2,2,0)\\
&+ \; p_{3s}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3p}(b)]^6\mathcal{P}(0,0,2,0,2)\\
&+ \; 6p_{3s}^2(b)p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3p}(b)]^5\mathcal{P}(0,0,2,1,1)\\
&+ \; p_{3s}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)][1-p_{3p}(b)]^6\mathcal{P}(0,0,1,0,3)\\
&+ \; 30p_{3s}(b)p_{3p}^2(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)][1-p_{3p}(b)]^4\mathcal{P}(0,0,1,2,1)\\
&+ \; 12p_{3s}(b)p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)][1-p_{3p}(b)]^5\mathcal{P}(0,0,1,1,2)\\
&+ \; 15p_{3p}^4(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^2\mathcal{P}(0,0,0,4,0)
\end{aligned}
$$

$$
\begin{aligned}
&+ \quad 15p_{3p}^3(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4\mathcal{P}(0,0,0,3,1)\\
&+ \quad 15p_{3p}^3(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4\mathcal{P}(0,0,0,2,2)\\
&+ \quad 6p_{3p}(b)[1-p_{2s}(b)]^2[1-p_{2p}(b)]^6[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5\mathcal{P}(0,0,0,1,3) \qquad \text{(A-13)}
\end{aligned}
$$

Para $(P_4)_{V_5}$ temos

$$
\begin{aligned}
&(P_4)_{V_1}(b) = 15p_{2s}^2(b)p_{2p}^2(b)\mathcal{P}(2,2,0,0,0) + p_{2s}^2(b)p_{3s}^2(b)\mathcal{P}(2,0,2,0,0)\\
&+ \quad 15p_{2s}^2(b)p_{3p}^2(b)\mathcal{P}(2,0,0,2,0) + p_{2s}^2(b)\mathcal{P}(2,0,0,0,2)\\
&+ \quad 12p_{2s}^2(b)p_{2p}(b)p_{3s}(b)\mathcal{P}(2,1,1,0,0) + 36p_{2s}^2(b)p_{2p}(b)p_{3p}(b)\mathcal{P}(2,1,0,1,0)\\
&+ \quad 6p_{2s}^2(b)p_{2p}(b)\mathcal{P}(2,1,0,0,1) + 40p_{2s}(b)p_{2p}^3(b)\mathcal{P}(1,3,0,0,0)\\
&+ \quad 40p_{2s}(b)p_{3p}^3(b)\mathcal{P}(1,0,0,3,0) + 2p_{2s}(b)(b)\mathcal{P}(1,0,0,0,3)\\
&+ \quad 60p_{2s}(b)p_{2p}^2(b)p_{3s}(b)\mathcal{P}(1,2,1,0,0) + 180p_{2s}(b)p_{2p}^2(b)p_{3p}(b)\mathcal{P}(1,2,0,1,0)\\
&+ \quad 30p_{2s}(b)p_{2p}^2(b)\mathcal{P}(1,2,0,0,1) + 12p_{2s}(b)p_{3s}^2(b)p_{3p}(b)\mathcal{P}(1,0,2,1,0)\\
&+ \quad 2p_{2s}(b)p_{3s}^2(b)\mathcal{P}(1,0,2,0,1) + 12p_{2s}(b)p_{3p}^2(b)\mathcal{P}(1,0,0,2,1)\\
&+ \quad 12p_{2s}(b)p_{2p}(b)p_{3s}^2(b)\mathcal{P}(1,1,2,0,0) + 180p_{2s}(b)p_{2p}(b)p_{3p}^2(b)\mathcal{P}(1,1,0,2,0)\\
&+ \quad 12p_{2s}(b)p_{2p}(b)\mathcal{P}(1,1,0,0,2) + 60p_{2s}(b)p_{3s}(b)p_{3p}^2(b)\mathcal{P}(1,0,1,2,0)\\
&+ \quad 4p_{2s}(b)p_{3s}(b)\mathcal{P}(1,0,1,0,2) + 144p_{2s}(b)p_{2p}(b)p_{3s}(b)p_{3p}(b)\mathcal{P}(1,1,1,1,0)\\
&+ \quad 24p_{2s}(b)p_{2p}(b)p_{3s}(b)\mathcal{P}(1,1,1,0,1) + 72p_{2s}(b)p_{2p}(b)p_{3p}(b)\mathcal{P}(1,1,0,1,1)\\
&+ \quad 24p_{2s}(b)p_{3s}(b)p_{3p}(b)\mathcal{P}(1,0,1,1,1) + 15p_{2p}^4(b)\mathcal{P}(0,4,0,0,0)\\
&+ \quad 20p_{3p}^4(b)\mathcal{P}(0,0,0,4,0) + 40p_{2p}^3(b)p_{3s}(b)\mathcal{P}(0,3,1,0,0)\\
&+ \quad 120p_{2p}^3(b)p_{3p}(b)\mathcal{P}(0,3,0,1,0) + 20p_{2p}^3(b)\mathcal{P}(0,3,0,0,1)\\
&+ \quad 15p_{2p}^2(b)p_{3s}^2(b)\mathcal{P}(0,2,2,0,0) + 225p_{2p}^2(b)p_{3p}^2(b)\mathcal{P}(0,2,0,2,0)\\
&+ \quad 15p_{2p}^2(b)\mathcal{P}(0,2,0,0,2) + 180p_{2p}^2(b)p_{3s}(b)p_{3p}(b)\mathcal{P}(0,2,1,1,0)\\
&+ \quad 30p_{2p}^2(b)p_{3s}(b)\mathcal{P}(0,2,1,0,1) + 90p_{2p}^2(b)p_{3p}(b)\mathcal{P}(0,2,0,1,1)\\
&+ \quad 120p_{2p}(b)p_{3p}^3(b)\mathcal{P}(0,1,0,3,0) + 6p_{2p}(b)\mathcal{P}(0,1,0,0,3)\\
&+ \quad 36p_{2p}(b)p_{3s}^2(b)p_{3p}(b)\mathcal{P}(0,1,2,1,0) + 6p_{2p}(b)p_{3s}^2(b)\mathcal{P}(0,1,2,0,1)\\
&+ \quad 90p_{2p}(b)p_{3p}^2(b)\mathcal{P}(0,1,0,2,1) + 180p_{2p}(b)p_{3s}(b)p_{3p}^2(b)\mathcal{P}(0,1,1,2,0)\\
&+ \quad 12p_{2p}(b)p_{3s}(b)\mathcal{P}(0,1,1,0,2) + 36p_{2p}(b)p_{3p}(b)\mathcal{P}(0,1,0,1,2)\\
&+ \quad 72p_{2p}(b)p_{3s}(b)p_{3p}(b)\mathcal{P}(0,1,1,1,1) + 15p_{3s}^2(b)p_{3p}^2(b)\mathcal{P}(0,0,2,2,0)\\
&+ \quad p_{3s}^2(b)\mathcal{P}(0,0,2,0,2) + 6p_{3s}^2(b)p_{3p}(b)\mathcal{P}(0,0,2,1,1)\\
&+ \quad p_{3s}(b)\mathcal{P}(0,0,1,0,3) + 30p_{3s}(b)p_{3p}^2(b)\mathcal{P}(0,0,1,2,1)\\
&+ \quad 12p_{3s}(b)p_{3p}(b)\mathcal{P}(0,0,1,1,2) + 15p_{3p}^4(b)\mathcal{P}(0,0,0,4,0)\\
&+ \quad 15p_{3p}^3(b)\mathcal{P}(0,0,0,3,1) + 15p_{3p}^3(b)\mathcal{P}(0,0,0,2,2)\\
&+ \quad 6p_{3p}(b)\mathcal{P}(0,0,0,1,3) \qquad \text{(A-14)}
\end{aligned}
$$

A.3
O átomo de Kr

A.3.1
Tabelas

Tabela A.8: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 1$, ionização simples, com $n_{\rm pos} = 0$ para o Kr.

$3s$	$3p$	$3d$	$4s$	$4p$	
n_4	n_5	n_6	n_7	n_8	$n_{\rm pos}$
1	0	0	0	0	0
0	1	0	0	0	0
0	0	1	0	0	0
0	0	0	1	0	0
0	0	0	0	1	0

A.3.2
Equações

Para $(P_1)_{V_1}$ temos

$$
\begin{aligned}
(P_1)_{V_1}(b) &= 6p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,0,0,0,1,0)\\
+\ & 2p_{4s}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(0,0,0,1,0,0)\\
+\ & 10p_{3d}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,0,1,0,0,0)\\
+\ & 6p_{3p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,1,0,0,0,0)\\
+\ & 2p_{3s}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(1,0,0,0,0,0); \qquad \text{(A-15)}
\end{aligned}
$$

Para $(P_1)_{V_6}$ temos

$$
\begin{aligned}
(P_1)_{V_6}(b) &= 6p_{4p}(b)\mathcal{P}(0,0,0,0,1,0) + 2p_{4s}(b)\mathcal{P}(0,0,0,1,0,0)\\
+\ & 10p_{3d}(b)\mathcal{P}(0,0,1,0,0,0) + 6p_{3p}(b)\mathcal{P}(0,1,0,0,0,0)\\
+\ & 2p_{3s}(b)\mathcal{P}(1,0,0,0,0,0); \qquad \text{(A-16)}
\end{aligned}
$$

Para $(P_2)_{V_1}$ temos

Tabela A.9: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 2$, ionização dupla, com $n_{\rm pos} = 0, 1$ para o Kr.

$3s$	$3p$	$3d$	$4s$	$4p$	
n_4	n_5	n_6	n_7	n_8	$n_{\rm pos}$
2	0	0	0	0	0
0	2	0	0	0	0
0	0	2	0	0	0
0	0	0	2	0	0
0	0	0	0	2	0
1	1	0	0	0	0
1	0	1	0	0	0
1	0	0	1	0	0
1	0	0	0	1	0
1	0	0	0	0	1
0	1	1	0	0	0
0	1	0	1	0	0
0	1	0	0	1	0
0	1	0	0	0	1
0	0	1	1	0	0
0	0	1	0	1	0
0	0	1	0	0	1
0	0	0	1	1	0

$$
\begin{aligned}
(P_2)_{V_1}(b) = {} & 15p_{4p}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^4\mathcal{P}(0,0,0,0,2,0 \\
+ \; & 2p_{4s}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4p}(b)]^6\mathcal{P}(0,0,0,2,0,0) \\
+ \; & 12p_{4s}(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^5\mathcal{P}(0,0,0,1,1,0) \\
+ \; & 60p_{3d}(b)p_{3p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,1,1,0,0,0) \\
+ \; & 20p_{3d}(b)p_{3s}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,0,1,0,0,0) \\
+ \; & 12p_{3s}(b)p_{3p}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,1,0,0,0,0) \\
+ \; & 10p_{3d}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,0,1,0,0,1) \\
+ \; & 6p_{3p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,1,0,0,0,1) \\
+ \; & 2p_{3s}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,0,0,0,0,1) \\
+ \; & 20p_{3d}(b)p_{4s}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(0,0,1,1,0,0) \\
+ \; & 60p_{3d}(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,0,1,0,1,0) \quad \text{(A-17}
\end{aligned}
$$

Para $(P_2)_{V_6}$ temos

Tabela A.10: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 3$, ionização tripla, com $n_{\mathrm{pos}} = 0, 1, 2$ para o Kr.

$3s$	$3p$	$3d$	$4s$	$4p$		$3s$	$3p$	$3d$	$4s$	$4p$	
n_4	n_5	n_6	n_7	n_8	n_{pos}	n_4	n_5	n_6	n_7	n_8	n_{pos}
2	1	0	0	0	0	0	1	0	2	0	0
2	0	1	0	0	0	0	1	0	0	2	0
2	0	0	1	0	0	0	1	0	0	0	2
2	0	0	0	1	0	0	1	1	1	0	0
2	0	0	0	0	1	0	1	1	0	1	0
1	2	0	0	0	0	0	1	1	0	0	1
1	0	2	0	0	0	0	1	0	1	1	0
1	0	0	2	0	0	0	1	0	1	0	1
1	0	0	0	2	0	0	1	0	0	1	1
1	0	0	0	0	2	0	0	2	1	0	0
1	1	1	0	0	0	0	0	2	0	1	0
1	1	0	1	0	0	0	0	2	0	0	1
1	1	0	0	1	0	0	0	1	2	0	0
1	1	0	0	0	1	0	0	1	0	2	0
1	0	1	1	0	0	0	0	1	0	0	2
1	0	1	0	1	0	0	0	1	1	1	0
1	0	1	0	0	1	0	0	1	1	0	1
1	0	0	1	1	0	0	0	1	0	1	1
1	0	0	1	0	1	0	0	3	0	0	0
1	0	0	0	1	1	0	0	0	2	1	0
0	3	0	0	0	0	0	0	0	2	0	1
0	2	1	0	0	0	0	0	0	1	2	0
0	2	0	1	0	0	0	0	0	0	3	0
0	2	0	0	1	0						
0	2	0	0	0	1						
0	1	2	0	0	0						

Tabela A.11: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 4$, ionização quádrupla, com $n_{\text{pos}} = 0, 1, 2, 3$ para o Kr.

$3s$	$3p$	$3d$	$4s$	$4p$		$3s$	$3p$	$3d$	$4s$	$4p$		$3s$	$3p$	$3d$	$4s$	$4p$	
n_4	n_5	n_6	n_7	n_8	n_{pos}	n_4	n_5	n_6	n_7	n_8	n_{pos}	n_4	n_5	n_6	n_7	n_8	n_{pos}
2	2	0	0	0	0	1	0	0	1	2	0	0	1	0	0	2	1
2	0	2	0	0	0	1	0	0	1	0	2	0	1	1	2	0	0
2	0	0	2	0	0	1	0	0	0	1	2	0	1	1	0	2	0
2	0	0	0	2	0	1	1	1	1	0	0	0	1	1	0	0	2
2	0	0	0	0	2	1	1	1	0	1	0	0	1	0	1	2	0
2	1	1	0	0	0	1	1	1	0	0	1	0	1	0	1	0	2
2	1	0	1	0	0	1	1	0	1	1	0	0	1	0	0	1	2
2	1	0	0	1	0	1	1	0	1	0	1	0	1	1	1	1	0
2	1	0	0	0	1	1	1	0	0	1	1	0	1	1	1	0	1
2	0	1	1	0	0	1	0	1	1	1	0	0	1	1	0	1	1
2	0	1	0	1	0	1	0	1	1	0	1	0	1	0	1	1	1
2	0	1	0	0	1	1	0	1	0	1	1	0	0	4	0	0	0
2	0	0	1	1	0	1	0	0	1	1	1	0	0	3	1	0	0
2	0	0	1	0	1	0	4	0	0	0	0	0	0	3	0	1	0
2	0	0	0	1	1	0	3	1	0	0	0	0	0	3	0	0	1
1	3	0	0	0	0	0	3	0	1	0	0	0	0	2	2	0	0
1	0	3	0	0	0	0	3	0	0	1	0	0	0	2	0	2	0
1	0	0	0	3	0	0	3	0	0	0	1	0	0	2	0	0	2
1	0	0	0	0	3	0	2	2	0	0	0	0	0	2	1	1	0
1	2	1	0	0	0	0	2	0	2	0	0	0	0	2	1	0	1
1	2	0	1	0	0	0	2	0	0	2	0	0	0	2	0	1	1
1	2	0	0	1	0	0	2	0	0	0	2	0	0	1	0	3	0
1	2	0	0	0	1	0	2	1	1	0	0	0	0	1	0	0	3
1	0	2	1	0	0	0	2	1	0	1	0	0	0	1	2	1	0
1	0	2	0	1	0	0	2	1	0	0	1	0	0	1	2	0	1
1	0	2	0	0	1	0	2	0	1	1	0	0	0	1	0	2	1
1	0	0	2	1	0	0	2	0	1	0	1	0	0	1	1	2	0
1	0	0	2	0	1	0	2	0	0	1	1	0	0	1	1	0	2
1	0	0	0	2	1	0	1	3	0	0	0	0	0	1	0	1	2
1	1	2	0	0	0	0	1	0	0	3	0	0	0	1	1	1	1
1	1	0	2	0	0	0	1	0	0	0	3	0	0	0	2	2	0
1	1	0	0	2	0	0	1	2	1	0	0	0	0	0	1	3	0
1	1	0	0	0	2	0	1	2	0	1	0	0	0	0	0	4	0
1	0	1	2	0	0	0	1	2	0	0	1						
1	0	1	0	2	0	0	1	0	2	1	0						
1	0	1	0	0	2	0	1	0	2	0	1						

$$
\begin{aligned}
(P_2)_{V_1}(b) &= 15p_{4p}^2(b)\mathcal{P}(0,0,0,0,2,0) + 2p_{4s}^2(b)\mathcal{P}(0,0,0,2,0,0) \\
+ \;& 12p_{4s}(b)p_{4p}(b)\mathcal{P}(0,0,0,1,1,0) + 60p_{3d}(b)p_{3p}(b)\mathcal{P}(0,1,1,0,0,0) \\
+ \;& 20p_{3d}(b)p_{3s}(b)\mathcal{P}(1,0,1,0,0,0) + 12p_{3s}(b)p_{3p}(b)\mathcal{P}(1,1,0,0,0,0) \\
+ \;& 10p_{3d}(b)\mathcal{P}(0,0,1,0,0,1) + 6p_{3p}(b)\mathcal{P}(0,1,0,0,0,1) \\
+ \;& 2p_{3s}(b)\mathcal{P}(1,0,0,0,0,1) + 20p_{3d}(b)p_{4s}(b)\mathcal{P}(0,0,1,1,0,0) \\
+ \;& 60p_{3d}(b)p_{4p}(b)\mathcal{P}(0,0,1,0,1,0); \qquad \text{(A-18)}
\end{aligned}
$$

Para $(P_3)_{V_1}$ temos

$$
\begin{aligned}
(P_3)_{V_1}(b) &= 6p_{3s}^2(b)p_{3p}(b)[1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(2,1,0,0,0,0) \\
+ \;& 10p_{3s}^2(b)p_{3d}(b)[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(2,0,1,0,0,0) \\
+ \;& 30p_{3s}(b)p_{3p}^2(b)[1-p_{3s}(b)][1-p_{3p}(b)]^4[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,2,0,0,0,0) \\
+ \;& 90p_{3s}(b)p_{3d}^2(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,0,2,0,0,0) \\
+ \;& 2p_{3s}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,0,0,0,0,2) \\
+ \;& 120p_{3s}(b)p_{3p}(b)p_{3d}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,1,1,0,0,0) \\
+ \;& 24p_{3s}(b)p_{3p}(b)p_{4s}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(1,1,0,1,0,0) \\
+ \;& 72p_{3s}(b)p_{3p}(b)p_{4p}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}^2(b)][1-p_{4p}(b)]^5\mathcal{P}(1,1,0,0,1,0) \\
+ \;& 40p_{3s}(b)p_{3d}(b)p_{4s}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(1,0,1,1,0,0) \\
+ \;& 120p_{3s}(b)p_{3d}(b)p_{4p}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}^2(b)][1-p_{4p}(b)]^5\mathcal{P}(1,0,1,0,1,0) \\
+ \;& 4p_{3s}(b)p_{4s}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(1,0,0,1,0,1) \\
+ \;& 12p_{3s}(b)p_{4p}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(1,0,0,0,1,1) \\
+ \;& 150p_{3p}^2(b)p_{3d}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,2,1,0,0,0) \\
+ \;& 270p_{3p}(b)p_{3d}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,1,2,0,0,0) \\
+ \;& 6p_{3p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,1,0,0,0,2) \\
+ \;& 120p_{3p}(b)p_{3d}(b)p_{4s}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(0,1,1,1,0,0) \\
+ \;& 360p_{3p}(b)p_{3d}(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,1,1,0,1,0 \\
+ \;& 12p_{3p}(b)p_{4s}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(0,1,0,1,0,1) \\
+ \;& 36p_{3p}(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,1,0,0,1,1) \\
+ \;& 90p_{3d}^2(b)p_{4s}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^8[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(0,0,2,1,0,0) \\
+ \;& 270p_{3d}^2(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^8[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,0,2,0,1,0) \\
+ \;& 45p_{3d}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^8[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,0,2,0,0,1) \\
+ \;& 10p_{3d}(b)p_{4s}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4p}(b)]^6\mathcal{P}(0,0,1,2,0,0)
\end{aligned}
$$

$$
\begin{aligned}
&+ \; 150p_{3d}(b)p_{4p}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^4\mathcal{P}(0,0,1,0,2,0)\\
&+ \; 10p_{3d}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,0,1,0,0,2)\\
&+ \; 120p_{3d}(b)p_{4s}(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^5\mathcal{P}(0,0,1,1,1,0)\\
&+ \; 20p_{3d}(b)p_{4s}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(0,0,1,1,0,1)\\
&+ \; 60p_{3d}(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,0,1,0,1,1)\\
&+ \; 6p_{4s}^2(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4p}(b)]^5\mathcal{P}(0,0,0,2,1,0)\\
&+ \; 30p_{4s}(b)p_{4p}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^4\mathcal{P}(0,0,0,1,2,0)\\
&+ \; 20p_{4p}^3(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^3\mathcal{P}(0,0,0,0,3,0); \qquad \text{(A-19}
\end{aligned}
$$

Para $(P_3)_{V_6}$ temos

$$
\begin{aligned}
&(P_3)_{V_6}(b) = 6p_{3s}^2(b)p_{3p}(b)\mathcal{P}(2,1,0,0,0,0) + 10p_{3s}^2(b)p_{3d}(b)\mathcal{P}(2,0,1,0,0,0)\\
&+ \; 30p_{3s}(b)p_{3p}^2(b)\mathcal{P}(1,2,0,0,0,0) + 90p_{3s}(b)p_{3d}^2(b)\mathcal{P}(1,0,2,0,0,0)\\
&+ \; 2p_{3s}(b)\mathcal{P}(1,0,0,0,0,2) + 120p_{3s}(b)p_{3p}(b)p_{3d}(b)\mathcal{P}(1,1,1,0,0,0)\\
&+ \; 24p_{3s}(b)p_{3p}(b)p_{4s}(b)\mathcal{P}(1,1,0,1,0,0) + 72p_{3s}(b)p_{3p}(b)p_{4p}(b)\mathcal{P}(1,1,0,0,1,0)\\
&+ \; 40p_{3s}(b)p_{3d}(b)p_{4s}(b)\mathcal{P}(1,0,1,1,0,0) + 120p_{3s}(b)p_{3d}(b)p_{4p}(b)\mathcal{P}(1,0,1,0,1,0)\\
&+ \; 4p_{3s}(b)p_{4s}(b)\mathcal{P}(1,0,0,1,0,1) + 12p_{3s}(b)p_{4p}(b)\mathcal{P}(1,0,0,0,1,1)\\
&+ \; 150p_{3p}^2(b)p_{3d}(b)\mathcal{P}(0,2,1,0,0,0) + 270p_{3p}(b)p_{3d}^2(b)\mathcal{P}(0,1,2,0,0,0)\\
&+ \; 6p_{3p}(b)\mathcal{P}(0,1,0,0,0,2) + 120p_{3p}(b)p_{3d}(b)p_{4s}(b)\mathcal{P}(0,1,1,1,0,0)\\
&+ \; 360p_{3p}(b)p_{3d}(b)p_{4p}(b)\mathcal{P}(0,1,1,0,1,0) + 12p_{3p}(b)p_{4s}(b)\mathcal{P}(0,1,0,1,0,1)\\
&+ \; 36p_{3p}(b)p_{4p}(b)\mathcal{P}(0,1,0,0,1,1) + 90p_{3d}^2(b)p_{4s}(b)\mathcal{P}(0,0,2,1,0,0)\\
&+ \; 270p_{3d}^2(b)p_{4p}(b)\mathcal{P}(0,0,2,0,1,0) + 45p_{3d}^2(b)\mathcal{P}(0,0,2,0,0,1)\\
&+ \; 10p_{3d}(b)p_{4s}^2(b)\mathcal{P}(0,0,1,2,0,0) + 150p_{3d}(b)p_{4p}^2(b)\mathcal{P}(0,0,1,0,2,0)\\
&+ \; 10p_{3d}(b)\mathcal{P}(0,0,1,0,0,2) + 120p_{3d}(b)p_{4s}(b)p_{4p}(b)\mathcal{P}(0,0,1,1,1,0)\\
&+ \; 20p_{3d}(b)p_{4s}(b)\mathcal{P}(0,0,1,1,0,1) + 60p_{3d}(b)p_{4p}(b)\mathcal{P}(0,0,1,0,1,1)\\
&+ \; 6p_{4s}^2(b)p_{4p}(b)\mathcal{P}(0,0,0,2,1,0) + 30p_{4s}(b)p_{4p}^2(b)\mathcal{P}(0,0,0,1,2,0)\\
&+ \; 20p_{4p}^3(b)\mathcal{P}(0,0,0,0,3,0); \qquad \text{(A-20)}
\end{aligned}
$$

Para $(P_4)_{V_1}$ temos

$$
\begin{aligned}
&(P_4)_{V_1}(b) = 15p_{3s}^2(b)p_{3p}^2(b)[1-p_{3p}(b)]^4[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(2,2,0,0,0,0)\\
&+ \; 45p_{3s}^2(b)p_{3d}(b)[1-p_{3p}(b)]^6[1-p_{3d}(b)]^8[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(2,0,2,0,0,0)\\
&+ \; 60p_{3s}^2(b)p_{3p}(b)p_{3d}(b)[1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(2,1,1,0,0,0)\\
&+ \; 12p_{3s}^2(b)p_{3p}(b)p_{4s}(b)[1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(2,1,0,1,0,0)
\end{aligned}
$$

$$
\begin{aligned}
&+ \; 36p_{3s}^2(b)p_{3p}(b)p_{4p}(b)[1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(2,1,0,0,1,0)\\
&+ \; 20p_{3s}^2(b)p_{3d}(b)p_{4s}(b)[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(2,0,1,1,0,0)\\
&+ \; 60p_{3s}^2(b)p_{3d}(b)p_{4p}(b)[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(2,0,1,0,1,0)\\
&+ \; 40p_{3s}(b)p_{3p}^3(b)[1-p_{3s}(b)][1-p_{3p}(b)]^3[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,3,0,0,0,0)\\
&+ \; 240p_{3s}(b)p_{3d}^3(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^7[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,0,3,0,0,0)\\
&+ \; 2p_{3s}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,0,0,0,0,3)\\
&+ \; 300p_{3s}(b)p_{3p}^2(b)p_{3d}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^4[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,2,1,0,0,0)\\
&+ \; 60p_{3s}(b)p_{3p}^2(b)p_{4s}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^4[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(1,2,0,1,0,0)\\
&+ \; 90p_{3s}(b)p_{3p}^2(b)p_{4p}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^4[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(1,2,0,0,1,0)\\
&+ \; 30p_{3s}(b)p_{3p}^2(b)[1-p_{3s}(b)][1-p_{3p}(b)]^4[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,2,0,0,0,1)\\
&+ \; 180p_{3s}(b)p_{3d}^2(b)p_{4s}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^8[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(1,0,2,1,0,0)\\
&+ \; 540p_{3s}(b)p_{3d}^2(b)p_{4p}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^8[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(1,0,2,0,1,0)\\
&+ \; 90p_{3s}(b)p_{3d}^2(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^8[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,0,2,0,0,1)\\
&+ \; 2p_{3s}(b)p_{4s}^2(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4p}(b)]^6\mathcal{P}(1,0,0,2,0,1)\\
&+ \; 30p_{3s}(b)p_{4p}^2(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^4\mathcal{P}(1,0,0,0,2,1)\\
&+ \; 540p_{3s}(b)p_{3p}(b)p_{3d}^2(b)[1-p_{3s}(b)][1-p_{3p}(b)]^5[1-p_{3d}(b)]^8[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,1,2,0,0,0)\\
&+ \; 12p_{3s}(b)p_{3p}(b)p_{4s}^2(b)[1-p_{3s}(b)][1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4p}(b)]^6\mathcal{P}(1,1,0,2,0,0)\\
&+ \; 180p_{3s}(b)p_{3p}(b)p_{4p}^2(b)[1-p_{3s}(b)][1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^4\mathcal{P}(1,1,0,0,2,0\\
&+ \; 12p_{3s}(b)p_{3p}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,1,0,0,0,2)\\
&+ \; 20p_{3s}(b)p_{3d}(b)p_{4s}^2(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4p}(b)]^6\mathcal{P}(1,0,1,2,0,0)\\
&+ \; 300p_{3s}(b)p_{3d}(b)p_{4p}^2(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^4\mathcal{P}(1,0,1,0,2,0)\\
&+ \; 20p_{3s}(b)(b)p_{3d}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(1,0,1,0,0,2)\\
&+ \; 4p_{3s}(b)p_{4s}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(1,0,0,1,0,2)\\
&+ \; 12p_{3s}(b)p_{4p}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(1,0,0,0,1,2)\\
&+ \; 240p_{3s}(b)p_{3p}(b)p_{3d}(b)p_{4s}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(1,1,1,1,\\
&+ \; 720p_{3s}(b)p_{3p}(b)p_{3d}(b)p_{4p}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(1,1,1,0\\
&+ \; 120p_{3s}(b)p_{3p}(b)p_{3d}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(1,1,1,0,0,1)\\
&+ \; 144p_{3s}(b)p_{3p}(b)p_{4s}(b)p_{4p}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^5\mathcal{P}(1,1,0,1\\
&+ \; 240p_{3s}(b)p_{3d}(b)p_{4s}(b)p_{4p}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^5\mathcal{P}(1,0,1,1,\\
&+ \; 40p_{3s}(b)p_{3d}(b)p_{4s}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(1,0,1,1,0,1)\\
&+ \; 120p_{3s}(b)p_{3d}(b)p_{4p}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(1,0,1,0,1,1)\\
&+ \; 24p_{3s}(b)p_{4s}(b)p_{4p}(b)[1-p_{3s}(b)][1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^5\mathcal{P}(1,0,0,1,1,1)\\
&+ \; 200p_{3p}^3(b)p_{3d}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^3[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,3,1,0,0,0)
\end{aligned}
$$

$$
\begin{aligned}
&+ 675p_{3p}^2(b)p_{3d}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4[1-p_{3d}(b)]^8[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,2,2,0,0,0)\\
&+ 15p_{3p}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,2,0,0,0,2)\\
&+ 200p_{3p}^2(b)p_{3d}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,2,1,0,0,1)\\
&+ 40p_{3p}^2(b)p_{4s}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(0,2,0,1,0,1)\\
&+ 120p_{3p}^2(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^4[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,2,0,0,1,1)\\
&+ 720p_{3p}(b)p_{3d}^3(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^7[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,1,3,0,0,0)\\
&+ 6p_{3p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,1,0,0,0,3)\\
&+ 540p_{3p}(b)p_{3d}^2(b)p_{4s}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^8[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(0,1,2,1,0,0)\\
&+ 1620p_{3p}(b)p_{3d}^2(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^8[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,1,2,0,1,\\
&+ 6p_{3p}(b)p_{4s}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4p}(b)]^6\mathcal{P}(0,1,0,2,0,1)\\
&+ 90p_{3p}(b)p_{4p}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^4\mathcal{P}(0,1,0,0,2,1)\\
&+ 60p_{3p}(b)p_{3d}(b)p_{4s}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4p}(b)]^6\mathcal{P}(0,1,1,2,0,0)\\
&+ 900p_{3p}(b)p_{3d}(b)p_{4p}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^4\mathcal{P}(0,1,1,0,2,0\\
&+ 60p_{3p}(b)p_{3d}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,1,1,0,0,2)\\
&+ 12p_{3p}(b)p_{4s}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(0,1,0,1,0,2)\\
&+ 36p_{3p}(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,1,0,0,1,2)\\
&+ 720p_{3p}(b)p_{3d}(b)p_{4s}(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^5\mathcal{P}(0,1,1,1\\
&+ 120p_{3p}(b)p_{3d}(b)p_{4s}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(0,1,1,1,0,1)\\
&+ 360p_{3p}(b)p_{3d}(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,1,1,0,1,1\\
&+ 72p_{3p}(b)p_{4s}(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^5[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,1,0,1,1,1)\\
&+ 120p_{3d}^3(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^7[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,0,3,0,0,1)\\
&+ 45p_{3d}^2(b)p_{4s}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^8[1-p_{4p}(b)]^6\mathcal{P}(0,0,2,2,0,0)\\
&+ 675p_{3d}^2(b)p_{4p}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^8[1-p_{4s}(b)]^2[1-p_{4p}(b)]^4\mathcal{P}(0,0,2,0,2,0)\\
&+ 45p_{3d}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^8[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,0,2,0,0,2)\\
&+ 540p_{3d}^2(b)p_{4s}(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^8[1-p_{4s}(b)][1-p_{4p}(b)]^5\mathcal{P}(0,0,2,1,1,0)\\
&+ 90p_{3d}^2(b)p_{4s}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^8[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(0,0,2,1,0,1)\\
&+ 270p_{3d}^2(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^8[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,0,2,0,1,1)\\
&+ 200p_{3d}(b)p_{4p}^3(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^3\mathcal{P}(0,0,1,0,3,0)\\
&+ 10p_{3d}[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^7[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6\mathcal{P}(0,0,1,0,0,3)\\
&+ 60p_{3d}(b)p_{4s}^2(b)p_{4p}[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^5\mathcal{P}(0,0,1,2,1,0)\\
&+ 10p_{3d}(b)p_{4s}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4p}(b)]^6\mathcal{P}(0,0,1,2,0,1)\\
&+ 150p_{3d}(b)p_{4p}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^4\mathcal{P}(0,0,1,0,2,1)\\
&+ 300p_{3d}(b)p_{4s}(b)p_{4p}^2[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^5\mathcal{P}(0,0,1,1,2,0)
\end{aligned}
$$

$$
\begin{aligned}
&+ \; 20p_{3d}(b)p_{4s}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^6\mathcal{P}(0,0,1,1,0,2)\\
&+ \; 60p_{3d}(b)p_{4p}(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5\mathcal{P}(0,0,1,0,1,2)\\
&+ \; 120p_{3d}(b)p_{4s}(b)p_{4p}[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^9[1-p_{4s}(b)][1-p_{4p}(b)]^5\mathcal{P}(0,0,1,1,1,1)\\
&+ \; 15p_{4s}^2(b)p_{4p}^2(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4p}(b)]^4\mathcal{P}(0,0,0,2,2,0)\\
&+ \; 40p_{4s}(b)p_{4p}^3(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)][1-p_{4p}(b)]^3\mathcal{P}(0,0,0,1,3,0)\\
&+ \; 15p_{4p}^4(b)[1-p_{3s}(b)]^2[1-p_{3p}(b)]^6[1-p_{3d}(b)]^{10}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^2\mathcal{P}(0,0,0,0,4,0);
\end{aligned}
\qquad (
$$

Para $(P_4)_{V_6}$ temos

$$
\begin{aligned}
&(P_4)_{V_6}(b) = 15p_{3s}^2(b)p_{3p}^2(b)\mathcal{P}(2,2,0,0,0,0) + 45p_{3s}^2(b)p_{3d}(b)\mathcal{P}(2,0,2,0,0,0)\\
&+ \; 60p_{3s}^2(b)p_{3p}(b)p_{3d}(b)\mathcal{P}(2,1,1,0,0,0) + 12p_{3s}^2(b)p_{3p}(b)p_{4s}(b)\mathcal{P}(2,1,0,1,0,0)\\
&+ \; 36p_{3s}^2(b)p_{3p}(b)p_{4p}(b)\mathcal{P}(2,1,0,0,1,0) + 20p_{3s}^2(b)p_{3d}(b)p_{4s}(b)\mathcal{P}(2,0,1,1,0,0)\\
&+ \; 60p_{3s}^2(b)p_{3d}(b)p_{4p}(b)\mathcal{P}(2,0,1,0,1,0) + 40p_{3s}(b)p_{3p}^3(b)\mathcal{P}(1,3,0,0,0,0)\\
&+ \; 240p_{3s}(b)p_{3d}^3(b)\mathcal{P}(1,0,3,0,0,0) + 2p_{3s}(b)\mathcal{P}(1,0,0,0,0,3)\\
&+ \; 300p_{3s}(b)p_{3p}^2(b)p_{3d}(b)\mathcal{P}(1,2,1,0,0,0) + 60p_{3s}(b)p_{3p}^2(b)p_{4s}(b)\mathcal{P}(1,2,0,1,0,0)\\
&+ \; 90p_{3s}(b)p_{3p}^2(b)p_{4p}(b)\mathcal{P}(1,2,0,0,1,0) + 30p_{3s}(b)p_{3p}^2(b)\mathcal{P}(1,2,0,0,0,1)\\
&+ \; 180p_{3s}(b)p_{3d}^2(b)p_{4s}(b)\mathcal{P}(1,0,2,1,0,0) + 540p_{3s}(b)p_{3d}^2(b)p_{4p}(b)\mathcal{P}(1,0,2,0,1,0)\\
&+ \; 90p_{3s}(b)p_{3d}^2(b)\mathcal{P}(1,0,2,0,0,1) + 2p_{3s}(b)p_{4s}^2(b)\mathcal{P}(1,0,0,2,0,1)\\
&+ \; 30p_{3s}(b)p_{4p}^2(b)\mathcal{P}(1,0,0,0,2,1) + 540p_{3s}(b)p_{3p}(b)p_{3d}^2(b)\mathcal{P}(1,1,2,0,0,0)\\
&+ \; 12p_{3s}(b)p_{3p}(b)p_{4s}^2(b)\mathcal{P}(1,1,0,2,0,0) + 180p_{3s}(b)p_{3p}(b)p_{4p}^2(b)\mathcal{P}(1,1,0,0,2,0)\\
&+ \; 12p_{3s}(b)p_{3p}(b)\mathcal{P}(1,1,0,0,0,2) + 20p_{3s}(b)p_{3d}(b)p_{4s}^2(b)\mathcal{P}(1,0,1,2,0,0)\\
&+ \; 300p_{3s}(b)p_{3d}(b)p_{4p}^2(b)\mathcal{P}(1,0,1,0,2,0) + 20p_{3s}(b)(b)p_{3d}(b)\mathcal{P}(1,0,1,0,0,2)\\
&+ \; 4p_{3s}(b)p_{4s}(b)\mathcal{P}(1,0,0,1,0,2) + 12p_{3s}(b)p_{4p}(b)\mathcal{P}(1,0,0,0,1,2)\\
&+ \; 240p_{3s}(b)p_{3p}(b)p_{3d}(b)p_{4s}(b)\mathcal{P}(1,1,1,1,0,0) + 720p_{3s}(b)p_{3p}(b)p_{3d}(b)p_{4p}(b)\mathcal{P}(1,1,1,0,1,0)\\
&+ \; 120p_{3s}(b)p_{3p}(b)p_{3d}(b)\mathcal{P}(1,1,1,0,0,1) + 144p_{3s}(b)p_{3p}(b)p_{4s}(b)p_{4p}(b)\mathcal{P}(1,1,0,1,1,0)\\
&+ \; 240p_{3s}(b)p_{3d}(b)p_{4s}(b)p_{4p}(b)\mathcal{P}(1,0,1,1,1,0) + 40p_{3s}(b)p_{3d}(b)p_{4s}(b)\mathcal{P}(1,0,1,1,0,1)\\
&+ \; 120p_{3s}(b)p_{3d}(b)p_{4p}(b)\mathcal{P}(1,0,1,0,1,1) + 24p_{3s}(b)p_{4s}(b)p_{4p}(b)\mathcal{P}(1,0,0,1,1,1)\\
&+ \; 200p_{3p}^3(b)p_{3d}(b)\mathcal{P}(0,3,1,0,0,0) + 675p_{3p}^2(b)p_{3d}^2(b)\mathcal{P}(0,2,2,0,0,0)\\
&+ \; 15p_{3p}^2(b)\mathcal{P}(0,2,0,0,0,2) + 200p_{3p}^2(b)p_{3d}(b)\mathcal{P}(0,2,1,0,0,1)\\
&+ \; 40p_{3p}^2(b)p_{4s}(b)\mathcal{P}(0,2,0,1,0,1) + 120p_{3p}^2(b)p_{4p}(b)\mathcal{P}(0,2,0,0,1,1)\\
&+ \; 720p_{3p}(b)p_{3d}^3(b)\mathcal{P}(0,1,3,0,0,0) + 6p_{3p}(b)\mathcal{P}(0,1,0,0,0,3)\\
&+ \; 540p_{3p}(b)p_{3d}^2(b)p_{4s}(b)\mathcal{P}(0,1,2,1,0,0) + 1620p_{3p}(b)p_{3d}^2(b)p_{4p}(b)\mathcal{P}(0,1,2,0,1,0)\\
&+ \; 6p_{3p}(b)p_{4s}^2(b)\mathcal{P}(0,1,0,2,0,1) + 90p_{3p}(b)p_{4p}^2(b)\mathcal{P}(0,1,0,0,2,1)\\
&+ \; 60p_{3p}(b)p_{3d}(b)p_{4s}^2(b)\mathcal{P}(0,1,1,2,0,0) + 900p_{3p}(b)p_{3d}(b)p_{4p}^2(b)\mathcal{P}(0,1,1,0,2,0)
\end{aligned}
$$

$$
\begin{aligned}
&+ \; 60p_{3p}(b)p_{3d}(b)\mathcal{P}(0,1,1,0,0,2) + 12p_{3p}(b)p_{4s}(b)\mathcal{P}(0,1,0,1,0,2) \\
&+ \; 36p_{3p}(b)p_{4p}(b)\mathcal{P}(0,1,0,0,1,2) + 720p_{3p}(b)p_{3d}(b)p_{4s}(b)p_{4p}(b)\mathcal{P}(0,1,1,1,1,0) \\
&+ \; 120p_{3p}(b)p_{3d}(b)p_{4s}(b)\mathcal{P}(0,1,1,1,0,1) + 360p_{3p}(b)p_{3d}(b)p_{4p}(b)\mathcal{P}(0,1,1,0,1,1) \\
&+ \; 72p_{3p}(b)p_{4s}(b)p_{4p}(b)\mathcal{P}(0,1,0,1,1,1) + 120p_{3d}^3(b)\mathcal{P}(0,0,3,0,0,1) \\
&+ \; 45p_{3d}^2(b)p_{4s}^2(b)\mathcal{P}(0,0,2,2,0,0) + 675p_{3d}^2(b)p_{4p}^2(b)\mathcal{P}(0,0,2,0,2,0) \\
&+ \; 45p_{3d}^2(b)\mathcal{P}(0,0,2,0,0,2) + 540p_{3d}^2(b)p_{4s}(b)p_{4p}(b)\mathcal{P}(0,0,2,1,1,0) \\
&+ \; 90p_{3d}^2(b)p_{4s}(b)\mathcal{P}(0,0,2,1,0,1) + 270p_{3d}^2(b)p_{4p}(b)\mathcal{P}(0,0,2,0,1,1) \\
&+ \; 200p_{3d}(b)p_{4p}^3(b)\mathcal{P}(0,0,1,0,3,0) + 10p_{3d}\mathcal{P}(0,0,1,0,0,3) \\
&+ \; 60p_{3d}(b)p_{4s}^2(b)p_{4p}\mathcal{P}(0,0,1,2,1,0) + 10p_{3d}(b)p_{4s}^2(b)\mathcal{P}(0,0,1,2,0,1) \\
&+ \; 150p_{3d}(b)p_{4p}^2(b)\mathcal{P}(0,0,1,0,2,1) + 300p_{3d}(b)p_{4s}(b)p_{4p}^2\mathcal{P}(0,0,1,1,2,0) \\
&+ \; 20p_{3d}(b)p_{4s}(b)\mathcal{P}(0,0,1,1,0,2) + 60p_{3d}(b)p_{4p}(b)\mathcal{P}(0,0,1,0,1,2) \\
&+ \; 120p_{3d}(b)p_{4s}(b)p_{4p}\mathcal{P}(0,0,1,1,1,1) + 15p_{4s}^2(b)p_{4p}^2(b)\mathcal{P}(0,0,0,2,2,0) \\
&+ \; 40p_{4s}(b)p_{4p}^3(b)\mathcal{P}(0,0,0,1,3,0) + 15p_{4p}^4(b)\mathcal{P}(0,0,0,0,4,0); \qquad \text{(A-22)}
\end{aligned}
$$

A.4
O átomo de Xe

A.4.1
Tabelas

Tabela A.12: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 1$, ionização simples, com $n_{\text{pos}} = 0$ para o Xe.

$4s$	$4p$	$4d$	$5s$	$5p$	
n_7	n_8	n_9	n_{10}	n_{11}	n_{pos}
1	0	0	0	0	0
0	1	0	0	0	0
0	0	1	0	0	0
0	0	0	1	0	0
0	0	0	0	1	0

A.4.2
Equações

Para $(P_1)_{V_1}$ temos

Tabela A.13: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 2$, ionização dupla, com $n_{\rm pos} = 0, 1$ para o Xe.

$4s$	$4p$	$4d$	$5s$	$5p$	
n_7	n_8	n_9	n_{10}	n_{11}	$n_{\rm pos}$
2	0	0	0	0	0
0	2	0	0	0	0
0	0	2	0	0	0
0	0	0	2	0	0
0	0	0	0	2	0
1	1	0	0	0	0
1	0	1	0	0	0
1	0	0	1	0	0
1	0	0	0	1	0
1	0	0	0	0	1
0	1	1	0	0	0
0	1	0	1	0	0
0	1	0	0	1	0
0	1	0	0	0	1
0	0	1	1	0	0
0	0	1	0	1	0
0	0	1	0	0	1
0	0	0	1	1	0

$$
\begin{aligned}
(P_1)_{V_1}(b) &= 6p_{5p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^5\mathcal{P}(0,0,0,0,1,0) \\
+ \;& 2p_{5s}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^6\mathcal{P}(0,0,0,1,0,0) \\
+ \;& 10p_{4d}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^5\mathcal{P}(0,0,1,0,0,0) \\
+ \;& 6p_{4p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^5\mathcal{P}(0,1,0,0,0,0) \\
+ \;& 2p_{4s}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^5\mathcal{P}(1,0,0,0,0,0); \qquad \text{(A-23)}
\end{aligned}
$$

Para $(P_1)_{V_6}$ temos

$$
\begin{aligned}
(P_1)_{V_6}(b) &= 6p_{5p}(b)\mathcal{P}(0,0,0,0,1,0) + 2p_{5s}(b)\mathcal{P}(0,0,0,1,0,0) \\
+ \;& 10p_{4d}(b)\mathcal{P}(0,0,1,0,0,0) + 6p_{4p}(b)\mathcal{P}(0,1,0,0,0,0) \\
+ \;& 2p_{4s}(b)\mathcal{P}(1,0,0,0,0,0) \qquad \text{(A-24)}
\end{aligned}
$$

Para $(P_2)_{V_1}$ temos

Tabela A.14: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 3$, ionização tripla, com $n_{\mathrm{pos}} = 0, 1, 2$ para o Xe.

$4s$	$4p$	$4d$	$5s$	$5p$		$4s$	$4p$	$4d$	$5s$	$5p$	
n_7	n_8	n_9	n_{10}	n_{11}	n_{pos}	n_7	n_8	n_9	n_{10}	n_{11}	n_{pos}
2	1	0	0	0	0	0	1	0	2	0	0
2	0	1	0	0	0	0	1	0	0	2	0
2	0	0	1	0	0	0	1	0	0	0	2
2	0	0	0	1	0	0	1	1	1	0	0
2	0	0	0	0	1	0	1	1	0	1	0
1	2	0	0	0	0	0	1	1	0	0	1
1	0	2	0	0	0	0	1	0	1	1	0
1	0	0	2	0	0	0	1	0	1	0	1
1	0	0	0	2	0	0	1	0	0	1	1
1	0	0	0	0	2	0	0	2	1	0	0
1	1	1	0	0	0	0	0	2	0	1	0
1	1	0	1	0	0	0	0	2	0	0	1
1	1	0	0	1	0	0	0	1	2	0	0
1	1	0	0	0	1	0	0	1	0	2	0
1	0	1	1	0	0	0	0	1	0	0	2
1	0	1	0	1	0	0	0	1	1	1	0
1	0	1	0	0	1	0	0	1	1	0	1
1	0	0	1	1	0	0	0	1	0	1	1
1	0	0	1	0	1	0	0	3	0	0	0
1	0	0	0	1	1	0	0	0	2	1	0
0	3	0	0	0	0	0	0	0	1	2	0
0	2	1	0	0	0	0	0	0	0	3	0
0	2	0	1	0	0						
0	2	0	0	1	0						
0	2	0	0	0	1						
0	1	2	0	0	0						

Tabela A.15: Combinações possíveis do número de elétrons ionizados por subcamada e respectiva emissão pós–colisional para $n = 4$, ionização quádrupla, com $n_{\text{pos}} = 0, 1, 2e3$ para o Xe.

$4s$	$4p$	$4d$	$5s$	$5p$		$4s$	$4p$	$4d$	$5s$	$5p$		$4s$	$4p$	$4d$	$5s$	$5p$	
n_7	n_8	n_9	n_{10}	n_{11}	n_{pos}	n_7	n_8	n_9	n_{10}	n_{11}	n_{pos}	n_7	n_8	n_9	n_{10}	n_{11}	n_{pos}
2	2	0	0	0	0	1	0	0	1	2	0	0	1	0	0	2	1
2	0	2	0	0	0	1	0	0	1	0	2	0	1	1	2	0	0
2	0	0	2	0	0	1	0	0	0	1	2	0	1	1	0	2	0
2	0	0	0	2	0	1	1	1	1	0	0	0	1	1	0	0	2
2	0	0	0	0	2	1	1	1	0	1	0	0	1	0	1	2	0
2	1	1	0	0	0	1	1	1	0	0	1	0	1	0	1	0	2
2	1	0	1	0	0	1	1	0	1	1	0	0	1	0	0	1	2
2	1	0	0	1	0	1	1	0	1	0	1	0	1	1	1	1	0
2	1	0	0	0	1	1	1	0	0	1	1	0	1	1	1	0	1
2	0	1	1	0	0	1	0	1	1	1	0	0	1	1	0	1	1
2	0	1	0	1	0	1	0	1	1	0	1	0	1	0	1	1	1
2	0	1	0	0	1	1	0	1	0	1	1	0	0	4	0	0	0
2	0	0	1	1	0	1	0	0	1	1	1	0	0	3	1	0	0
2	0	0	1	0	1	0	4	0	0	0	0	0	0	3	0	1	0
2	0	0	0	1	1	0	3	1	0	0	0	0	0	3	0	0	1
1	3	0	0	0	0	0	3	0	1	0	0	0	0	2	2	0	0
1	0	3	0	0	0	0	3	0	0	1	0	0	0	2	0	2	0
1	0	0	0	3	0	0	3	0	0	0	1	0	0	2	0	0	2
1	0	0	0	0	3	0	2	2	0	0	0	0	0	2	1	1	0
1	2	1	0	0	0	0	2	0	2	0	0	0	0	2	1	0	1
1	2	0	1	0	0	0	2	0	0	2	0	0	0	2	0	1	1
1	2	0	0	1	0	0	2	0	0	0	2	0	0	1	0	3	0
1	2	0	0	0	1	0	2	1	1	0	0	0	0	1	0	0	3
1	0	2	1	0	0	0	2	1	0	1	0	0	0	1	2	1	0
1	0	2	0	1	0	0	2	1	0	0	1	0	0	1	2	0	1
1	0	2	0	0	1	0	2	0	1	1	0	0	0	1	0	2	1
1	0	0	2	1	0	0	2	0	1	0	1	0	0	1	1	2	0
1	0	0	2	0	1	0	2	0	0	1	1	0	0	1	1	0	2
1	0	0	0	2	1	0	1	3	0	0	0	0	0	1	0	1	2
1	1	2	0	0	0	0	1	0	0	3	0	0	0	1	1	1	1
1	1	0	2	0	0	0	1	0	0	0	3	0	0	0	2	2	0
1	1	0	0	2	0	0	1	2	1	0	0	0	0	0	1	3	0
1	1	0	0	0	2	0	1	2	0	1	0	0	0	0	0	4	0
1	0	1	2	0	0	0	1	2	0	0	1						
1	0	1	0	2	0	0	1	0	2	1	0						
1	0	1	0	0	2	0	1	0	2	0	1						

$$
\begin{aligned}
&(P_2)_{V_1}(b) = 15p_{5p}^2(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^4\mathcal{P}(0,0,0,0,2,0\\
+\;& 2p_{5s}^2(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5p}(b)]^6\mathcal{P}(0,0,0,2,0,0)\\
+\;& 12p_{5s}(b)p_{5p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^5\mathcal{P}(0,0,0,1,1,0)\\
+\;& 60p_{4d}(b)p_{4p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(0,1,1,0,0,0)\\
+\;& 20p_{4d}(b)p_{4s}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(1,0,1,0,0,0)\\
+\;& 10p_{4d}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(0,0,1,0,0,1)\\
+\;& 6p_{4p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(0,1,0,0,0,1)\\
+\;& 2p_{4s}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(1,0,0,0,0,1); \qquad \text{(A-25}
\end{aligned}
$$

Para $(P_2)_{V_6}$ temos

$$
\begin{aligned}
&(P_2)_{V_6}(b) = 15p_{5p}^2(b)\mathcal{P}(0,0,0,0,2,0) + 2p_{5s}^2(b)\mathcal{P}(0,0,0,2,0,0)\\
+\;& 12p_{5s}(b)p_{5p}(b)\mathcal{P}(0,0,0,1,1,0) + 60p_{4d}(b)p_{4p}(b)\mathcal{P}(0,1,1,0,0,0)\\
+\;& 20p_{4d}(b)p_{4s}(b)\mathcal{P}(1,0,1,0,0,0) + 10p_{4d}(b)\mathcal{P}(0,0,1,0,0,1)\\
+\;& 6p_{4p}(b)\mathcal{P}(0,1,0,0,0,1) + 2p_{4s}(b)\mathcal{P}(1,0,0,0,0,1); \qquad \text{(A-26)}
\end{aligned}
$$

Para $(P_3)_{V_1}$ temos

$$
\begin{aligned}
&(P_3)_{V_1}(b) = 6p_{4s}^2(b)p_{4p}(b)[1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(2,1,0,0,0,0)\\
+\;& 10p_{4s}^2(b)p_{4d}(b)[1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(2,0,1,0,0,0)\\
+\;& 30p_{4s}(b)p_{4p}^2(b)[1-p_{4s}(b)][1-p_{4p}(b)]^4[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(1,2,0,0,0,0)\\
+\;& 2p_{4s}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(1,0,0,0,0,2)\\
+\;& 120p_{4s}(b)p_{4p}(b)p_{4d}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^5[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(1,1,1,0,0,0)\\
+\;& 24p_{4s}(b)p_{4p}(b)p_{5s}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^6\mathcal{P}(1,1,0,1,0,0)\\
+\;& 72p_{4s}(b)p_{4p}(b)p_{5p}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5s}^2(b)][1-p_{5p}(b)]^5\mathcal{P}(1,1,0,0,1,0)\\
+\;& 120p_{4s}(b)p_{4d}(b)p_{5p}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5s}^2(b)][1-p_{5p}(b)]^5\mathcal{P}(1,0,1,0,1,0)\\
+\;& 4p_{4s}(b)p_{5s}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^6\mathcal{P}(1,0,0,1,0,1)\\
+\;& 12p_{4s}(b)p_{5p}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^5\mathcal{P}(1,0,0,0,1,1)\\
+\;& 150p_{4p}^2(b)p_{4d}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^4[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(0,2,1,0,0,0)\\
+\;& 270p_{4p}(b)p_{4d}^2(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(0,1,2,0,0,0)\\
+\;& 6p_{4p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(0,1,0,0,0,2)\\
+\;& 120p_{4p}(b)p_{4d}(b)p_{5s}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^9[1-p_{5s}(b)][1-p_{4p}(b)]^6\mathcal{P}(0,1,1,1,0,0)
\end{aligned}
$$

$$
\begin{aligned}
&+ \; 360p_{4p}(b)p_{4d}(b)p_{5p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^5\mathcal{P}(0,1,1,0,1,0\\
&+ \; 12p_{4p}(b)p_{5s}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^6\mathcal{P}(0,1,0,1,0,1)\\
&+ \; 36p_{4p}(b)p_{5p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^5\mathcal{P}(0,1,0,0,1,1)\\
&+ \; 10p_{4d}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(0,0,1,0,0,2)\\
&+ \; 20p_{4d}(b)p_{5s}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5s}(b)][1-p_{5p}(b)]^6\mathcal{P}(0,0,1,1,0,1)\\
&+ \; 60p_{4d}(b)p_{5p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^5\mathcal{P}(0,0,1,0,1,1)\\
&+ \; 6p_{5s}^2(b)p_{5p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5p}(b)]^5\mathcal{P}(0,0,0,2,1,0)\\
&+ \; 30p_{5s}(b)p_{5p}^2(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^4\mathcal{P}(0,0,0,1,2,0)\\
&+ \; 20p_{5p}^3(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^3\mathcal{P}(0,0,0,0,3,0); \qquad \text{(A-27}
\end{aligned}
$$

Para $(P_3)_{V_6}$ temos

$$
\begin{aligned}
&(P_3)_{V_6}(b) = 6p_{4s}^2(b)p_{4p}(b)\mathcal{P}(2,1,0,0,0,0)\\
&+ \; 10p_{4s}^2(b)p_{4d}(b)\mathcal{P}(2,0,1,0,0,0) + 30p_{4s}(b)p_{4p}^2(b)\mathcal{P}(1,2,0,0,0,0)\\
&+ \; 2p_{4s}(b)\mathcal{P}(1,0,0,0,0,2) + 120p_{4s}(b)p_{4p}(b)p_{4d}(b)\mathcal{P}(1,1,1,0,0,0)\\
&+ \; 24p_{4s}(b)p_{4p}(b)p_{5s}(b)\mathcal{P}(1,1,0,1,0,0) + 72p_{4s}(b)p_{4p}(b)p_{5p}(b)\mathcal{P}(1,1,0,0,1,0)\\
&+ \; 120p_{4s}(b)p_{4d}(b)p_{5p}(b)\mathcal{P}(1,0,1,0,1,0) + 4p_{4s}(b)p_{5s}(b)\mathcal{P}(1,0,0,1,0,1)\\
&+ \; 12p_{4s}(b)p_{5p}(b)\mathcal{P}(1,0,0,0,1,1) + 150p_{4p}^2(b)p_{4d}(b)\mathcal{P}(0,2,1,0,0,0)\\
&+ \; 270p_{4p}(b)p_{4d}^2(b)\mathcal{P}(0,1,2,0,0,0) + 6p_{4p}(b)\mathcal{P}(0,1,0,0,0,2)\\
&+ \; 120p_{4p}(b)p_{4d}(b)p_{5s}(b)\mathcal{P}(0,1,1,1,0,0) + 360p_{4p}(b)p_{4d}(b)p_{5p}(b)\mathcal{P}(0,1,1,0,1,0)\\
&+ \; 12p_{4p}(b)p_{5s}(b)\mathcal{P}(0,1,0,1,0,1) + 36p_{4p}(b)p_{5p}(b)\mathcal{P}(0,1,0,0,1,1)\\
&+ \; 10p_{4d}(b)\mathcal{P}(0,0,1,0,0,2) + 20p_{4d}(b)p_{5s}(b)\mathcal{P}(0,0,1,1,0,1)\\
&+ \; 60p_{4d}(b)p_{5p}(b)\mathcal{P}(0,0,1,0,1,1) + 6p_{5s}^2(b)p_{5p}(b)\mathcal{P}(0,0,0,2,1,0)\\
&+ \; 30p_{5s}(b)p_{5p}^2(b)\mathcal{P}(0,0,0,1,2,0) + 20p_{5p}^3(b)\mathcal{P}(0,0,0,0,3,0); \qquad \text{(A-28)}
\end{aligned}
$$

Para $(P_4)_{V_1}$ temos

$$
\begin{aligned}
&(P_4)_{V_1}(b) = 15p_{4p}^4(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^2[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(0,4,0,0,0,0\\
&+ \; 15p_{4s}^2(b)p_{4p}^2(b)[1-p_{4p}(b)]^4[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(2,2,0,0,0,0)\\
&+ \; 45p_{4s}^2(b)p_{4d}^2(b)[1-p_{4p}(b)]^6[1-p_{4d}(b)]^8[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(2,0,2,0,0,0)\\
&+ \; 12p_{4s}^2(b)p_{4p}(b)p_{5s}(b)[1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^6\mathcal{P}(2,1,0,1,0,0)\\
&+ \; 36p_{4s}^2(b)p_{4p}(b)p_{5p}(b)[1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^5\mathcal{P}(2,1,0,0,1,0)\\
&+ \; 20p_{4s}^2(b)p_{4d}(b)p_{5s}(b)[1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5s}(b)][1-p_{5p}(b)]^6\mathcal{P}(2,0,1,1,0,0)\\
&+ \; 40p_{4s}(b)p_{4p}^3(b)[1-p_{4s}(b)][1-p_{4p}(b)]^3[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(1,3,0,0,0,0)
\end{aligned}
$$

$$
\begin{aligned}
&+ \; 240p_{4s}(b)p_{4d}^{3}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{6}[1-p_{4d}(b)]^{7}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{6}\mathcal{P}(1,0,3,0,0,0)\\
&+ \; 2p_{4s}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{6}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{6}\mathcal{P}(1,0,0,0,0,3)\\
&+ \; 300p_{4s}(b)p_{4p}^{2}(b)p_{4d}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{4}[1-p_{4d}(b)]^{9}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{6}\mathcal{P}(1,2,1,0,0,0)\\
&+ \; 60p_{4s}(b)p_{4p}^{2}(b)p_{5s}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{4}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^{6}\mathcal{P}(1,2,0,1,0,0)\\
&+ \; 90p_{4s}(b)p_{4p}^{2}(b)p_{5p}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{4}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{5}\mathcal{P}(1,2,0,0,1,0)\\
&+ \; 180p_{4s}(b)p_{4d}^{2}(b)p_{5s}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{6}[1-p_{4d}(b)]^{8}[1-p_{5s}(b)][1-p_{5p}(b)]^{6}\mathcal{P}(1,0,2,1,0,0)\\
&+ \; 540p_{4s}(b)p_{4d}^{2}(b)p_{5p}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{6}[1-p_{4d}(b)]^{8}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{5}\mathcal{P}(1,0,2,0,1,0)\\
&+ \; 2p_{4s}(b)p_{5s}^{2}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{6}[1-p_{4d}(b)]^{10}[1-p_{5p}(b)]^{6}\mathcal{P}(1,0,0,2,0,1)\\
&+ \; 30p_{4s}(b)p_{5p}^{2}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{6}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{4}\mathcal{P}(1,0,0,0,2,1)\\
&+ \; 540p_{4s}(b)p_{4p}(b)p_{4d}^{2}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{5}[1-p_{4d}(b)]^{8}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{6}\mathcal{P}(1,1,2,0,0,0)\\
&+ \; 12p_{4s}(b)p_{4p}(b)p_{5s}^{2}(b)[1-p_{5s}(b)][1-p_{4p}(b)]^{5}[1-p_{4d}(b)]^{10}[1-p_{5p}(b)]^{6}\mathcal{P}(1,1,0,2,0,0)\\
&+ \; 180p_{4s}(b)p_{4p}(b)p_{5p}^{2}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{5}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{4}\mathcal{P}(1,1,0,0,2,0\\
&+ \; 12p_{4s}(b)p_{4p}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{5}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{6}\mathcal{P}(1,1,0,0,0,2)\\
&+ \; 20p_{4s}(b)p_{4d}(b)p_{5s}^{2}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{6}[1-p_{4d}(b)]^{9}[1-p_{5p}(b)]^{6}\mathcal{P}(1,0,1,2,0,0)\\
&+ \; 300p_{4s}(b)p_{4d}(b)p_{5p}^{2}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{6}[1-p_{4d}(b)]^{9}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{4}\mathcal{P}(1,0,1,0,2,0)\\
&+ \; 20p_{4s}(b)(b)p_{4d}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{6}[1-p_{4d}(b)]^{9}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{6}\mathcal{P}(1,0,1,0,0,2)\\
&+ \; 4p_{4s}(b)p_{5s}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{6}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^{6}\mathcal{P}(1,0,0,1,0,2)\\
&+ \; 12p_{4s}(b)p_{5p}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{6}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{5}\mathcal{P}(1,0,0,0,1,2)\\
&+ \; 240p_{4s}(b)p_{4p}(b)p_{4d}(b)p_{5s}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{5}[1-p_{4d}(b)]^{9}[1-p_{5s}(b)][1-p_{5p}(b)]^{6}\mathcal{P}(1,1,1,1,\\
&+ \; 720p_{4s}(b)p_{4p}(b)p_{4d}(b)p_{5p}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{5}[1-p_{4d}(b)]^{9}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{5}\mathcal{P}(1,1,1,0\\
&+ \; 120p_{4s}(b)p_{4p}(b)p_{4d}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{5}[1-p_{4d}(b)]^{9}[1-p_{5s}(b)][1-p_{5p}(b)]^{6}\mathcal{P}(1,1,1,0,0,1)\\
&+ \; 144p_{4s}(b)p_{4p}(b)p_{5s}(b)p_{5p}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{5}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^{5}\mathcal{P}(1,1,0,1\\
&+ \; 240p_{4s}(b)p_{4d}(b)p_{5s}(b)p_{5p}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{6}[1-p_{4d}(b)]^{9}[1-p_{5s}(b)][1-p_{5p}(b)]^{5}\mathcal{P}(1,0,1,1,\\
&+ \; 24p_{4s}(b)p_{5s}(b)p_{5p}(b)[1-p_{4s}(b)][1-p_{4p}(b)]^{6}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^{5}\mathcal{P}(1,0,0,1,1,1)\\
&+ \; 200p_{4p}^{3}(b)p_{4d}(b)[1-p_{4s}(b)]^{2}[1-p_{4p}(b)]^{3}[1-p_{4d}(b)]^{9}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{6}\mathcal{P}(0,3,1,0,0,0)\\
&+ \; 675p_{4p}^{2}(b)p_{4d}^{2}(b)[1-p_{4s}(b)]^{2}[1-p_{4p}(b)]^{4}[1-p_{4d}(b)]^{8}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{6}\mathcal{P}(0,2,2,0,0,0)\\
&+ \; 15p_{4p}^{2}(b)[1-p_{4s}(b)]^{2}[1-p_{4p}(b)]^{4}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{6}\mathcal{P}(0,2,0,0,0,2)\\
&+ \; 40p_{4p}^{2}(b)p_{5s}(b)[1-p_{4s}(b)]^{2}[1-p_{4p}(b)]^{4}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^{6}\mathcal{P}(0,2,0,1,0,1)\\
&+ \; 900p_{4p}^{2}(b)p_{4d}(b)p_{5s}(b)[1-p_{4s}(b)]^{2}[1-p_{4p}(b)]^{4}[1-p_{4d}(b)]^{9}[1-p_{5s}(b)][1-p_{5p}(b)]^{6}\mathcal{P}(0,2,1,1,0,0)\\
&+ \; 900p_{4p}^{2}(b)p_{4d}(b)p_{5p}(b)[1-p_{4s}(b)]^{2}[1-p_{4p}(b)]^{4}[1-p_{4d}(b)]^{9}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{5}\mathcal{P}(0,2,1,0,1,0\\
&+ \; 120p_{4p}^{2}(b)p_{5p}(b)[1-p_{4s}(b)]^{2}[1-p_{4p}(b)]^{4}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{5}\mathcal{P}(0,2,0,0,1,1)\\
&+ \; 720p_{4p}(b)p_{4d}^{3}(b)[1-p_{4s}(b)]^{2}[1-p_{4p}(b)]^{5}[1-p_{4d}(b)]^{7}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{6}\mathcal{P}(0,1,3,0,0,0)\\
&+ \; 6p_{4p}(b)[1-p_{4s}(b)]^{2}[1-p_{4p}(b)]^{5}[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^{2}[1-p_{5p}(b)]^{6}\mathcal{P}(0,1,0,0,0,3)
\end{aligned}
$$

$$
\begin{aligned}
&+ \; 540p_{4p}(b)p_{4d}^2(b)p_{5s}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^8[1-p_{5s}(b)][1-p_{5p}(b)]^6\mathcal{P}(0,1,2,1,0,0)\\
&+ \; 1620p_{4p}(b)p_{4d}^2(b)p_{5p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^8[1-p_{5s}(b)]^2[1-p_{5p}(b)]^5\mathcal{P}(0,1,2,0,1,\\
&+ \; 6p_{4p}(b)p_{5s}^2(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5p}(b)]^6\mathcal{P}(0,1,0,2,0,1)\\
&+ \; 90p_{4p}(b)p_{5p}^2(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5s}(b)]^2[1-p_{5p}(b)]^4\mathcal{P}(0,1,0,0,2,1)\\
&+ \; 60p_{4p}(b)p_{4d}(b)p_{5s}^2(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^9[1-p_{5p}(b)]^6\mathcal{P}(0,1,1,2,0,0)\\
&+ \; 900p_{4p}(b)p_{4d}(b)p_{5p}^2(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^4\mathcal{P}(0,1,1,0,2,0\\
&+ \; 60p_{4p}(b)p_{4d}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(0,1,1,0,0,2)\\
&+ \; 12p_{4p}(b)p_{5s}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^6\mathcal{P}(0,1,0,1,0,2)\\
&+ \; 720p_{4p}(b)p_{4d}(b)p_{5s}(b)p_{5p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^9[1-p_{5s}(b)][1-p_{5p}(b)]^5\mathcal{P}(0,1,1,1\\
&+ \; 72p_{4p}(b)p_{5s}(b)p_{5p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^5[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^5\mathcal{P}(0,1,0,1,1,1)\\
&+ \; 45p_{4d}^2(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^8[1-p_{5s}(b)]^2[1-p_{5p}(b)]^6\mathcal{P}(0,0,2,0,0,2)\\
&+ \; 270p_{4d}^2(b)p_{5p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^8[1-p_{5s}(b)]^2[1-p_{5p}(b)]^5\mathcal{P}(0,0,2,0,1,1)\\
&+ \; 10p_{4d}(b)p_{5s}^2(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5p}(b)]^6\mathcal{P}(0,0,1,2,0,1)\\
&+ \; 150p_{4d}(b)p_{5p}^2(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^4\mathcal{P}(0,0,1,0,2,1)\\
&+ \; 20p_{4d}(b)p_{5s}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5s}(b)][1-p_{5p}(b)]^6\mathcal{P}(0,0,1,1,0,2)\\
&+ \; 60p_{4d}(b)p_{5p}(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5s}(b)]^2[1-p_{5p}(b)]^5\mathcal{P}(0,0,1,0,1,2)\\
&+ \; 120p_{4d}(b)p_{5s}(b)p_{5p}[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^9[1-p_{5s}(b)][1-p_{5p}(b)]^5\mathcal{P}(0,0,1,1,1,1)\\
&+ \; 15p_{5s}^2(b)p_{5p}^2(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5p}(b)]^4\mathcal{P}(0,0,0,2,2,0)\\
&+ \; 40p_{5s}(b)p_{5p}^3(b)[1-p_{4s}(b)]^2[1-p_{4p}(b)]^6[1-p_{4d}(b)]^{10}[1-p_{5s}(b)][1-p_{5p}(b)]^3\mathcal{P}(0,0,0,1,3,0);
\end{aligned}
$$

Para $(P_4)_{V_6}$ temos

$$
\begin{aligned}
&(P_4)_{V_6}(b) = 15p_{4p}^4(b)\mathcal{P}(0,4,0,0,0,0) + 15p_{4s}^2(b)p_{4p}^2(b)\mathcal{P}(2,2,0,0,0,0)\\
&+ \; 45p_{4s}^2(b)p_{4d}^2(b)\mathcal{P}(2,0,2,0,0,0) + 12p_{4s}^2(b)p_{4p}(b)p_{5s}(b)\mathcal{P}(2,1,0,1,0,0)\\
&+ \; 36p_{4s}^2(b)p_{4p}(b)p_{5p}(b)\mathcal{P}(2,1,0,0,1,0) + 20p_{4s}^2(b)p_{4d}(b)p_{5s}(b)\mathcal{P}(2,0,1,1,0,0)\\
&+ \; 40p_{4s}(b)p_{4p}^3(b)\mathcal{P}(1,3,0,0,0,0) + 240p_{4s}(b)p_{4d}^3(b)\mathcal{P}(1,0,3,0,0,0)\\
&+ \; 2p_{4s}(b)\mathcal{P}(1,0,0,0,0,3) + 300p_{4s}(b)p_{4p}^2(b)p_{4d}(b)\mathcal{P}(1,2,1,0,0,0)\\
&+ \; 60p_{4s}(b)p_{4p}^2(b)p_{5s}(b)\mathcal{P}(1,2,0,1,0,0) + 90p_{4s}(b)p_{4p}^2(b)p_{5p}(b)\mathcal{P}(1,2,0,0,1,0)\\
&+ \; 180p_{4s}(b)p_{4d}^2(b)p_{5s}(b)\mathcal{P}(1,0,2,1,0,0) + 540p_{4s}(b)p_{4d}^2(b)p_{5p}(b)\mathcal{P}(1,0,2,0,1,0)\\
&+ \; 2p_{4s}(b)p_{5s}^2(b)\mathcal{P}(1,0,0,2,0,1) + 30p_{4s}(b)p_{5p}^2(b)\mathcal{P}(1,0,0,0,2,1)\\
&+ \; 540p_{4s}(b)p_{4p}(b)p_{4d}^2(b)\mathcal{P}(1,1,2,0,0,0) + 12p_{4s}(b)p_{4p}(b)p_{5s}^2(b)\mathcal{P}(1,1,0,2,0,0)\\
&+ \; 180p_{4s}(b)p_{4p}(b)p_{5p}^2(b)\mathcal{P}(1,1,0,0,2,0) + 12p_{4s}(b)p_{4p}(b)\mathcal{P}(1,1,0,0,0,2)\\
&+ \; 20p_{4s}(b)p_{4d}(b)p_{5s}^2(b)\mathcal{P}(1,0,1,2,0,0) + 300p_{4s}(b)p_{4d}(b)p_{5p}^2(b)\mathcal{P}(1,0,1,0,2,0)\\
&+ \; 20p_{4s}(b)(b)p_{4d}(b)\mathcal{P}(1,0,1,0,0,2) + 4p_{4s}(b)p_{5s}(b)\mathcal{P}(1,0,0,1,0,2)
\end{aligned}
$$

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\begin{aligned}
&+ \; 12p_{4s}(b)p_{5p}(b)\mathcal{P}(1,0,0,0,1,2) + 240p_{4s}(b)p_{4p}(b)p_{4d}(b)p_{5s}(b)\mathcal{P}(1,1,1,1,0,0) \\
&+ \; 720p_{4s}(b)p_{4p}(b)p_{4d}(b)p_{5p}(b)\mathcal{P}(1,1,1,0,1,0) + 120p_{4s}(b)p_{4p}(b)p_{4d}(b)\mathcal{P}(1,1,1,0,0,1) \\
&+ \; 144p_{4s}(b)p_{4p}(b)p_{5s}(b)p_{5p}(b)\mathcal{P}(1,1,0,1,1,0) + 240p_{4s}(b)p_{4d}(b)p_{5s}(b)p_{5p}(b)\mathcal{P}(1,0,1,1,1,0) \\
&+ \; 24p_{4s}(b)p_{5s}(b)p_{5p}(b)\mathcal{P}(1,0,0,1,1,1) + 200p_{4p}^3(b)p_{4d}(b)\mathcal{P}(0,3,1,0,0,0) \\
&+ \; 675p_{4p}^2(b)p_{4d}^2(b)\mathcal{P}(0,2,2,0,0,0) + 15p_{4p}^2(b)\mathcal{P}(0,2,0,0,0,2) \\
&+ \; 40p_{4p}^2(b)p_{5s}(b)\mathcal{P}(0,2,0,1,0,1) + 900p_{4p}^2(b)p_{4d}(b)p_{5s}(b)\mathcal{P}(0,2,1,1,0,0) \\
&+ \; 900p_{4p}^2(b)p_{4d}(b)p_{5p}(b)\mathcal{P}(0,2,1,0,1,0) + 120p_{4p}^2(b)p_{5p}(b)\mathcal{P}(0,2,0,0,1,1) \\
&+ \; 720p_{4p}(b)p_{4d}^3(b)\mathcal{P}(0,1,3,0,0,0) + 6p_{4p}(b)\mathcal{P}(0,1,0,0,0,3) \\
&+ \; 540p_{4p}(b)p_{4d}^2(b)p_{5s}(b)\mathcal{P}(0,1,2,1,0,0) + 1620p_{4p}(b)p_{4d}^2(b)p_{5p}(b)\mathcal{P}(0,1,2,0,1,0) \\
&+ \; 6p_{4p}(b)p_{5s}^2(b)\mathcal{P}(0,1,0,2,0,1) + 90p_{4p}(b)p_{5p}^2(b)\mathcal{P}(0,1,0,0,2,1) \\
&+ \; 60p_{4p}(b)p_{4d}(b)p_{5s}^2(b)\mathcal{P}(0,1,1,2,0,0) + 900p_{4p}(b)p_{4d}(b)p_{5p}^2(b)\mathcal{P}(0,1,1,0,2,0) \\
&+ \; 60p_{4p}(b)p_{4d}(b)\mathcal{P}(0,1,1,0,0,2) + 12p_{4p}(b)p_{5s}(b)\mathcal{P}(0,1,0,1,0,2) \\
&+ \; 720p_{4p}(b)p_{4d}(b)p_{5s}(b)p_{5p}(b)\mathcal{P}(0,1,1,1,1,0) + 72p_{4p}(b)p_{5s}(b)p_{5p}(b)\mathcal{P}(0,1,0,1,1,1) \\
&+ \; 45p_{4d}^2(b)\mathcal{P}(0,0,2,0,0,2) + 270p_{4d}^2(b)p_{5p}(b)\mathcal{P}(0,0,2,0,1,1) \\
&+ \; 10p_{4d}(b)p_{5s}^2(b)\mathcal{P}(0,0,1,2,0,1) + 150p_{4d}(b)p_{5p}^2(b)\mathcal{P}(0,0,1,0,2,1) \\
&+ \; 20p_{4d}(b)p_{5s}(b)\mathcal{P}(0,0,1,1,0,2) + 60p_{4d}(b)p_{5p}(b)\mathcal{P}(0,0,1,0,1,2) \\
&+ \; 120p_{4d}(b)p_{5s}(b)p_{5p}\mathcal{P}(0,0,1,1,1,1) + 15p_{5s}^2(b)p_{5p}^2(b)\mathcal{P}(0,0,0,2,2,0) \\
&+ \; 40p_{5s}(b)p_{5p}^3(b)\mathcal{P}(0,0,0,1,3,0); \qquad \text{(A-30)}
\end{aligned}
$$