



wwPDB EM Validation Summary Report ⓘ

Jun 30, 2024 – 02:50 PM EDT

PDB ID : 8VK4
EMDB ID : EMD-43304
Title : Structure of mouse RyR1 in complex with S100A1 (high-Ca²⁺/CFF/ATP dataset)
Authors : Weninger, G.; Marks, A.R.
Deposited on : 2024-01-08
Resolution : 3.56 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

EMDB validation analysis : 0.0.1.dev92
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.37.1

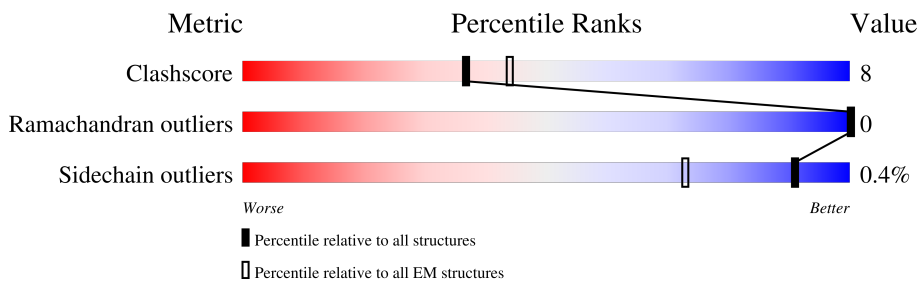
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.56 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	E	108	
1	F	108	
1	G	108	
1	H	108	
2	I	94	
2	J	94	
2	K	94	
2	L	94	

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Mol	Chain	Length	Quality of chain
2	M	94	<p>36% 50% 49%</p>
2	N	94	<p>24% 52% 47%</p>
2	O	94	<p>36% 51% 48%</p>
2	P	94	<p>24% 51% 48%</p>
3	A	5035	<p>10% 71% 16% 13%</p>
3	B	5035	<p>10% 71% 16% 13%</p>
3	C	5035	<p>10% 71% 15% 13%</p>
3	D	5035	<p>10% 72% 15% 13%</p>

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 149304 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Peptidyl-prolyl cis-trans isomerase FKBP1A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	E	107	829	526	145	155	3	0	0
1	F	107	829	526	145	155	3	0	0
1	G	107	829	526	145	155	3	0	0
1	H	107	829	526	145	155	3	0	0

- Molecule 2 is a protein called Protein S100A1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	I	93	729	460	114	152	3	0	0
2	J	93	729	460	114	152	3	0	0
2	K	93	729	460	114	152	3	0	0
2	L	93	729	460	114	152	3	0	0
2	N	93	729	460	114	152	3	0	0
2	M	93	729	460	114	152	3	0	0
2	O	93	729	460	114	152	3	0	0
2	P	93	729	460	114	152	3	0	0

- Molecule 3 is a protein called Ryanodine receptor 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	D	4379	34849	22163	5998	6451	237	0	0

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Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	A	4379	34849	22163	5998	6451	237	0	0
3	B	4379	34849	22163	5998	6451	237	0	0
3	C	4379	34849	22163	5998	6451	237	0	0

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
4	I	2	Total 2	Ca 2	0
4	J	2	Total 2	Ca 2	0
4	D	1	Total 1	Ca 1	0
4	A	1	Total 1	Ca 1	0
4	B	1	Total 1	Ca 1	0
4	C	1	Total 1	Ca 1	0
4	K	2	Total 2	Ca 2	0
4	L	2	Total 2	Ca 2	0
4	N	2	Total 2	Ca 2	0
4	M	2	Total 2	Ca 2	0
4	O	2	Total 2	Ca 2	0
4	P	2	Total 2	Ca 2	0

- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

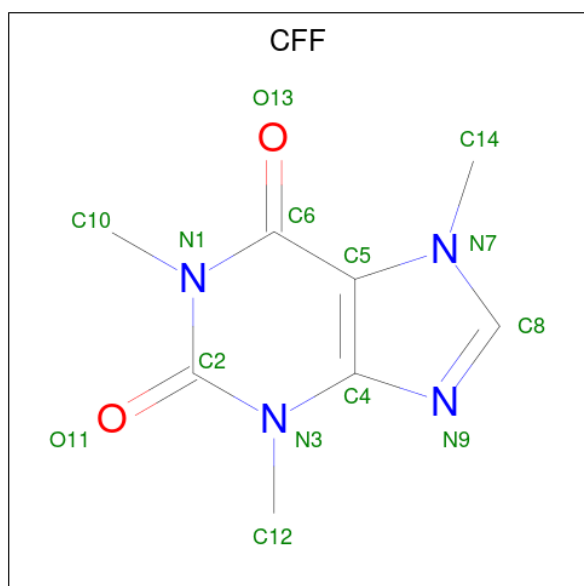
Mol	Chain	Residues	Atoms		AltConf
5	D	1	Total 1	Zn 1	0

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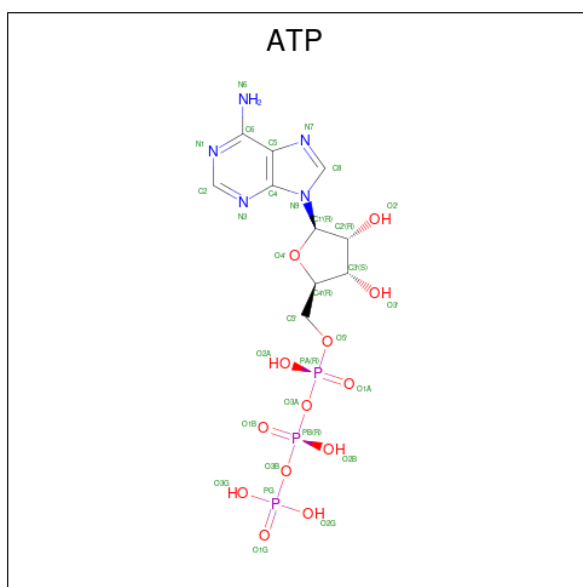
Mol	Chain	Residues	Atoms		AltConf
5	A	1	Total	Zn	0
			1	1	
5	B	1	Total	Zn	0
			1	1	
5	C	1	Total	Zn	0
			1	1	

- Molecule 6 is CAFFEINE (three-letter code: CFF) (formula: $C_8H_{10}N_4O_2$) (labeled as "Ligand of Interest" by depositor).



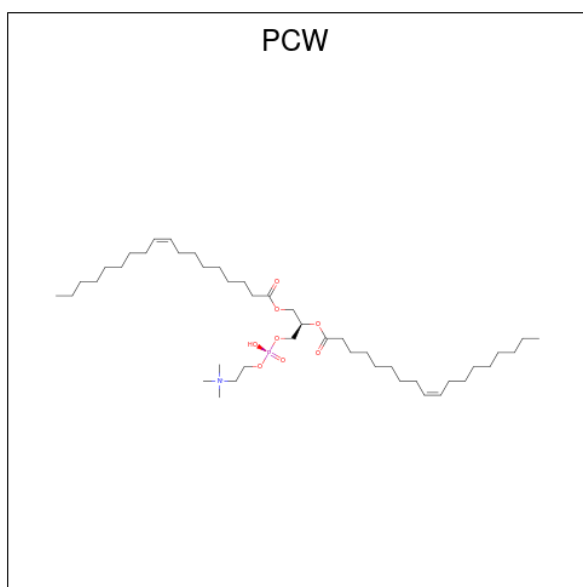
Mol	Chain	Residues	Atoms				AltConf
6	D	1	Total	C	N	O	0
			14	8	4	2	
6	A	1	Total	C	N	O	0
			14	8	4	2	
6	B	1	Total	C	N	O	0
			14	8	4	2	
6	C	1	Total	C	N	O	0
			14	8	4	2	

- Molecule 7 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
7	D	1	Total	C	N	O	P	0
			31	10	5	13	3	
7	D	1	Total	C	N	O	P	0
			31	10	5	13	3	
7	A	1	Total	C	N	O	P	0
			31	10	5	13	3	
7	A	1	Total	C	N	O	P	0
			31	10	5	13	3	
7	B	1	Total	C	N	O	P	0
			31	10	5	13	3	
7	B	1	Total	C	N	O	P	0
			31	10	5	13	3	
7	C	1	Total	C	N	O	P	0
			31	10	5	13	3	
7	C	1	Total	C	N	O	P	0
			31	10	5	13	3	

- Molecule 8 is 1,2-DIOLEOYL-SN-GLYCERO-3-PHOSPHOCHOLINE (three-letter code: PCW) (formula: C₄₄H₈₅NO₈P).

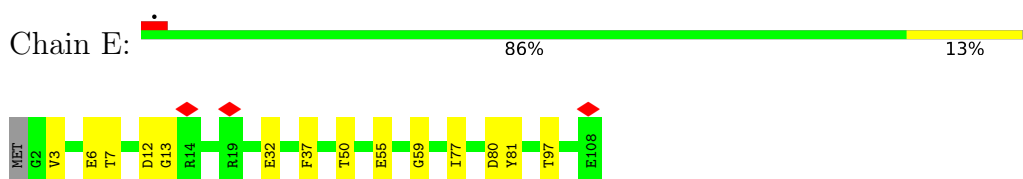


Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
8	D	1	Total 54	44	1	8	1	0
8	D	1	Total 54	44	1	8	1	0
8	A	1	Total 54	44	1	8	1	0
8	A	1	Total 54	44	1	8	1	0
8	B	1	Total 54	44	1	8	1	0
8	B	1	Total 54	44	1	8	1	0
8	C	1	Total 54	44	1	8	1	0
8	C	1	Total 54	44	1	8	1	0

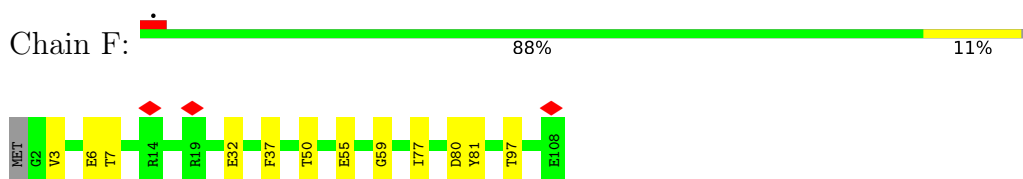
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

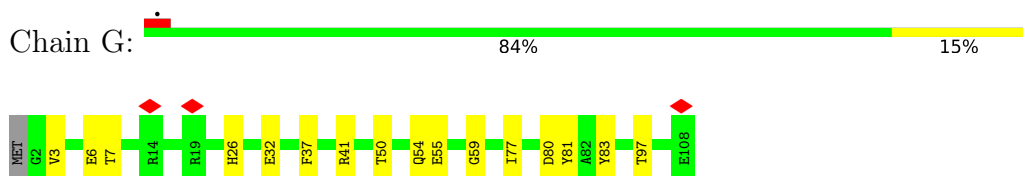
- Molecule 1: Peptidyl-prolyl cis-trans isomerase FKBP1A



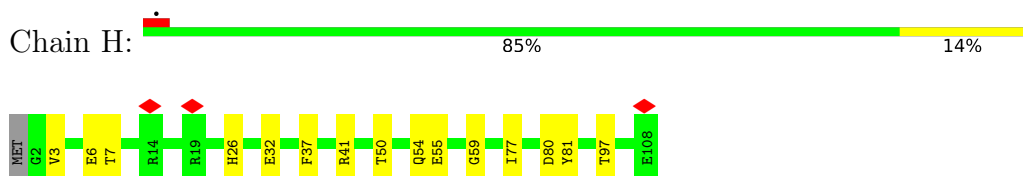
- Molecule 1: Peptidyl-prolyl cis-trans isomerase FKBP1A



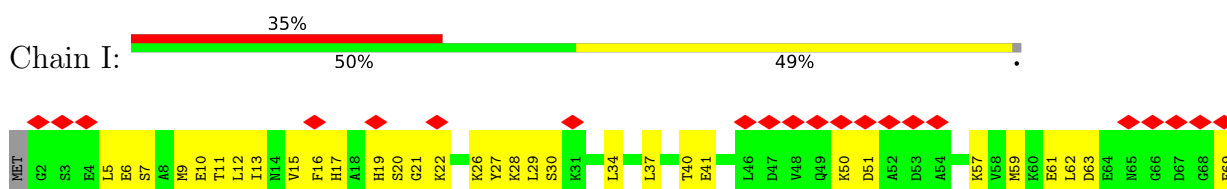
- Molecule 1: Peptidyl-prolyl cis-trans isomerase FKBP1A



- Molecule 1: Peptidyl-prolyl cis-trans isomerase FKBP1A

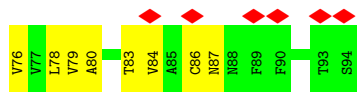
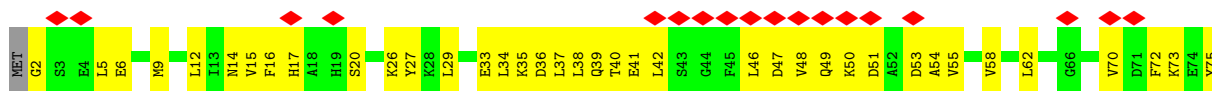


- Molecule 2: Protein S100A1

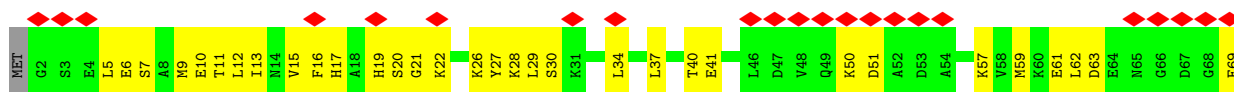




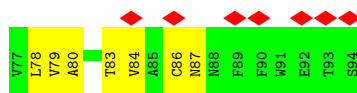
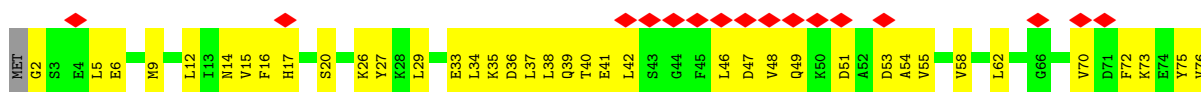
• Molecule 2: Protein S100A1



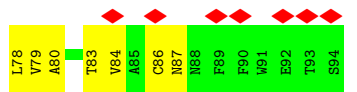
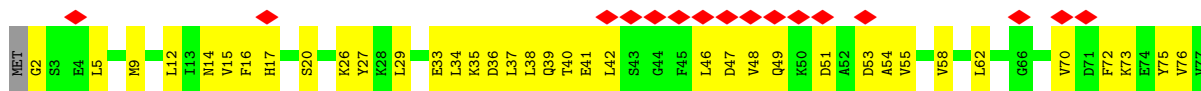
• Molecule 2: Protein S100A1



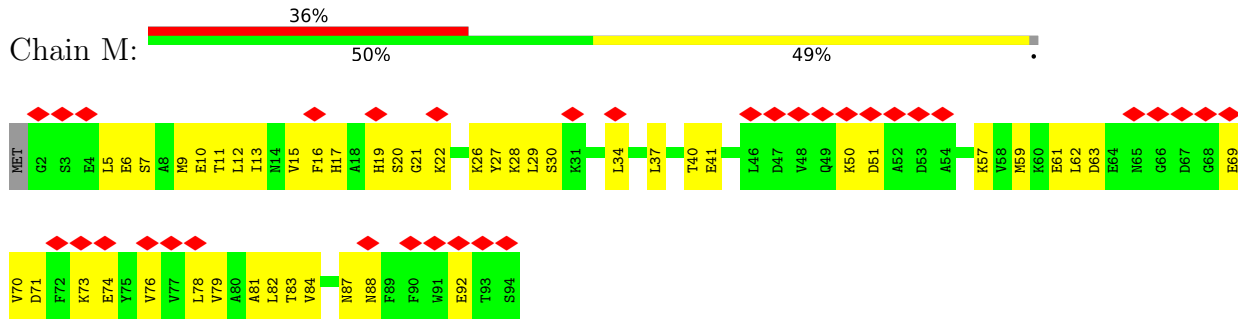
• Molecule 2: Protein S100A1



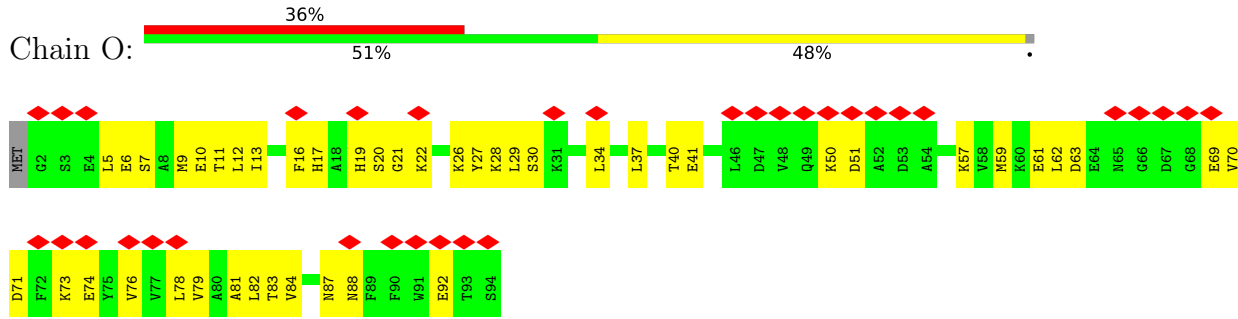
• Molecule 2: Protein S100A1



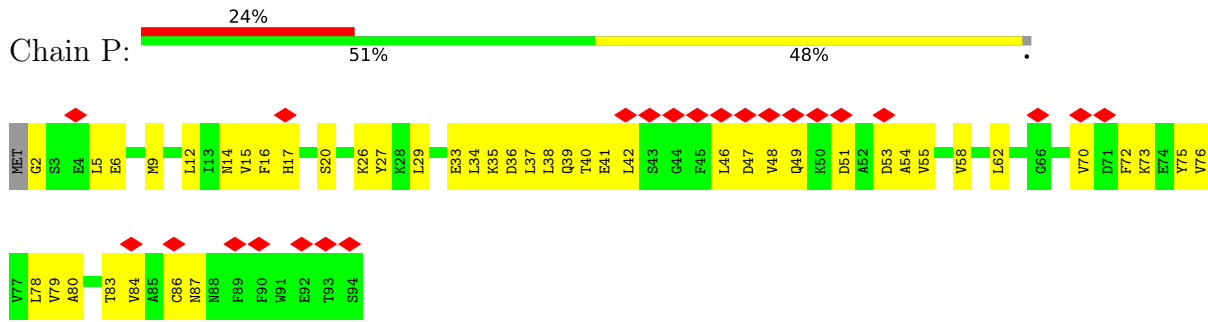
• Molecule 2: Protein S100A1



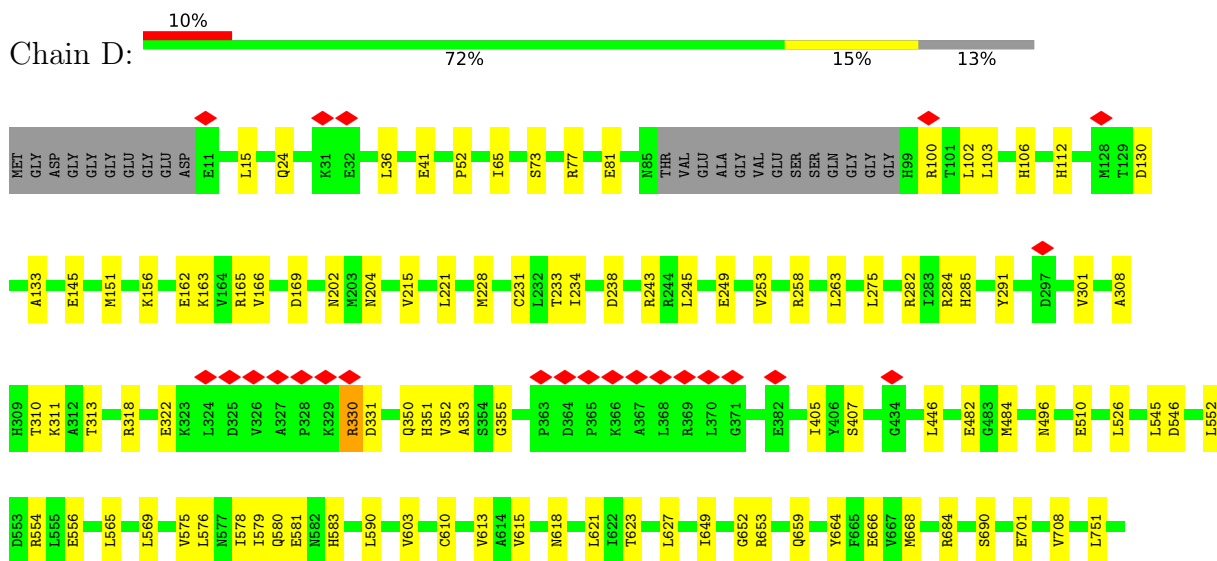
• Molecule 2: Protein S100A1

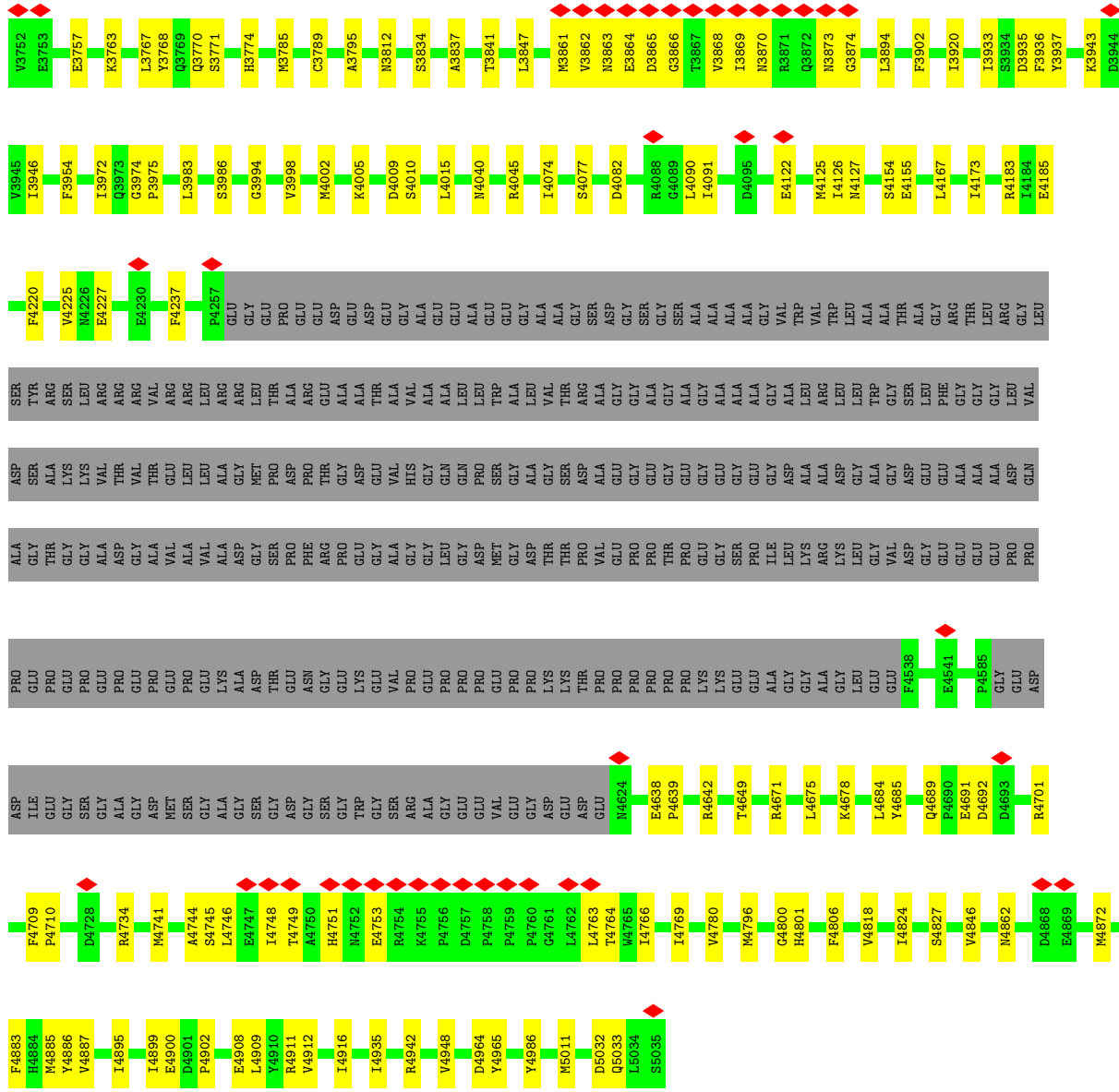


• Molecule 2: Protein S100A1

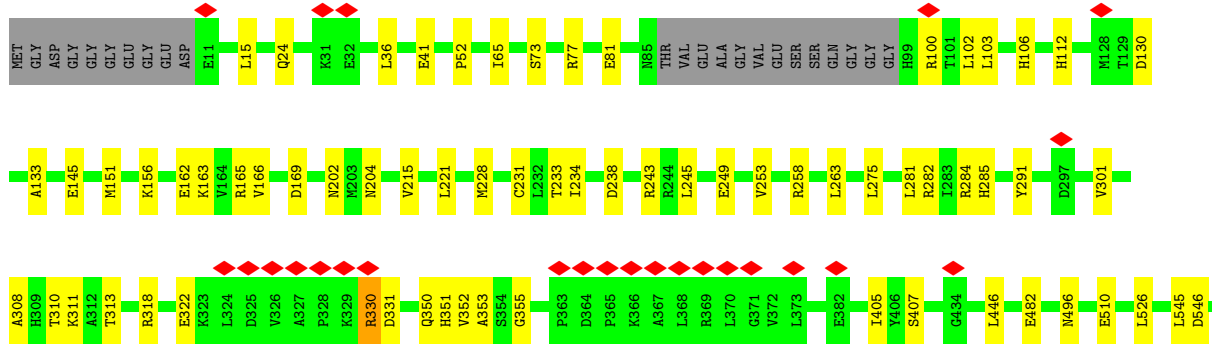


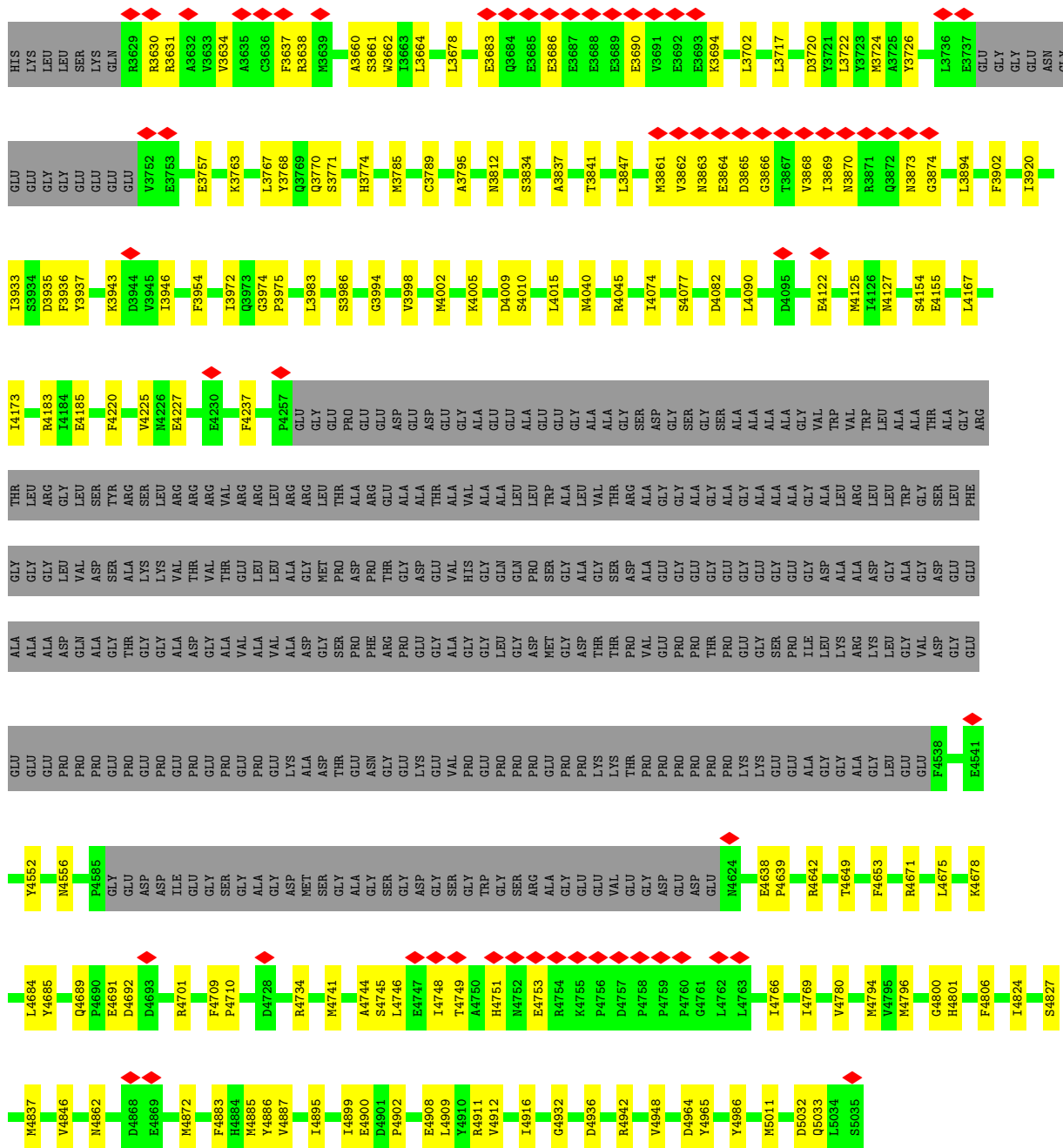
• Molecule 3: Ryanodine receptor 1



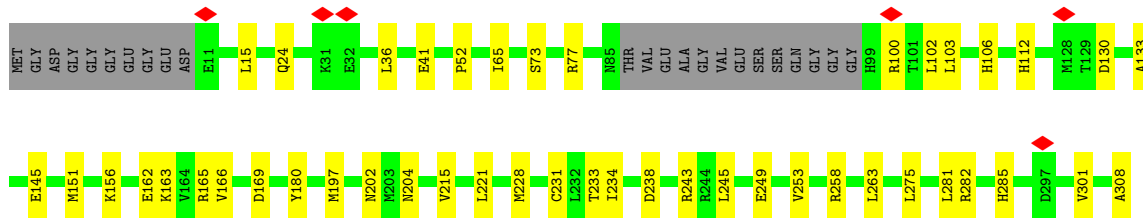


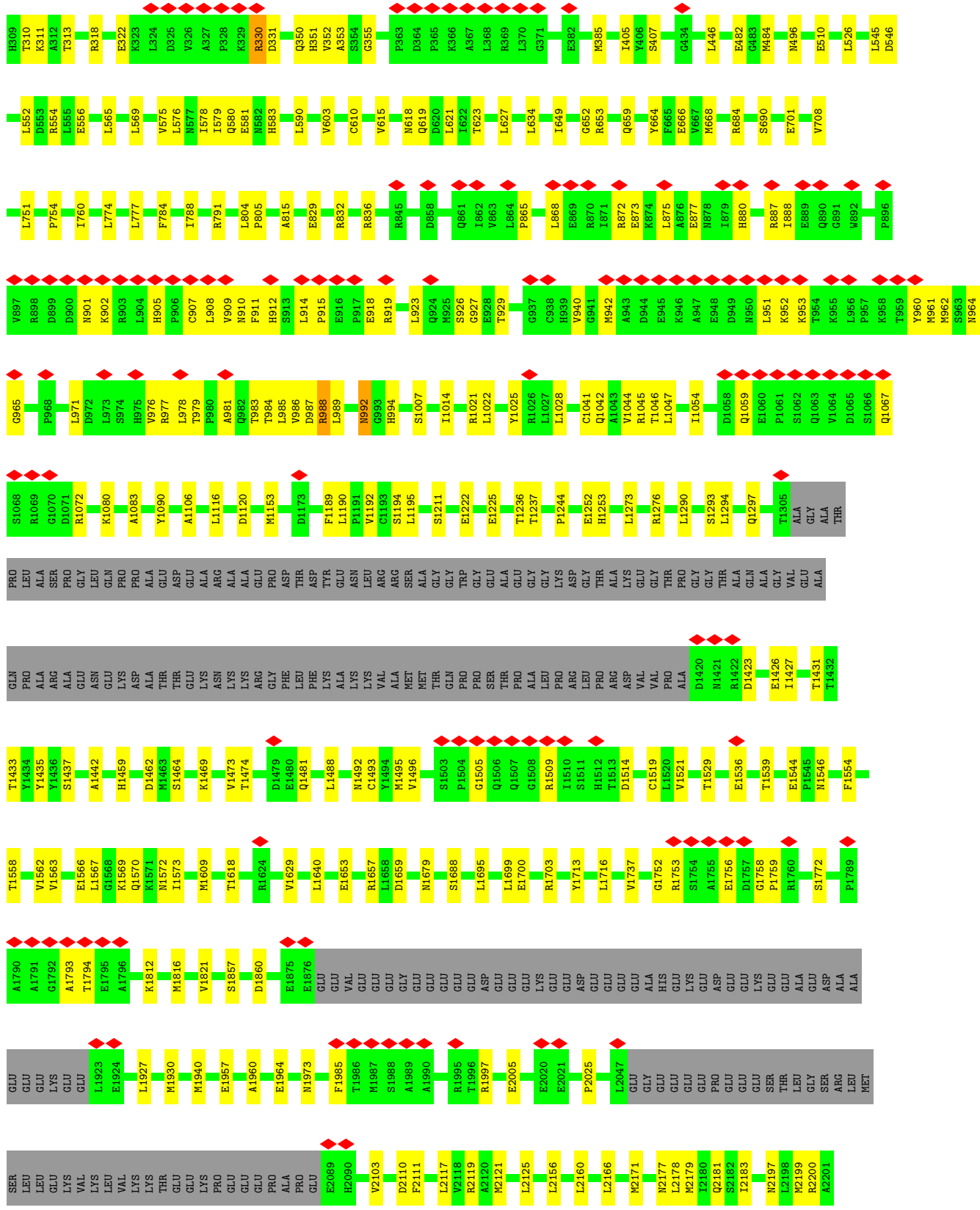
• Molecule 3: Ryanodine receptor 1



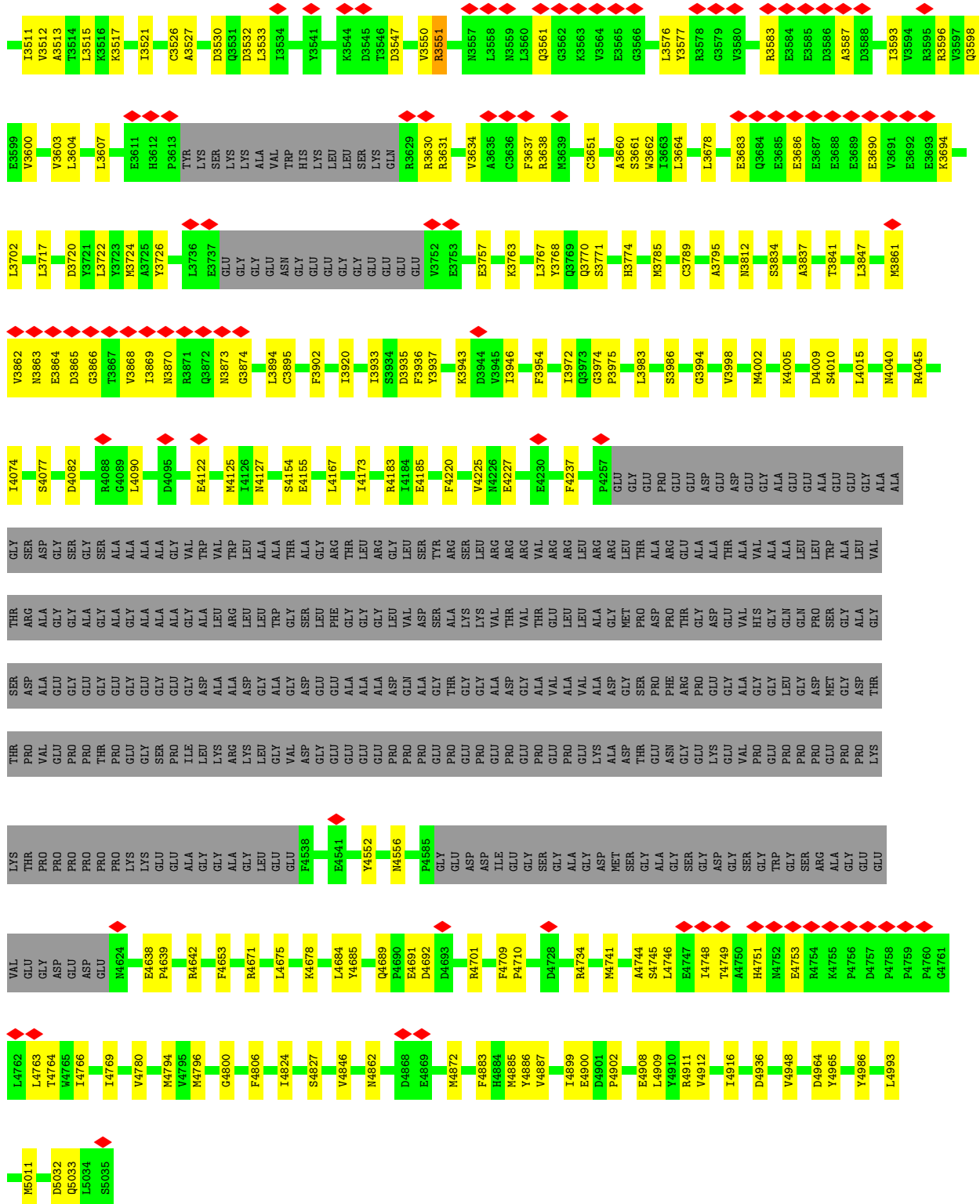


• Molecule 3: Ryanodine receptor 1



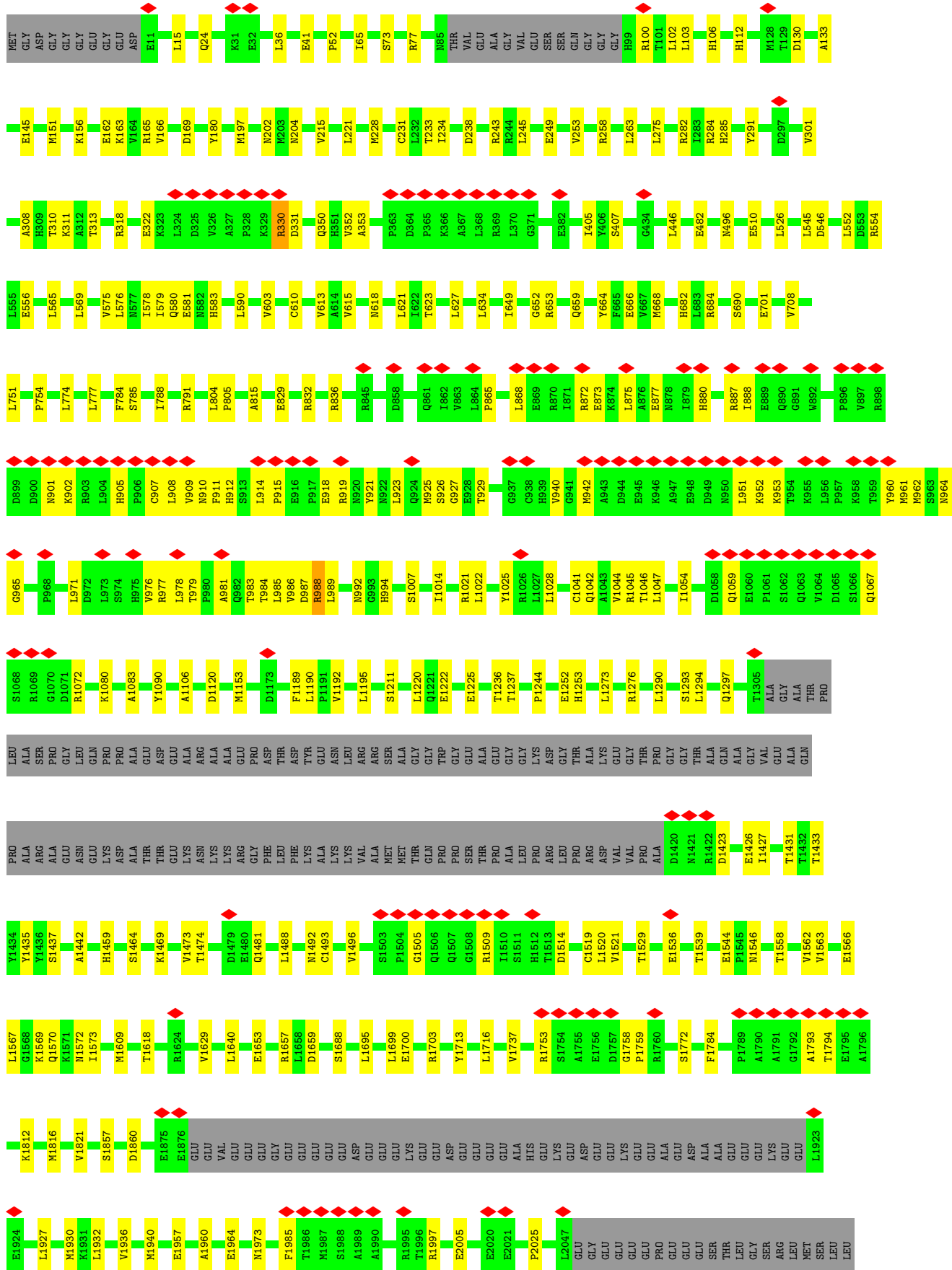


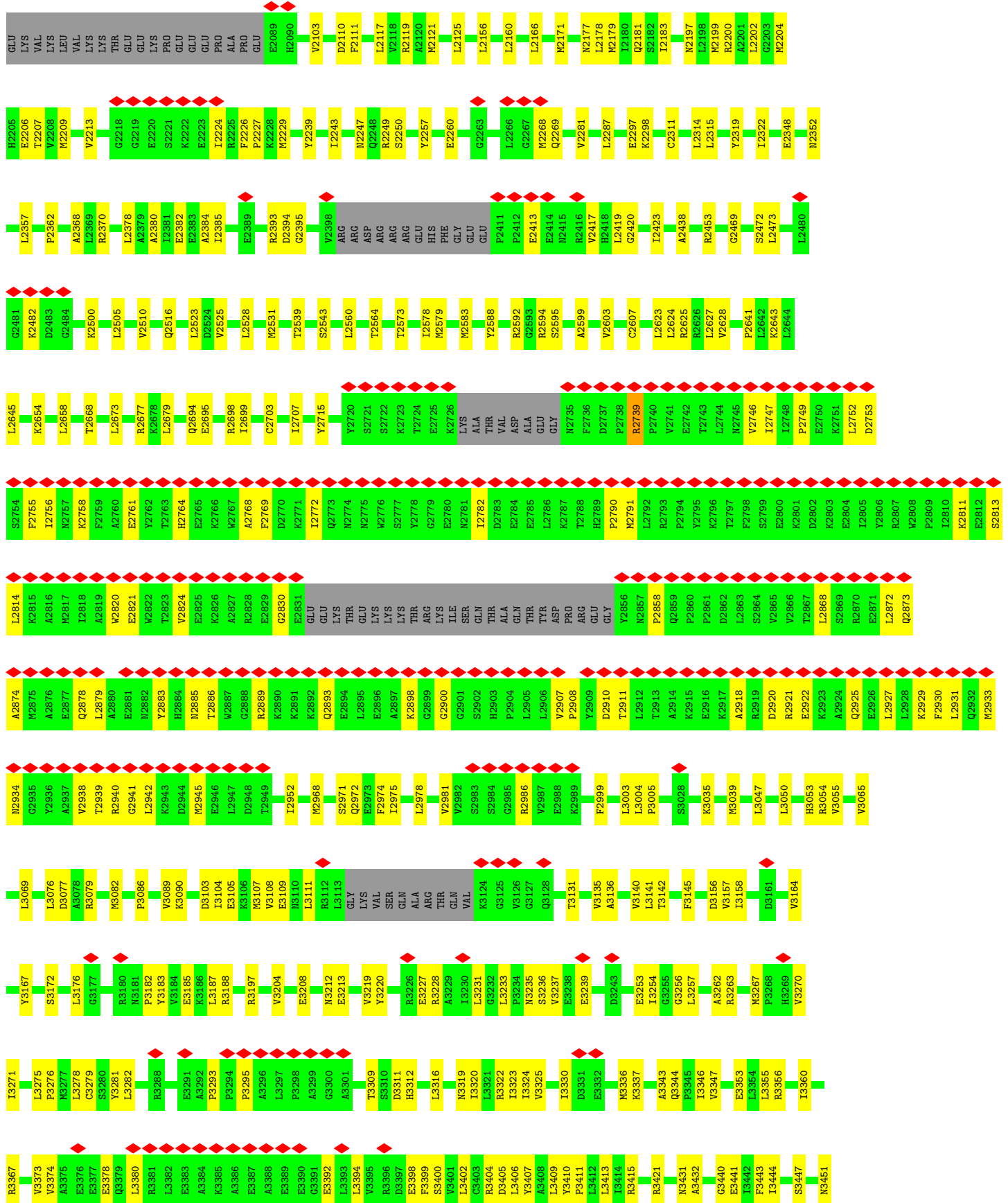
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L2357	P2362	H2365	A2368	L2369	R2370	L2378	A2379	A2380	L2381	E2382	E2385	A2384	I2385	E2389	R2393	D2394	G2395	V2398	ARG	ARG	ASP	ARG	ARG	ARG	GLU	HIS	PHE	GLY	GLU	P2411	P2412	E2413	E2414	N2415	R2416	V2417	H2418	L2419	G2420	I2423	D2432	R2436	C2437	A2438	R2453	G2469	S2472												
L2473	L2480	G2481	K2482	D2483	G2484	K2500	V2510	Q2516	L2523	D2524	V2525	L2528	M2531	T2539	S2543	L2560	T2564	T2573	I2578	M2579	M2583	Y2588	R2592	G2593	R2594	S2595	A2599	V2603	C2607	L2623	L2624	R2625	R2626	A2638	V2628	V2741	E2742	L2744	N2745	V2746	I2747	I2748																	
L2644	L2645	K2654	L2658	T2668	L2673	H2674	L2675	T2676	R2677	K2678	L2679	Q2694	E2695	R2698	L2699	A2700	M2701	P2702	C2703	I2707	Y2715	Y2720	S2721	S2722	K2723	T2724	E2725	K2726	LYS	ALA	THR	VAL	ASP	ALA	ALA	N2735	F2736	D2737	P2738	R2739	P2740	V2741	E2742	L2744	N2745	V2746	I2747	I2748											
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F2809	I2810	K2811	E2812	S2813	L2814	K2815	A2816	M2817	L2818	A2819	W2820	E2821	W2822	T2823	V2824	E2825	L2826	A2827	R2828	E2829	G2830	E2831	GLU	GLU	THR	GLU	LYS	LYS	THR	ARG	LYS	ILE	SER	GLN	THR	ALA	GLN	THR	TYR	ASP	PRO	ARG	GLU	GLY	V2856	N2857	P2858	Q2859	P2860	P2861	E2862	L2863	S2864	V2865	V2866	T2867	L2868		
S2869	R2870	E2871	L2872	Q2873	A2874	M2875	A2876	E2877	Q2878	L2879	A2880	E2881	N2882	Y2883	H2884	N2885	T2886	W2887	G2888	R2889	K2890	K2891	K2892	Q2893	E2894	L2895	E2896	A2897	K2898	G2899	G2900	G2901	S2902	H2903	P2904	L2905	L2906	V2907	P2908	Y2909	D2910	T2911	L2912	T2913	P2914	K2915	E2916	Q2917	A2918	R2919	D2920	E2922	K2923	A2924	Q2925	E2926	L2927	L2928	
K2929	F2930	L2931	Q2932	M2933	N2934	G2935	Y2936	A2937	V2938	T2939	R2940	G2941	L2942	K2943	D2944	M2945	E2946	L2947	D2948	T2949	I2952	M2968	S2971	Q2972	E2973	F2974	L2975	L2978	V2981	V2982	S2983	S2984	G2985	G2986	V2987	E2988	K2989	F2999	L3003	L3004	P3005	S3028	K3035	M3039	L3047	L3050													
H3053	K3054	V3055	V3065	L3069	L3076	D3077	A3078	R3079	M3082	P3086	P3086	V3089	K3090	D3103	I3104	E3105	K3106	K3107	V3108	E3109	N3110	L3111	R3112	L3113	GLY	LYS	VAL	SER	GLN	ALA	ARG	THR	GLN	VAL	K3124	G3125	V3126	G3127	Q3128	T3131	V3135	A3136	V3140	L3141	T3142	L3145	D3156	V3157											
I3158	D3161	V3164	Y3167	S3172	A3176	G3177	R3180	N3181	P3182	Y3183	V3184	E3185	K3186	L3187	R3197	V3204	E3208	M3212	E3213	V3219	Y3220	R3226	E3227	A3229	L3316	N3319	L3320	L3321	R3322	L3323	L3324	V3325	L3330	D3331	E3332	M3336	K3337	A3343	Q3344	P3345	L3346	V3347	A3353	E3354	L3355	R3356													
P3268	H3269	V3270	I3271	L3275	P3276	M3277	L3278	S3279	G3280	Y3281	L3282	R3288	E3291	A3292	P3293	P3294	P3295	A3296	L3297	P3298	A3299	G3300	A3301	T3309	S3310	D3311	H3312	L3316	N3319	L3320	L3321	R3322	L3323	L3324	V3325	L3330	D3331	E3332	M3336	K3337	A3343	Q3344	P3345	L3346	V3347	A3353	E3354	L3355	R3356										
I3360	R3367	V3373	V3374	A3375	E3376	E3377	E3378	Q3379	L3380	R3381	L3382	E3383	A3384	K3385	A3386	E3387	A3388	E3389	E3390	G3391	E3392	L3393	L3394	V3395	R3396	D3397	E3398	F3399	S3400	V3401	L3402	R3403	R3404	D3405	L3406	Y3407	A3408	L3409	Y3410	P3411	L3412	L3413	L3414	R3415	R3421	N3431	A3432	G3440	S3505	E3441	I3442	F3443	I3444						
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• Molecule 3: Ryanodine receptor 1







4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	31572	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	58	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1200	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.547	Depositor
Minimum map value	0.000	Depositor
Average map value	0.005	Depositor
Map value standard deviation	0.026	Depositor
Recommended contour level	0.13	Depositor
Map size (Å)	426.496, 426.496, 426.496	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.833, 0.833, 0.833	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PCW, ATP, CA, ZN, CFF

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	E	0.30	0/847	0.50	0/1142
1	F	0.30	0/847	0.50	0/1142
1	G	0.30	0/847	0.50	0/1142
1	H	0.30	0/847	0.50	0/1142
2	I	0.26	0/739	0.43	0/992
2	J	0.31	0/739	0.53	0/992
2	K	0.26	0/739	0.43	0/992
2	L	0.31	0/739	0.52	0/992
2	M	0.26	0/739	0.43	0/992
2	N	0.31	0/739	0.53	0/992
2	O	0.27	0/739	0.43	0/992
2	P	0.31	0/739	0.53	0/992
3	A	0.29	0/35638	0.49	0/48272
3	B	0.29	0/35638	0.49	0/48272
3	C	0.29	0/35638	0.49	0/48272
3	D	0.29	0/35638	0.49	0/48272
All	All	0.29	0/151852	0.49	0/205592

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	829	0	826	10	0
1	F	829	0	826	9	0
1	G	829	0	826	11	0
1	H	829	0	826	10	0
2	I	729	0	705	50	0
2	J	729	0	705	53	0
2	K	729	0	705	51	0
2	L	729	0	705	52	0
2	M	729	0	705	51	0
2	N	729	0	705	51	0
2	O	729	0	705	49	0
2	P	729	0	705	52	0
3	A	34849	0	34448	540	0
3	B	34849	0	34448	543	0
3	C	34849	0	34448	538	0
3	D	34849	0	34448	532	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
4	I	2	0	0	0	0
4	J	2	0	0	0	0
4	K	2	0	0	0	0
4	L	2	0	0	0	0
4	M	2	0	0	0	0
4	N	2	0	0	0	0
4	O	2	0	0	0	0
4	P	2	0	0	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
6	A	14	0	10	0	0
6	B	14	0	10	0	0
6	C	14	0	10	0	0
6	D	14	0	10	0	0
7	A	62	0	24	2	0
7	B	62	0	24	2	0
7	C	62	0	24	3	0
7	D	62	0	24	3	0
8	A	108	0	167	6	0
8	B	108	0	167	6	0
8	C	108	0	167	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
8	D	108	0	167	5	0
All	All	149304	0	147540	2468	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 8.

The worst 5 of 2468 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:I:10:GLU:OE2	3:A:2694:GLN:NE2	1.72	1.23
3:C:2694:GLN:NE2	2:M:10:GLU:OE2	1.72	1.23
3:D:2694:GLN:NE2	2:O:10:GLU:OE2	1.72	1.22
3:B:2694:GLN:NE2	2:K:10:GLU:OE2	1.72	1.21
3:A:875:LEU:HD11	3:A:1047:LEU:HD21	1.41	1.02

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	E	105/108 (97%)	98 (93%)	7 (7%)	0	100	100
1	F	105/108 (97%)	99 (94%)	6 (6%)	0	100	100
1	G	105/108 (97%)	100 (95%)	5 (5%)	0	100	100
1	H	105/108 (97%)	100 (95%)	5 (5%)	0	100	100
2	I	91/94 (97%)	86 (94%)	5 (6%)	0	100	100
2	J	91/94 (97%)	83 (91%)	8 (9%)	0	100	100
2	K	91/94 (97%)	86 (94%)	5 (6%)	0	100	100
2	L	91/94 (97%)	83 (91%)	8 (9%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	M	91/94 (97%)	86 (94%)	5 (6%)	0	100	100
2	N	91/94 (97%)	83 (91%)	8 (9%)	0	100	100
2	O	91/94 (97%)	86 (94%)	5 (6%)	0	100	100
2	P	91/94 (97%)	83 (91%)	8 (9%)	0	100	100
3	A	4351/5035 (86%)	4238 (97%)	113 (3%)	0	100	100
3	B	4351/5035 (86%)	4240 (97%)	111 (3%)	0	100	100
3	C	4351/5035 (86%)	4241 (98%)	110 (2%)	0	100	100
3	D	4351/5035 (86%)	4240 (97%)	111 (3%)	0	100	100
All	All	18552/21324 (87%)	18032 (97%)	520 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	E	89/90 (99%)	89 (100%)	0	100	100
1	F	89/90 (99%)	89 (100%)	0	100	100
1	G	89/90 (99%)	89 (100%)	0	100	100
1	H	89/90 (99%)	89 (100%)	0	100	100
2	I	80/81 (99%)	78 (98%)	2 (2%)	47	75
2	J	80/81 (99%)	80 (100%)	0	100	100
2	K	80/81 (99%)	78 (98%)	2 (2%)	47	75
2	L	80/81 (99%)	80 (100%)	0	100	100
2	M	80/81 (99%)	78 (98%)	2 (2%)	47	75
2	N	80/81 (99%)	80 (100%)	0	100	100
2	O	80/81 (99%)	78 (98%)	2 (2%)	47	75
2	P	80/81 (99%)	80 (100%)	0	100	100
3	A	3811/4296 (89%)	3798 (100%)	13 (0%)	92	97

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	B	3811/4296 (89%)	3798 (100%)	13 (0%)	92	97
3	C	3811/4296 (89%)	3798 (100%)	13 (0%)	92	97
3	D	3811/4296 (89%)	3798 (100%)	13 (0%)	92	97
All	All	16240/18192 (89%)	16180 (100%)	60 (0%)	91	97

5 of 60 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	B	330	ARG
2	K	57	LYS
3	B	2739	ARG
2	K	22	LYS
2	O	57	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 24 such sidechains are listed below:

Mol	Chain	Res	Type
3	B	2128	GLN
3	C	106	HIS
3	B	3181	ASN
3	C	726	HIS
3	A	726	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry

Of 44 ligands modelled in this entry, 24 are monoatomic - leaving 20 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
7	ATP	B	8005	-	26,33,33	0.61	0	31,52,52	1.07	2 (6%)
7	ATP	D	8003	-	26,33,33	0.68	0	31,52,52	0.71	1 (3%)
8	PCW	B	8006	-	53,53,53	1.14	3 (5%)	59,61,61	2.36	9 (15%)
6	CFF	B	8002	-	8,15,15	0.91	0	8,23,23	2.82	2 (25%)
8	PCW	A	8006	-	53,53,53	1.13	3 (5%)	59,61,61	2.36	9 (15%)
8	PCW	C	5101	-	53,53,53	1.14	4 (7%)	59,61,61	2.30	9 (15%)
7	ATP	C	5104	-	26,33,33	0.68	0	31,52,52	0.72	1 (3%)
8	PCW	B	8007	-	53,53,53	1.14	4 (7%)	59,61,61	2.30	9 (15%)
8	PCW	D	8007	-	53,53,53	1.14	4 (7%)	59,61,61	2.30	9 (15%)
8	PCW	C	5107	-	53,53,53	1.14	3 (5%)	59,61,61	2.36	9 (15%)
8	PCW	D	8006	-	53,53,53	1.14	3 (5%)	59,61,61	2.36	9 (15%)
7	ATP	B	8003	-	26,33,33	0.68	0	31,52,52	0.72	1 (3%)
6	CFF	A	8002	-	8,15,15	0.90	0	8,23,23	2.79	2 (25%)
8	PCW	A	8007	-	53,53,53	1.14	4 (7%)	59,61,61	2.30	9 (15%)
7	ATP	D	8005	-	26,33,33	0.61	0	31,52,52	1.07	2 (6%)
7	ATP	A	8003	-	26,33,33	0.68	0	31,52,52	0.71	1 (3%)
6	CFF	C	5103	-	8,15,15	0.91	0	8,23,23	2.80	2 (25%)
6	CFF	D	8002	-	8,15,15	0.92	0	8,23,23	2.83	2 (25%)
7	ATP	A	8005	-	26,33,33	0.60	0	31,52,52	1.07	2 (6%)
7	ATP	C	5106	-	26,33,33	0.61	0	31,52,52	1.07	2 (6%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	ATP	B	8005	-	-	5/18/38/38	0/3/3/3
7	ATP	D	8003	-	-	7/18/38/38	0/3/3/3
8	PCW	B	8006	-	-	21/57/57/57	-
6	CFF	B	8002	-	-	-	0/2/2/2
8	PCW	A	8006	-	-	21/57/57/57	-
8	PCW	C	5101	-	-	20/57/57/57	-
7	ATP	C	5104	-	-	7/18/38/38	0/3/3/3
8	PCW	B	8007	-	-	20/57/57/57	-
8	PCW	D	8007	-	-	20/57/57/57	-
8	PCW	C	5107	-	-	21/57/57/57	-
8	PCW	D	8006	-	-	21/57/57/57	-
7	ATP	B	8003	-	-	7/18/38/38	0/3/3/3
6	CFF	A	8002	-	-	-	0/2/2/2
8	PCW	A	8007	-	-	20/57/57/57	-
7	ATP	D	8005	-	-	5/18/38/38	0/3/3/3
7	ATP	A	8003	-	-	7/18/38/38	0/3/3/3
6	CFF	C	5103	-	-	-	0/2/2/2
6	CFF	D	8002	-	-	-	0/2/2/2
7	ATP	A	8005	-	-	5/18/38/38	0/3/3/3
7	ATP	C	5106	-	-	5/18/38/38	0/3/3/3

The worst 5 of 28 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	D	8006	PCW	O3-C11	3.07	1.42	1.33
8	A	8006	PCW	O3-C11	3.07	1.42	1.33
8	B	8006	PCW	O3-C11	3.07	1.42	1.33
8	C	5107	PCW	O3-C11	3.07	1.42	1.33
8	A	8007	PCW	O3-C11	3.03	1.42	1.33

The worst 5 of 92 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	A	8006	PCW	C8-N-C6	11.85	139.44	108.97
8	C	5107	PCW	C8-N-C6	11.85	139.44	108.97
8	D	8006	PCW	C8-N-C6	11.84	139.42	108.97
8	B	8006	PCW	C8-N-C6	11.84	139.42	108.97
8	B	8007	PCW	C8-N-C6	11.22	137.81	108.97

There are no chirality outliers.

5 of 212 torsion outliers are listed below:

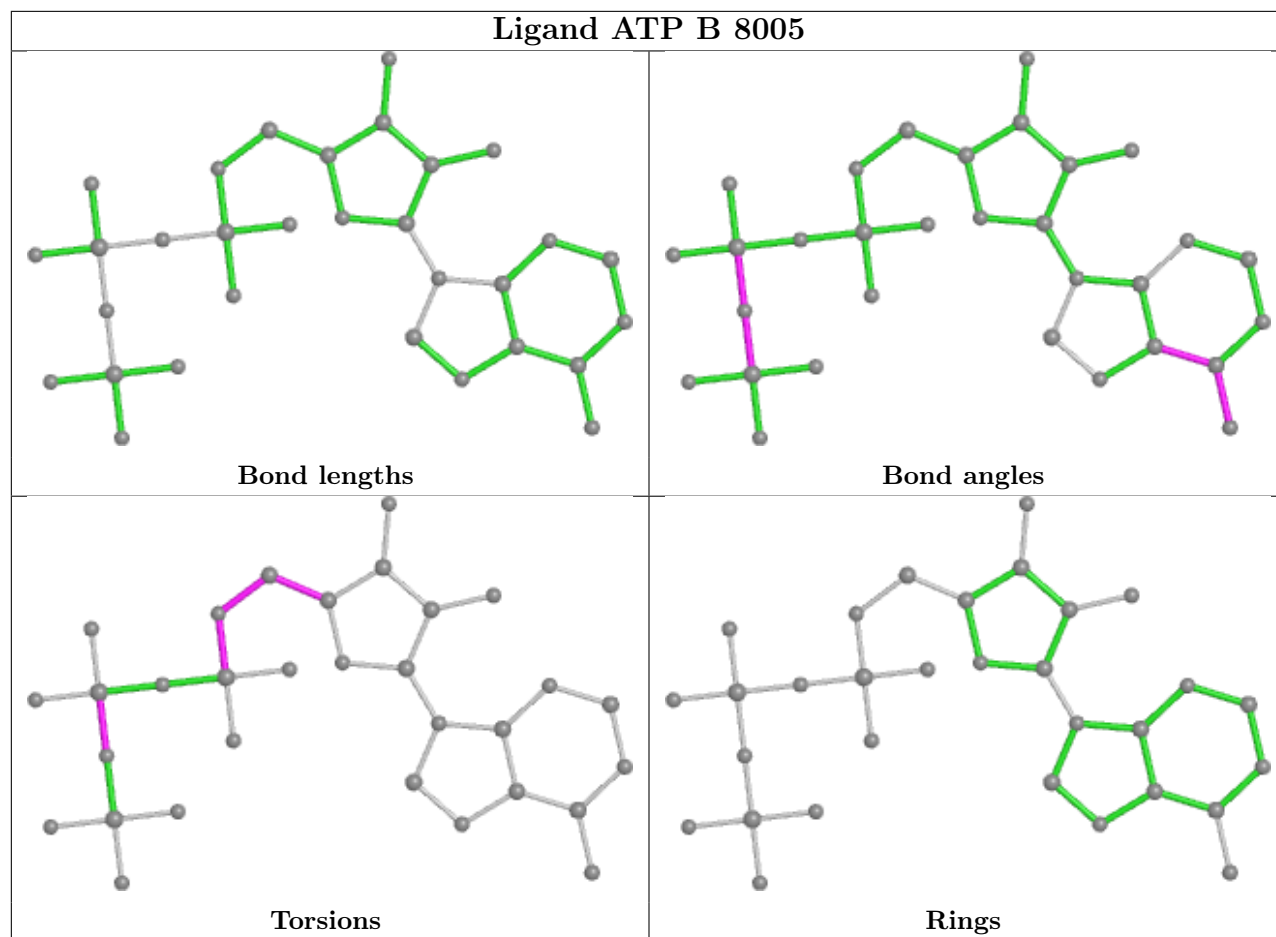
Mol	Chain	Res	Type	Atoms
7	D	8003	ATP	C5'-O5'-PA-O1A
7	D	8005	ATP	C5'-O5'-PA-O1A
7	A	8003	ATP	C5'-O5'-PA-O1A
7	A	8005	ATP	C5'-O5'-PA-O1A
7	B	8003	ATP	C5'-O5'-PA-O1A

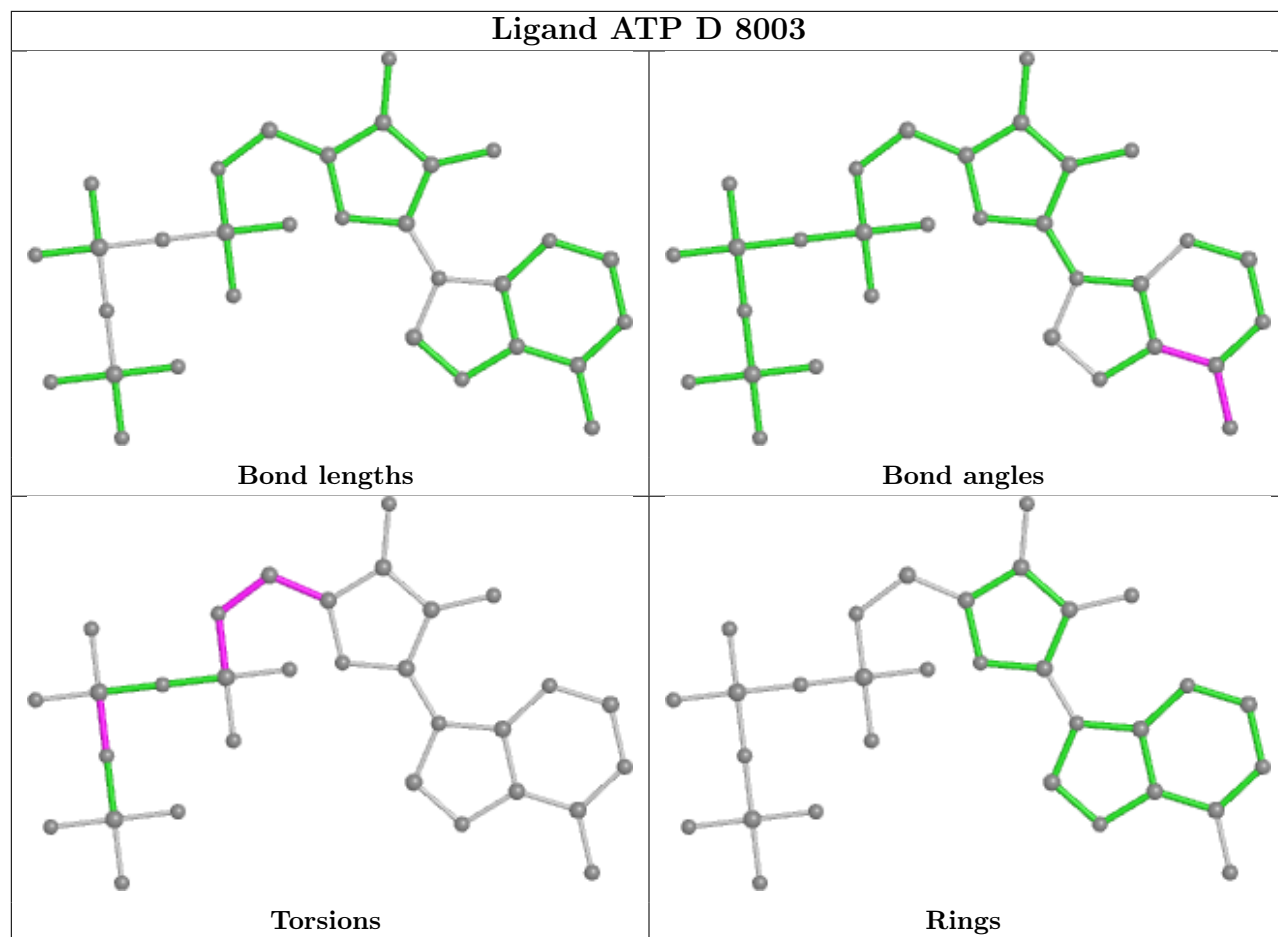
There are no ring outliers.

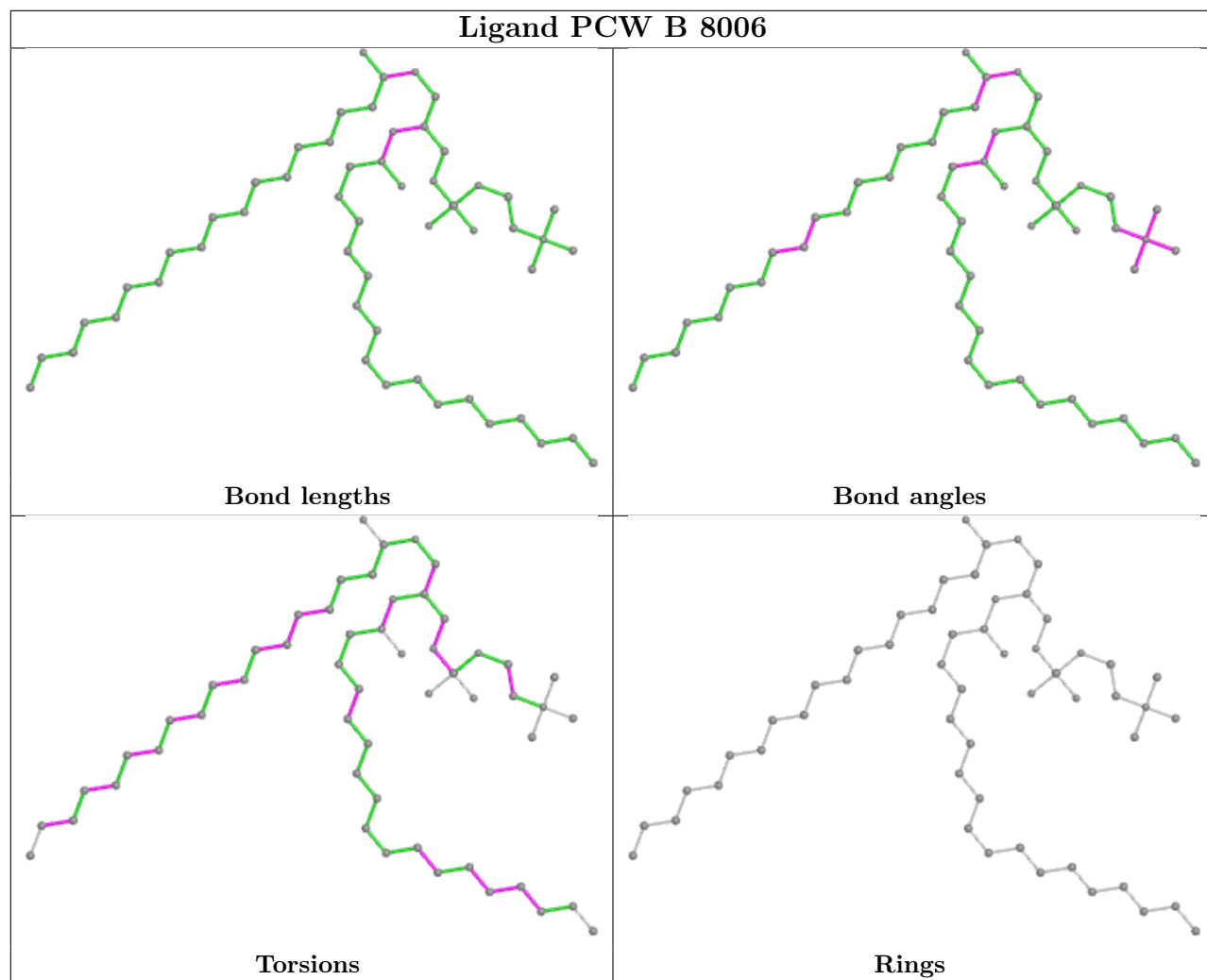
12 monomers are involved in 27 short contacts:

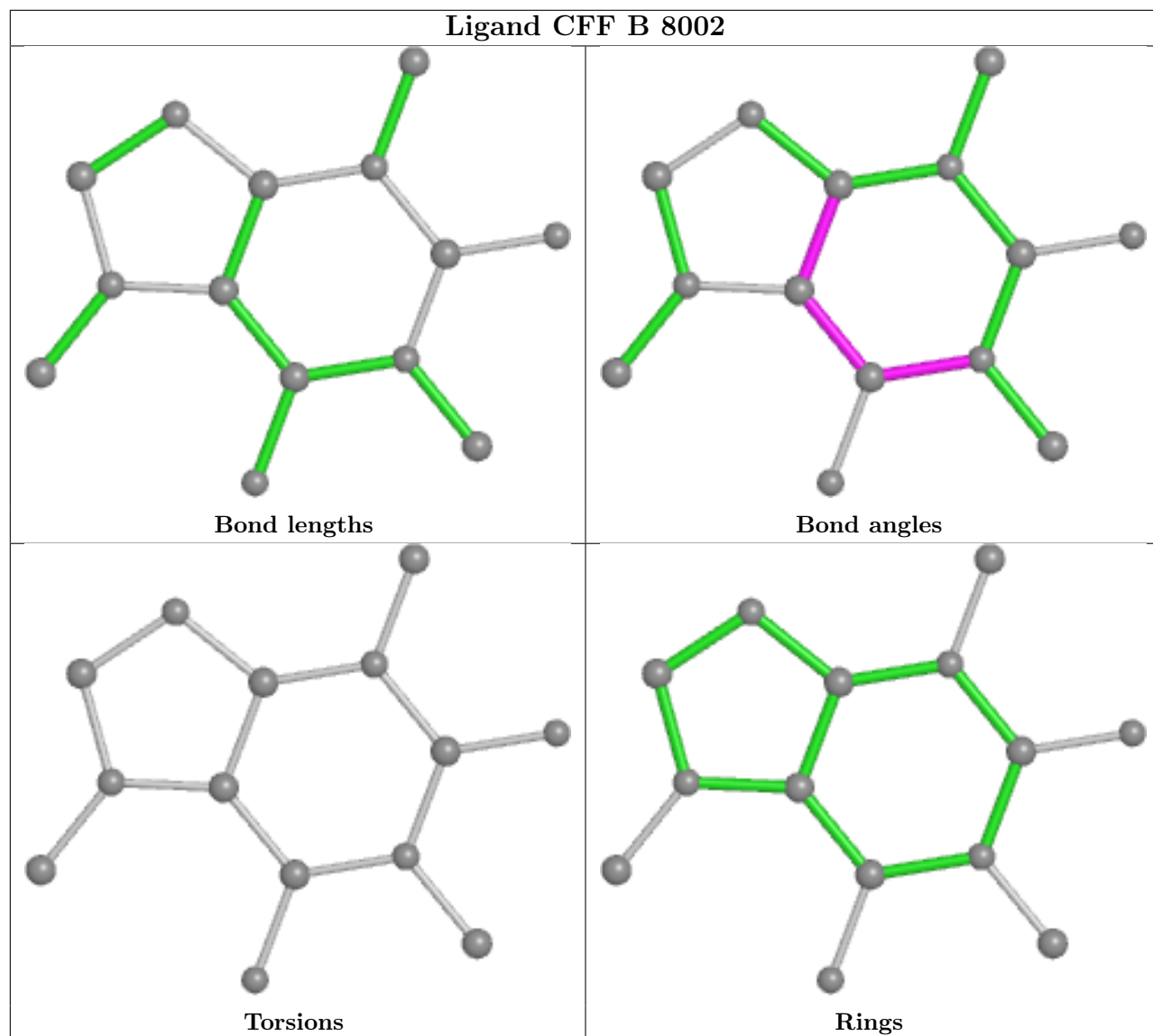
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	8005	ATP	2	0
8	B	8006	PCW	1	0
8	A	8006	PCW	2	0
8	C	5101	PCW	3	0
8	B	8007	PCW	5	0
8	D	8007	PCW	4	0
8	C	5107	PCW	1	0
8	D	8006	PCW	1	0
8	A	8007	PCW	4	0
7	D	8005	ATP	3	0
7	A	8005	ATP	2	0
7	C	5106	ATP	3	0

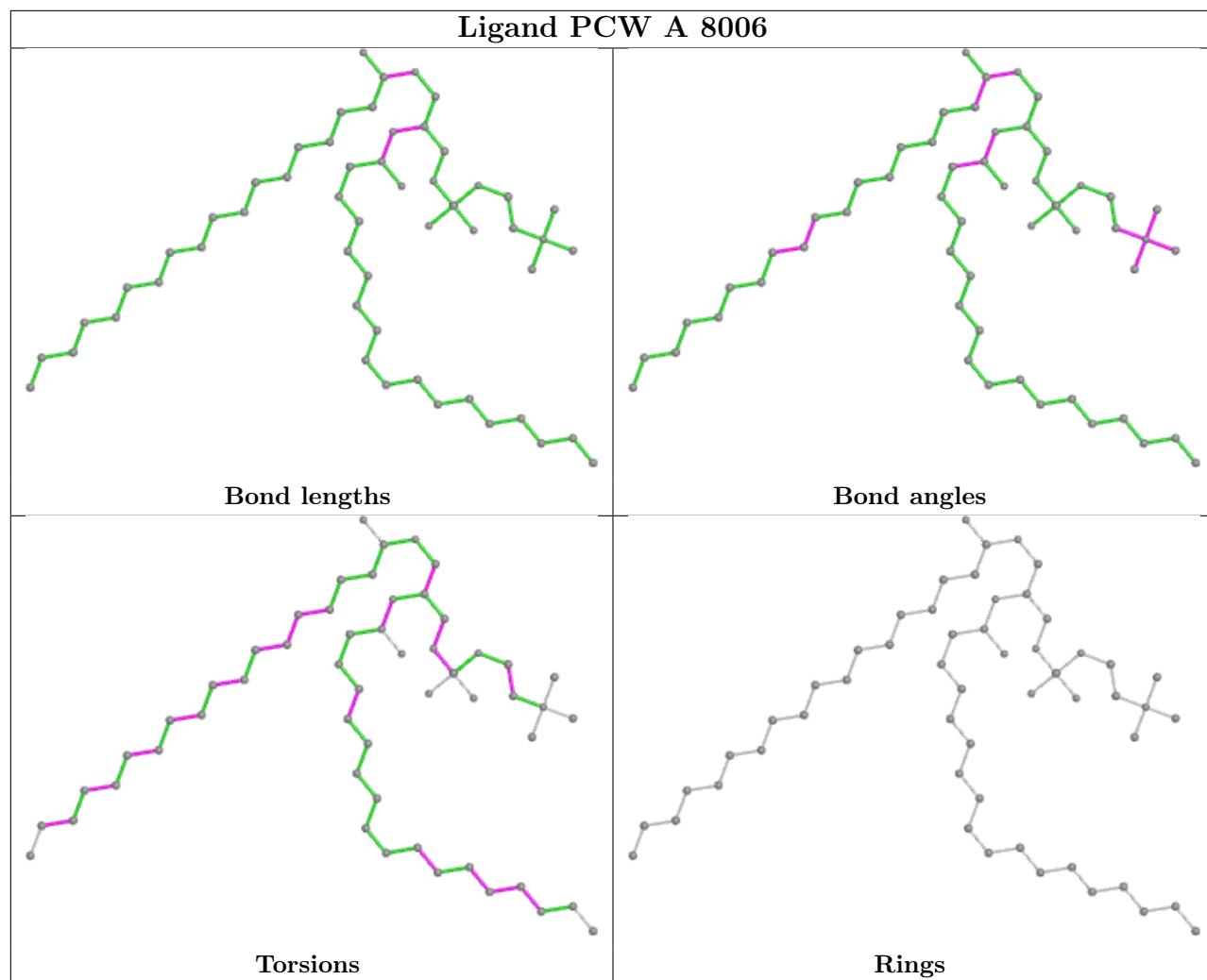
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

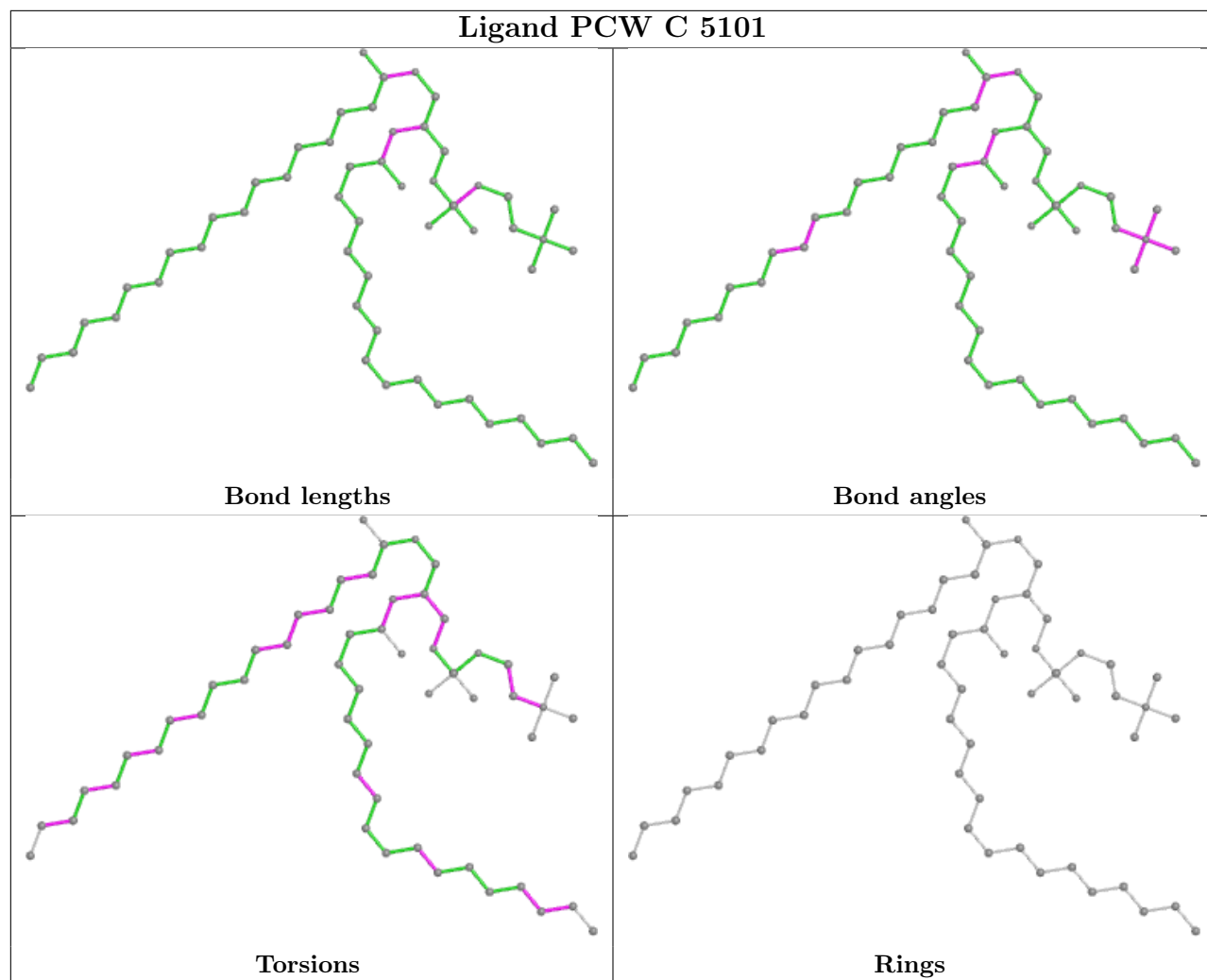


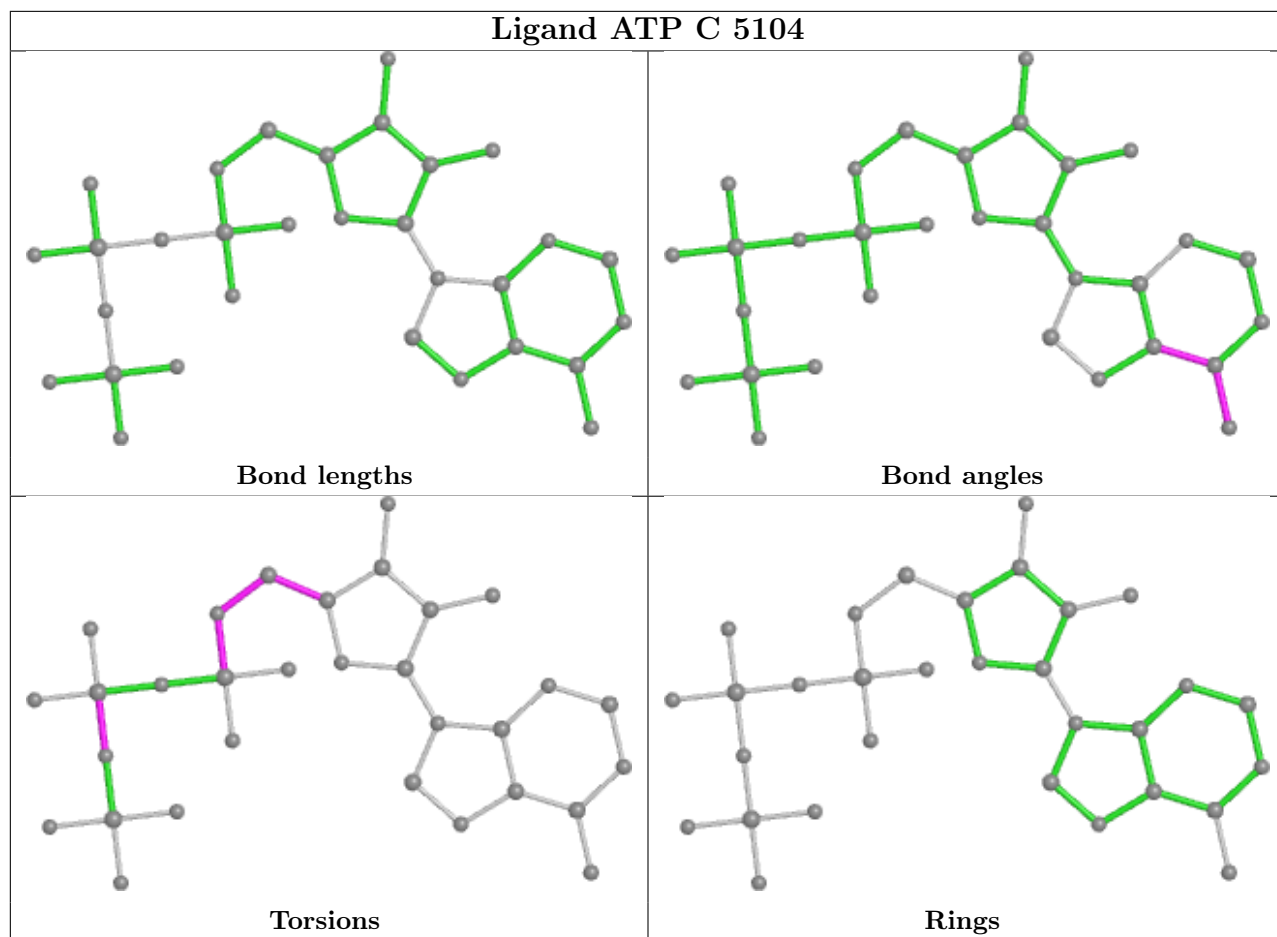


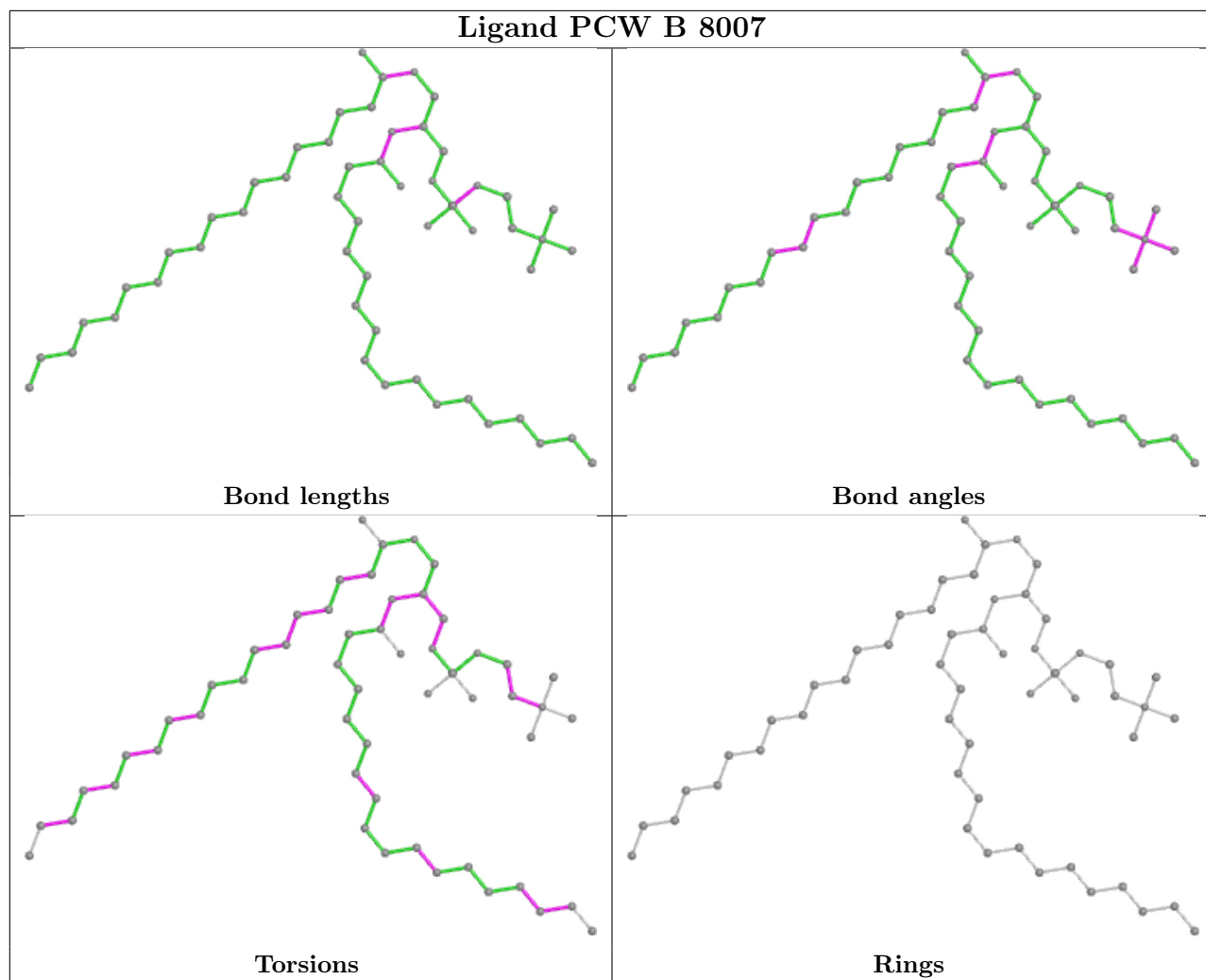


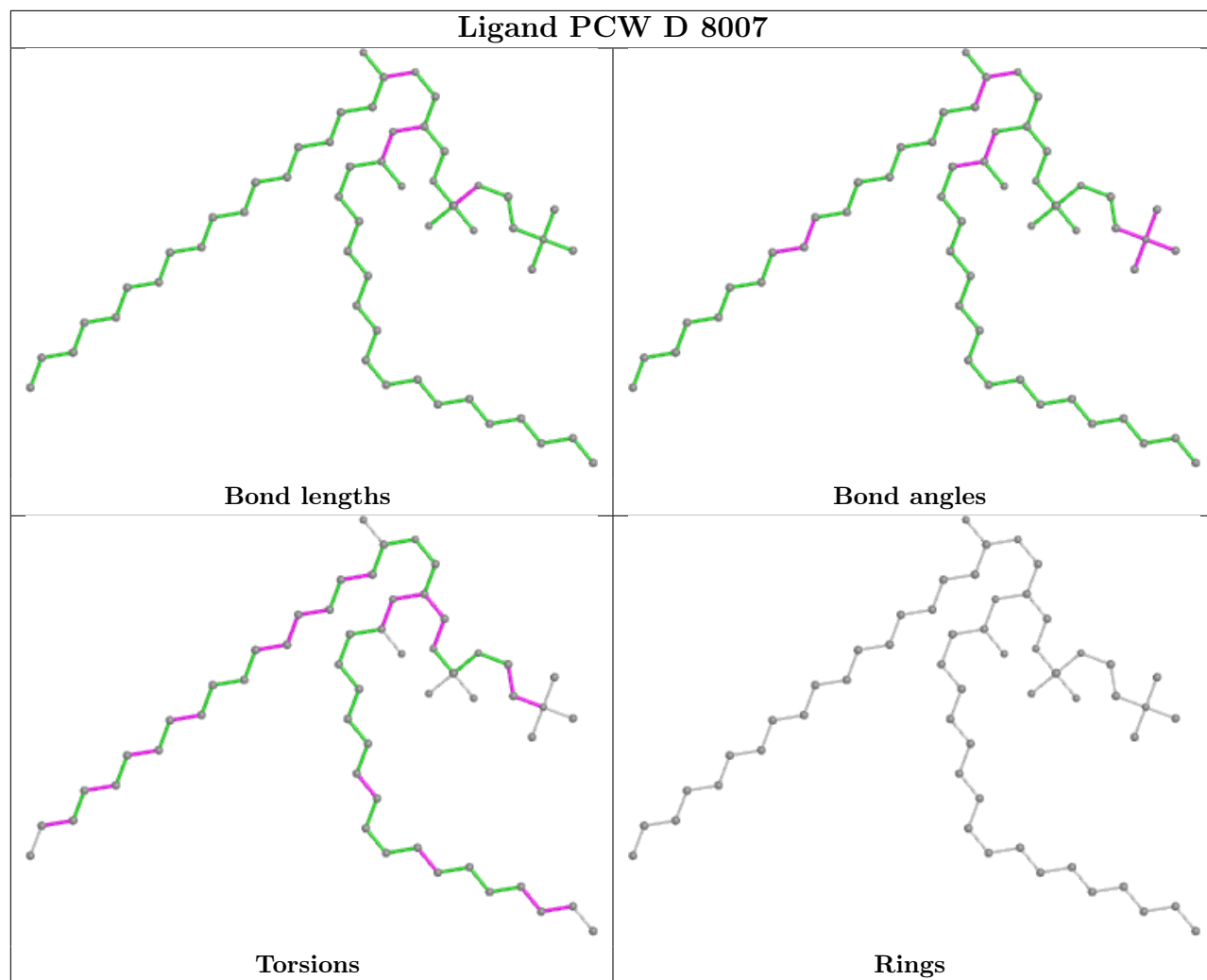


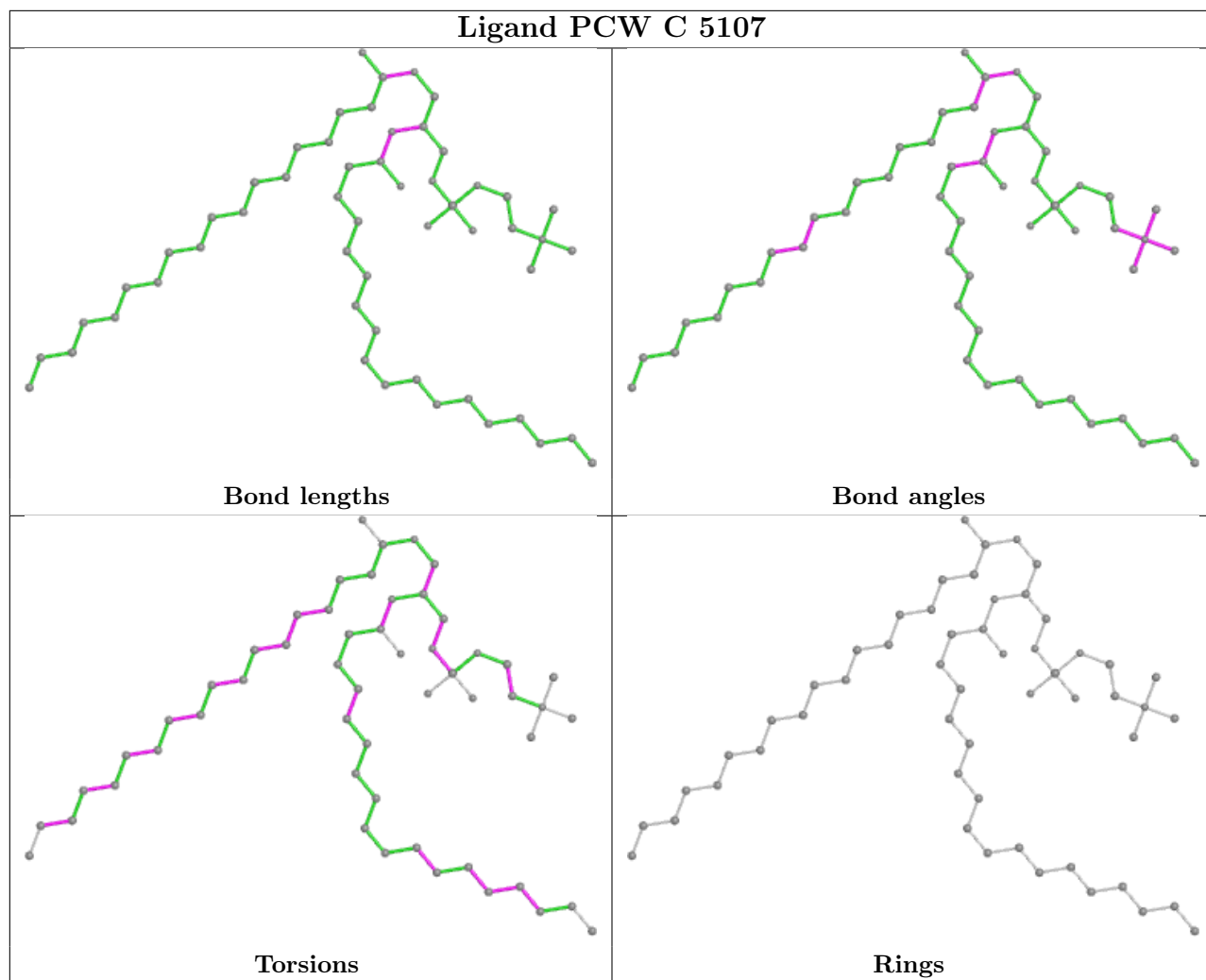


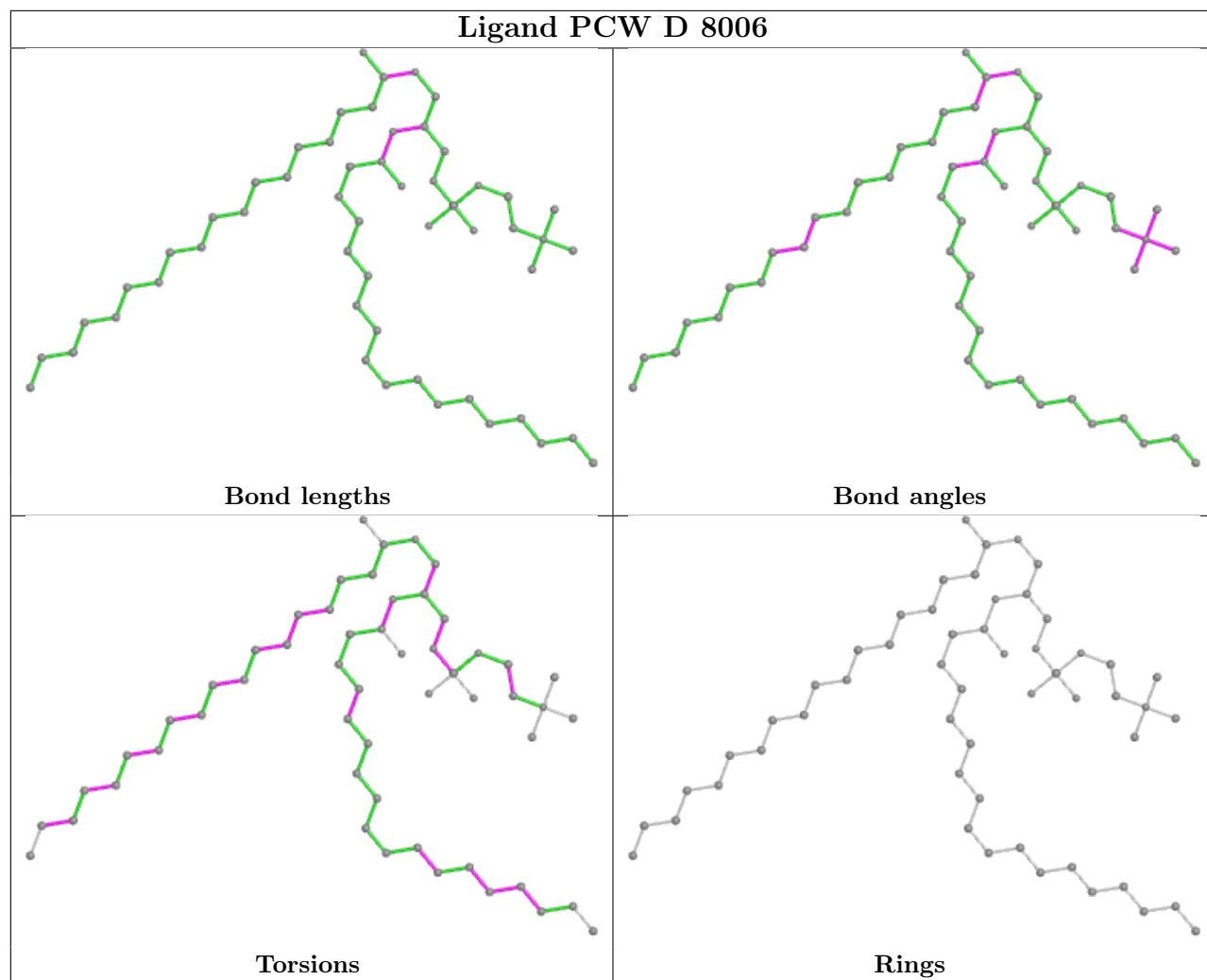


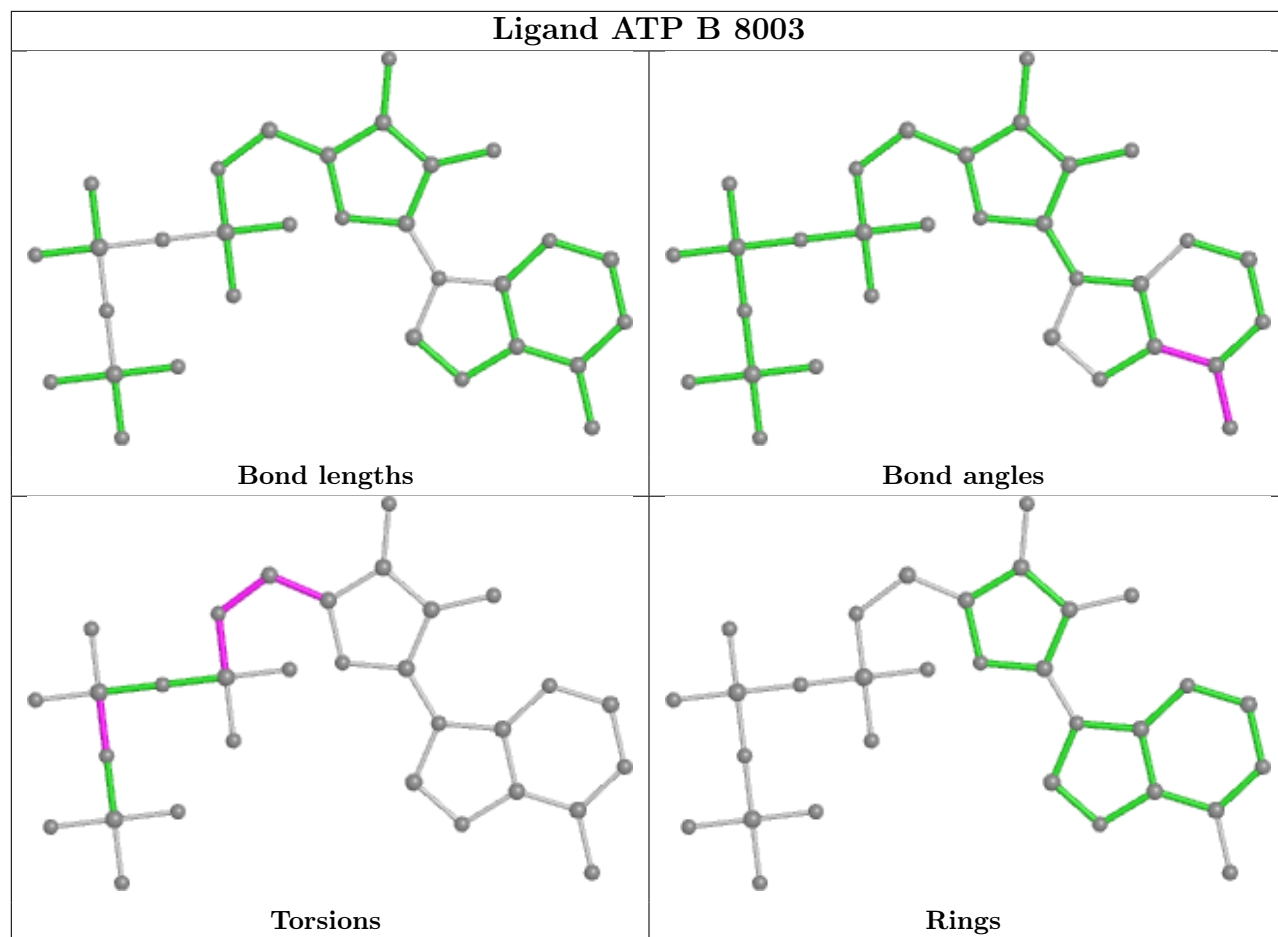


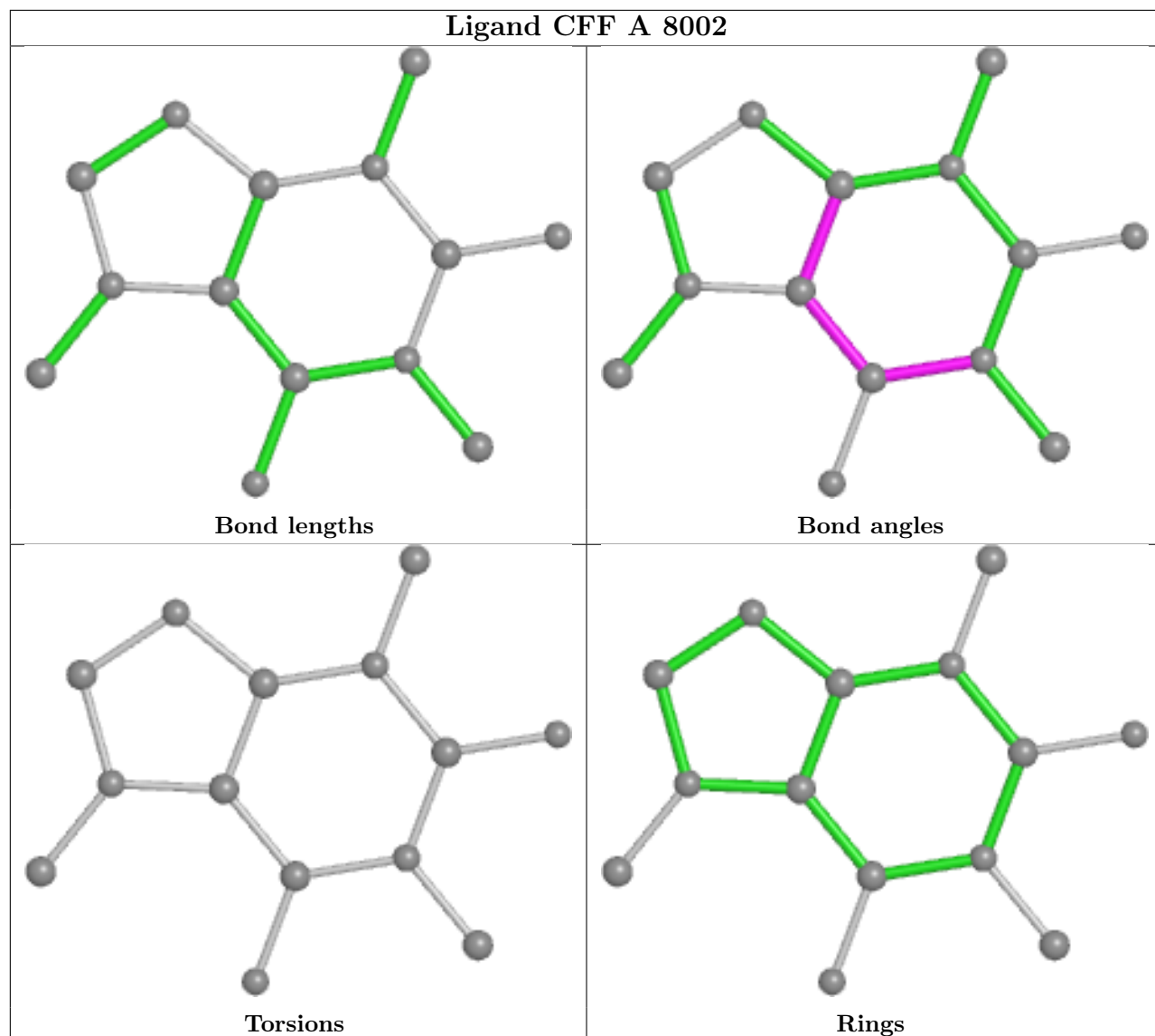


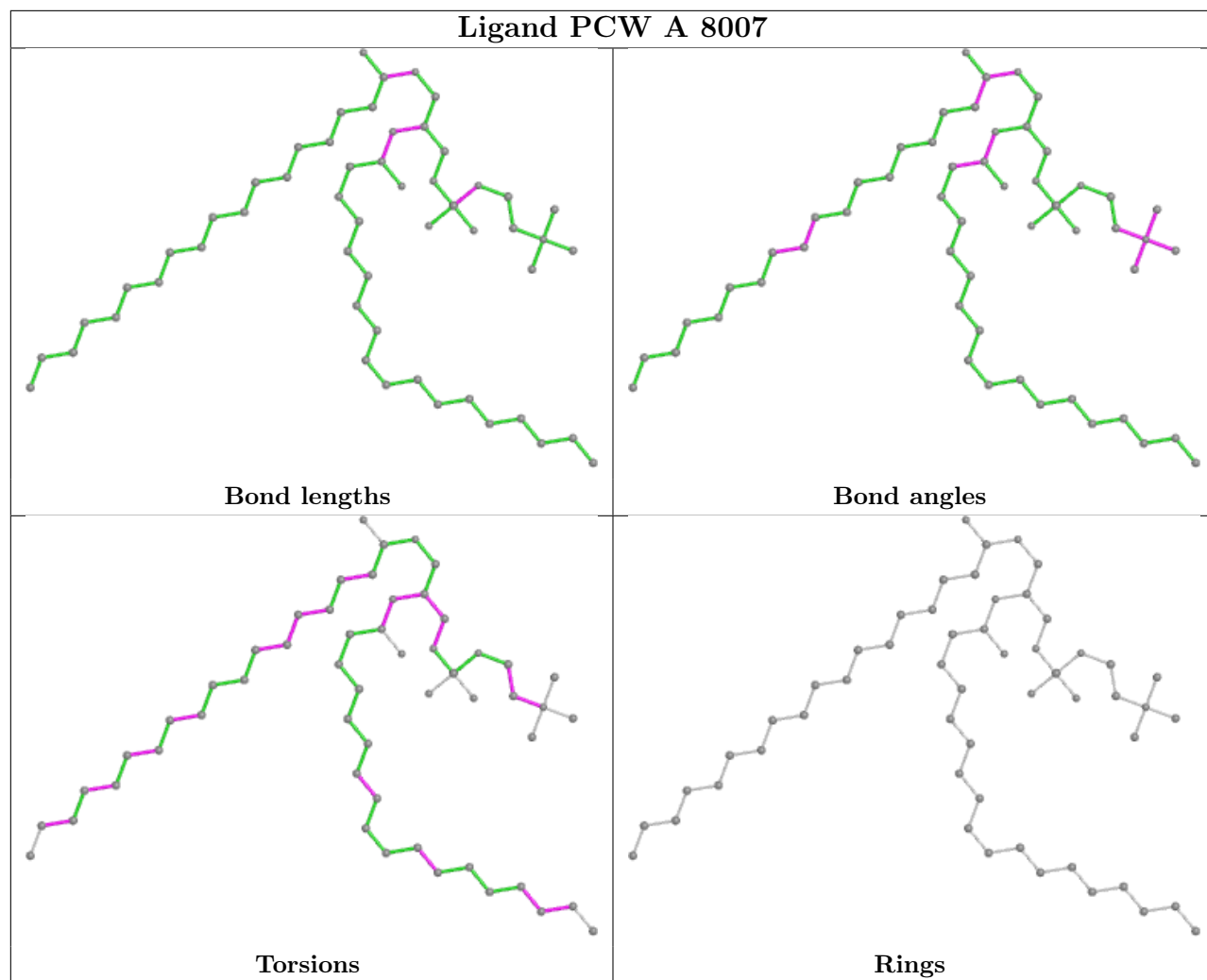


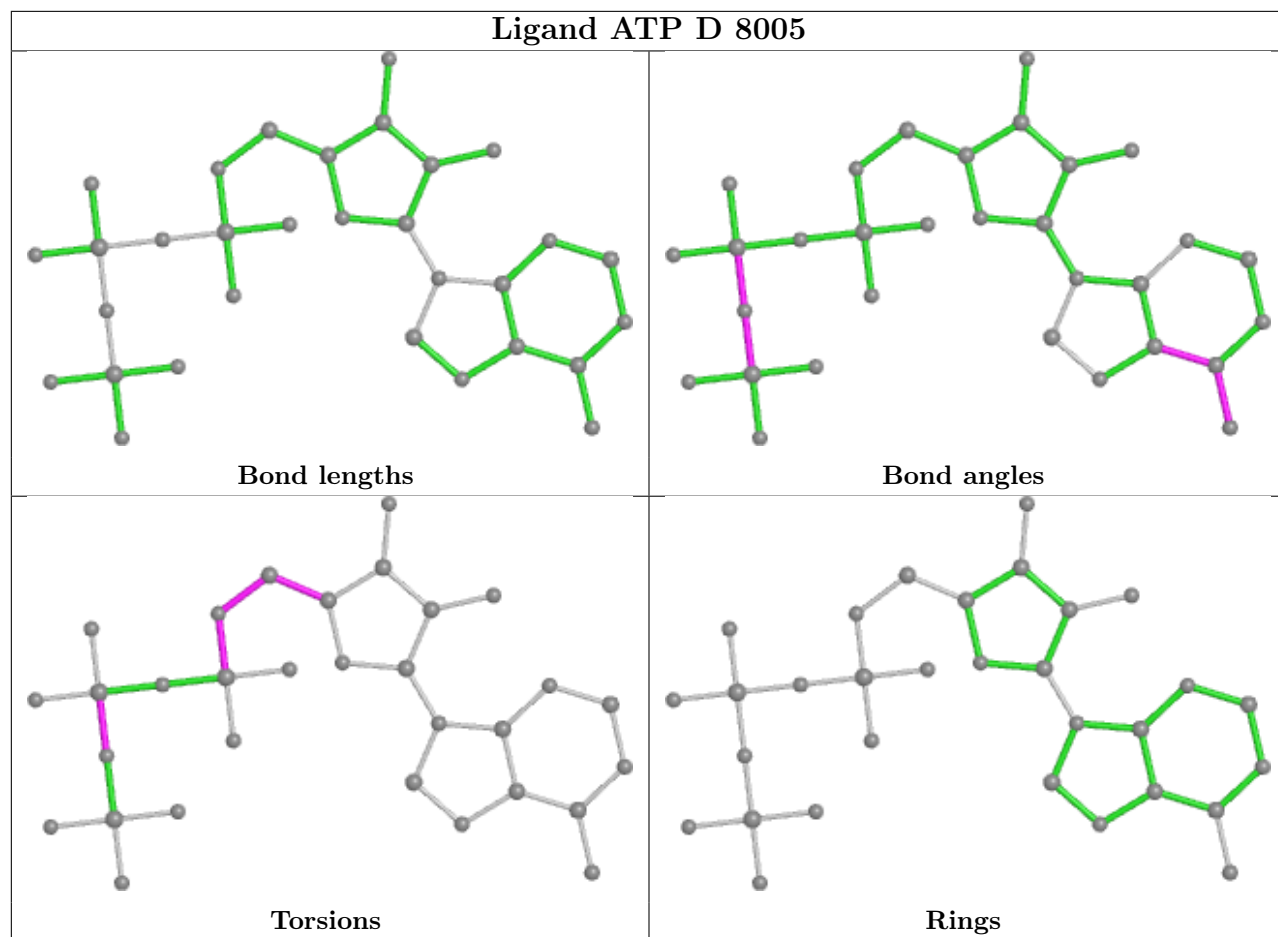


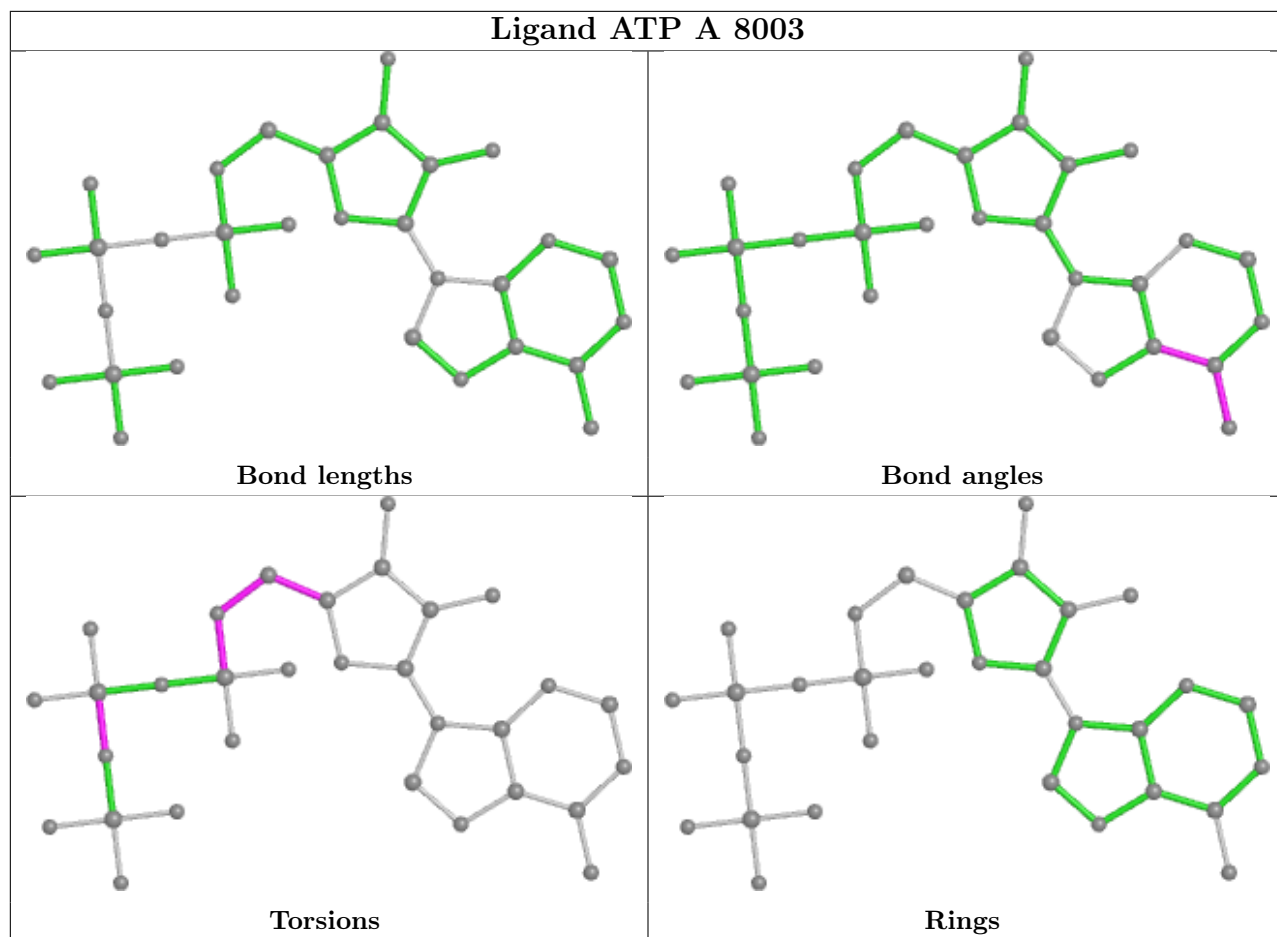


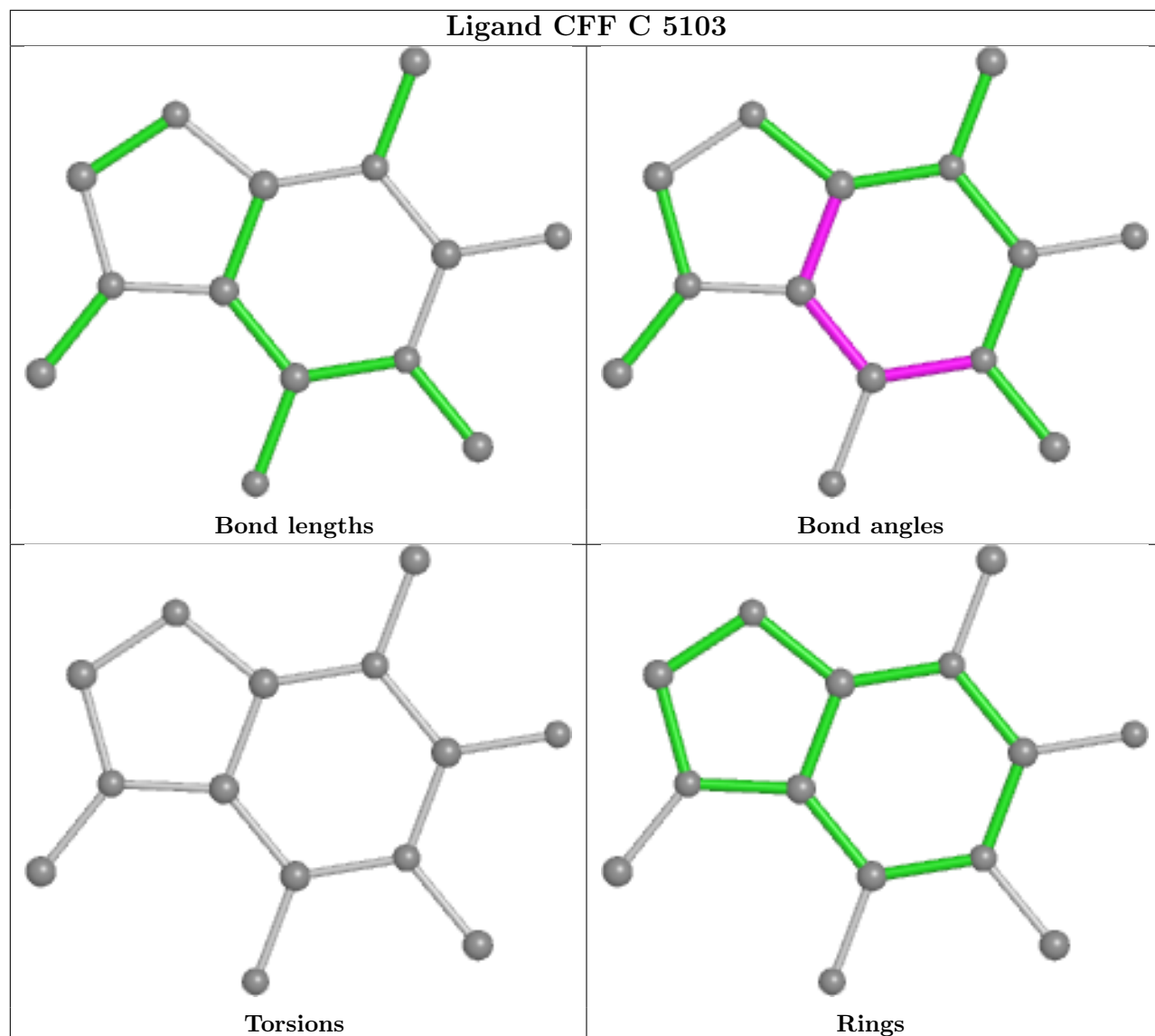


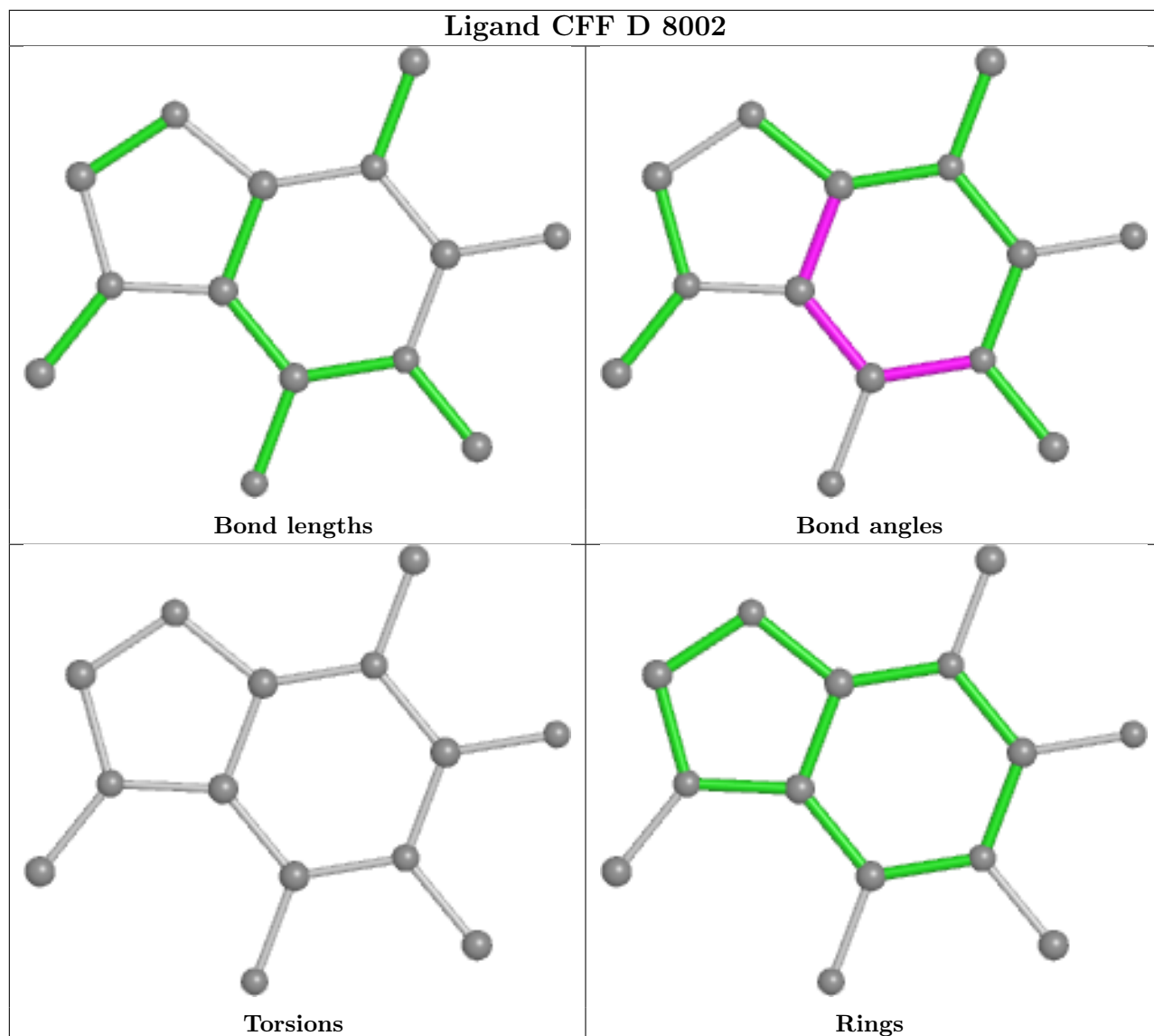


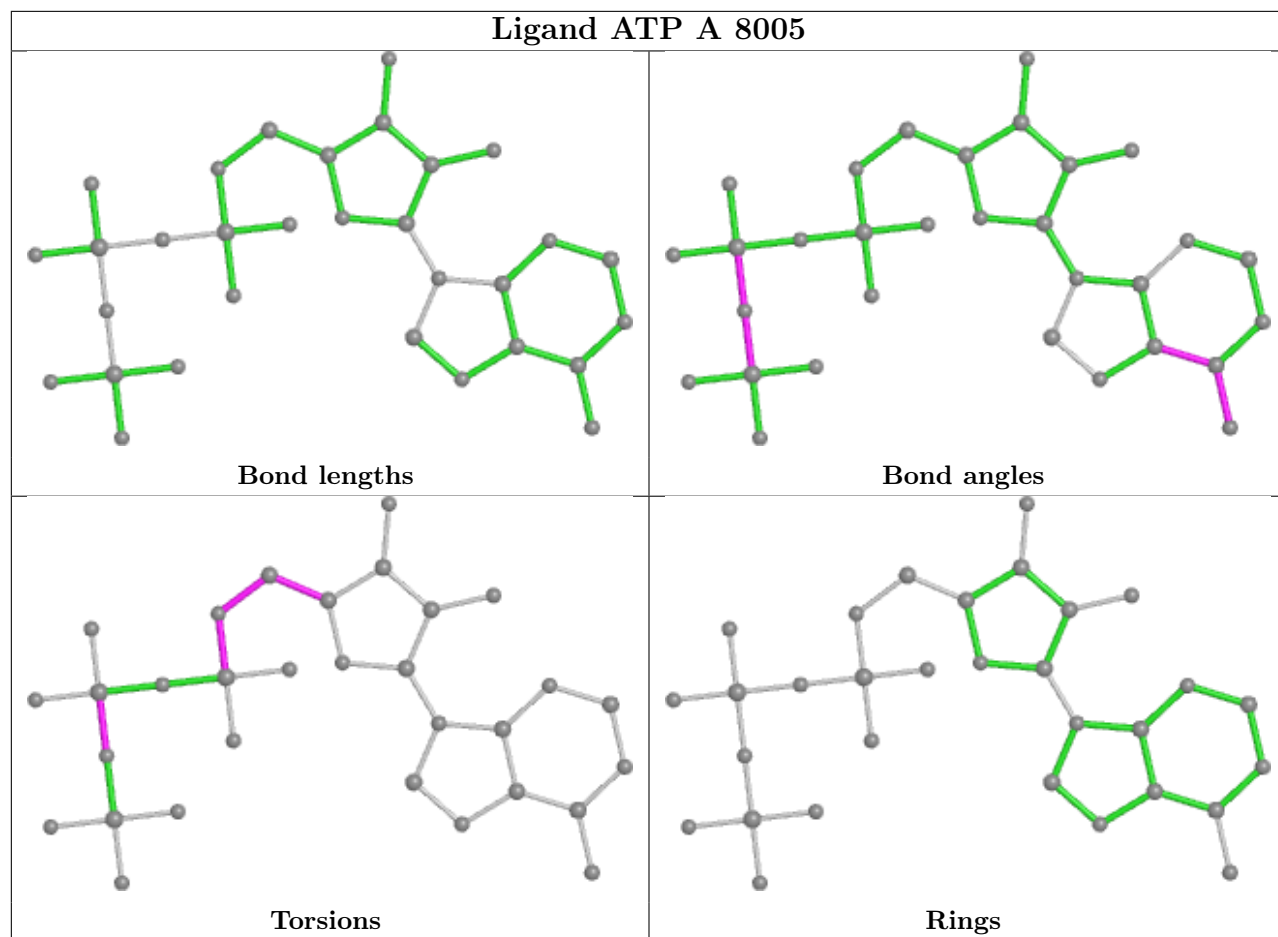


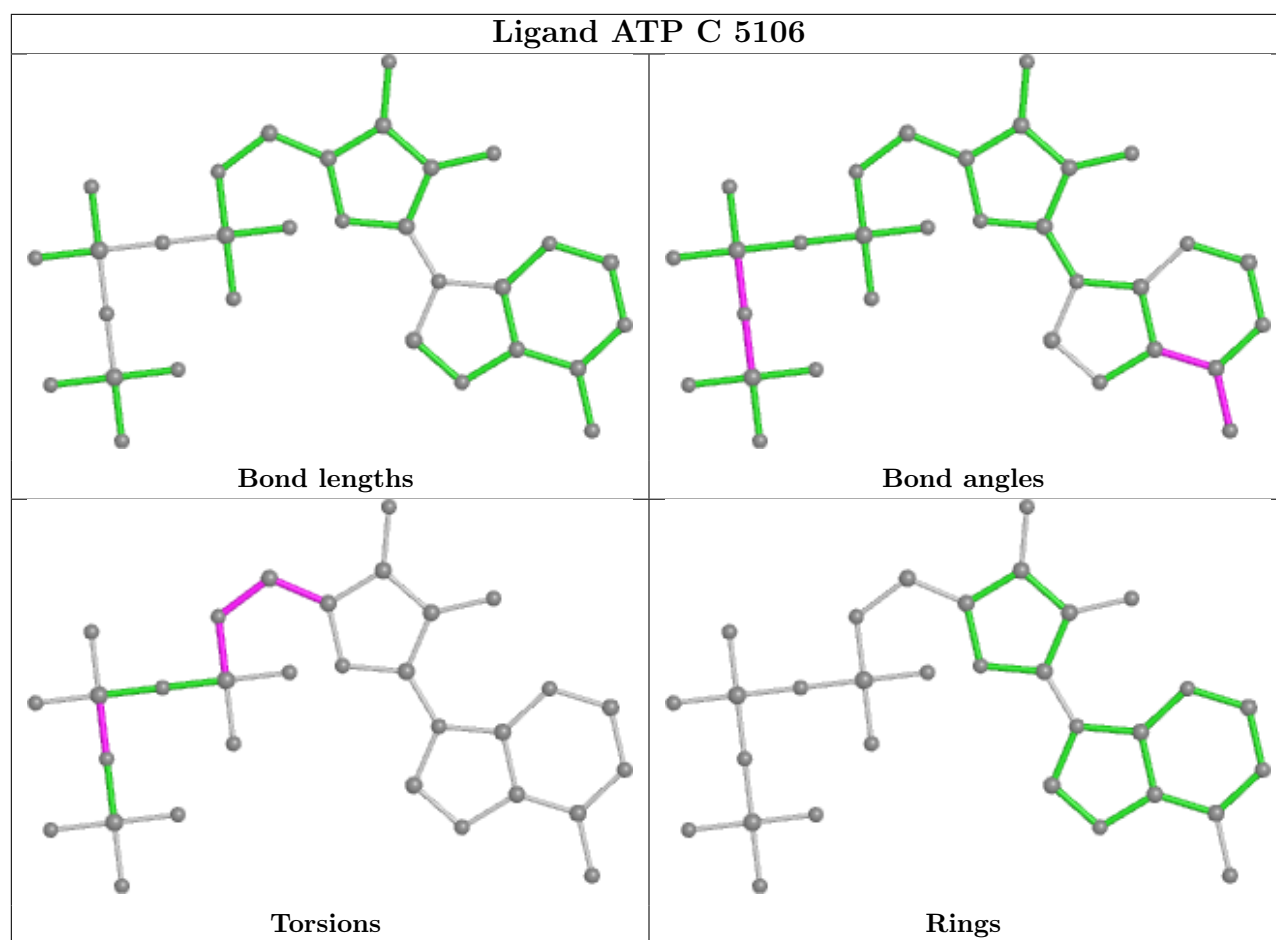












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

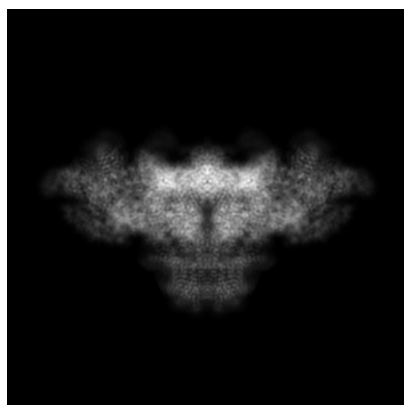
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-43304. These allow visual inspection of the internal detail of the map and identification of artifacts.

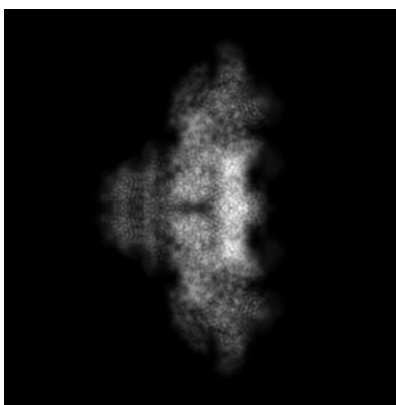
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

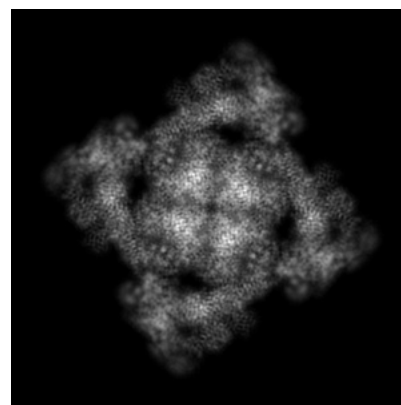
6.1.1 Primary map



X



Y



Z

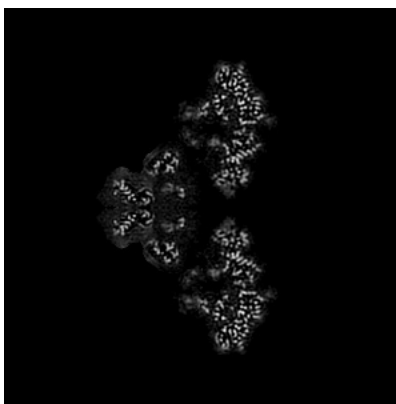
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

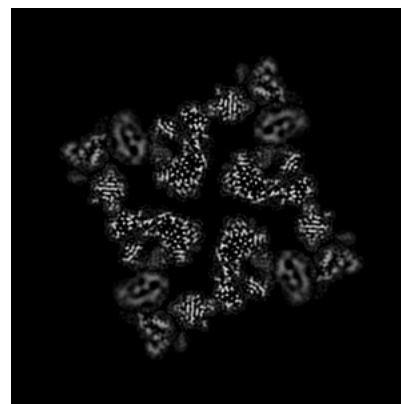
6.2.1 Primary map



X Index: 256



Y Index: 256



Z Index: 256

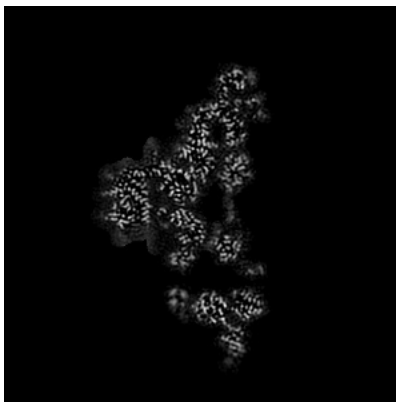
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [\(i\)](#)

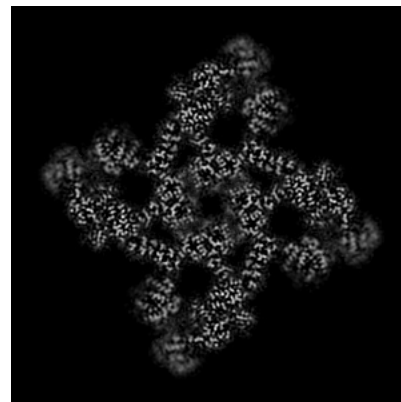
6.3.1 Primary map



X Index: 274



Y Index: 274

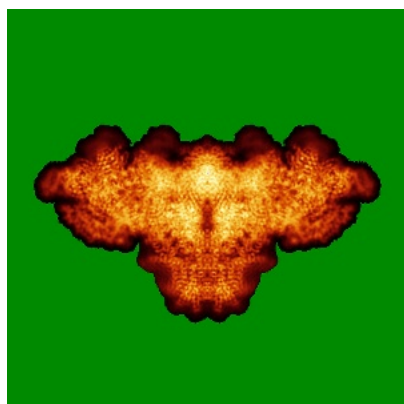


Z Index: 285

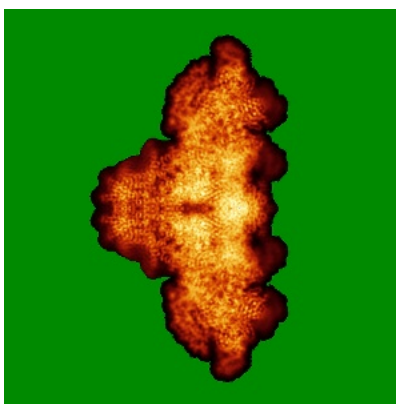
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [\(i\)](#)

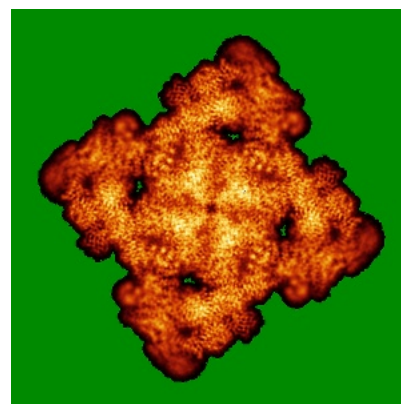
6.4.1 Primary map



X



Y

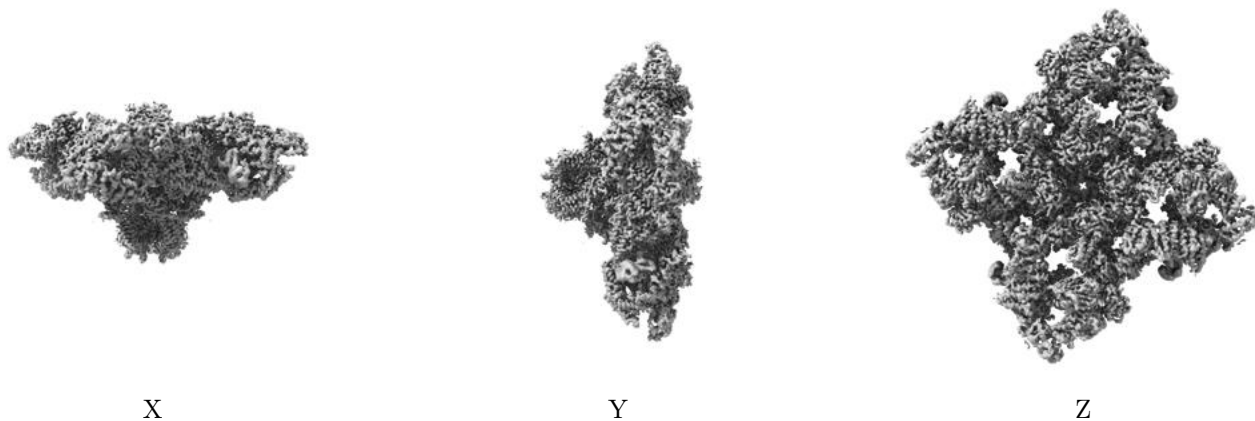


Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.13. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

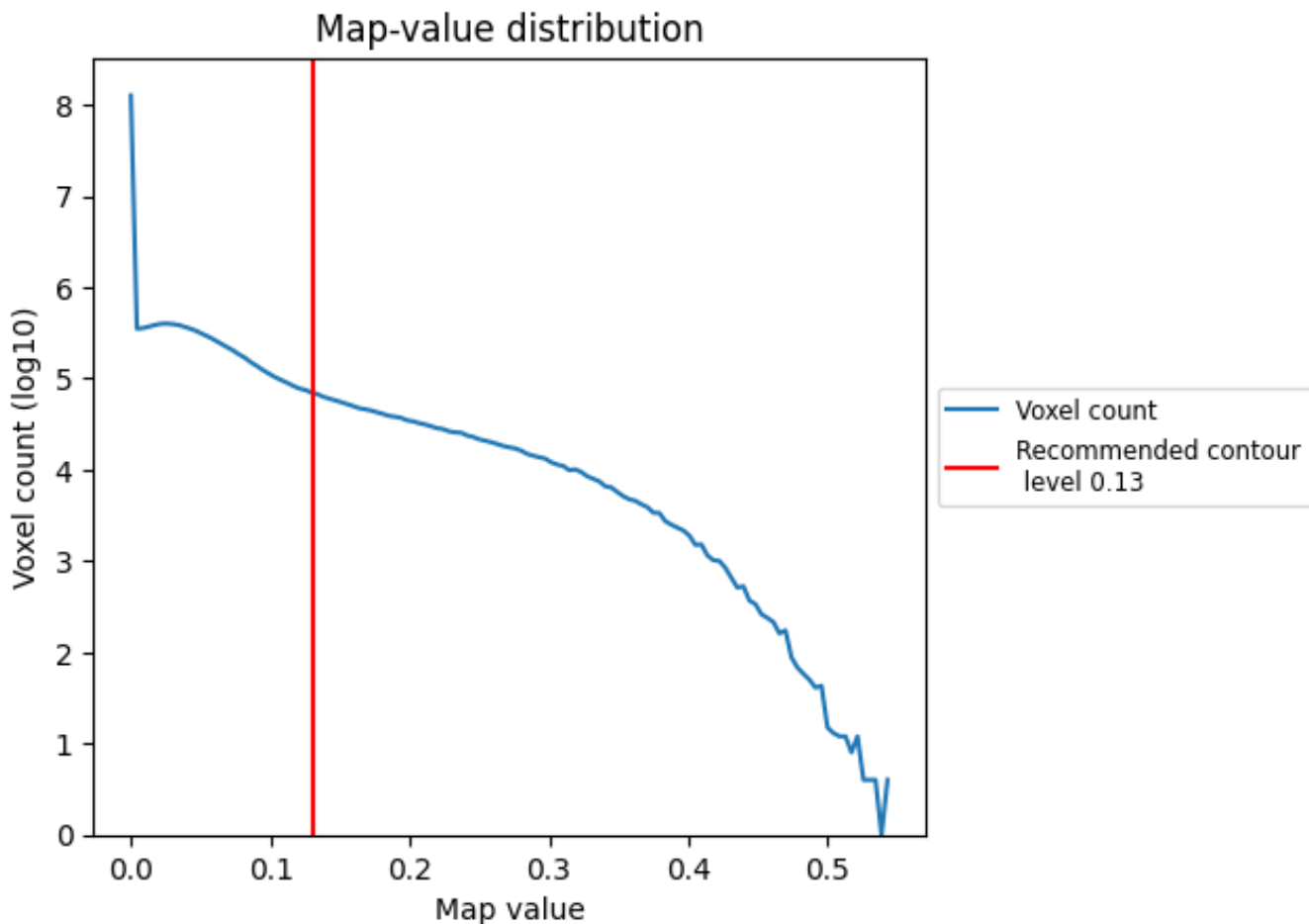
6.6 Mask visualisation [i](#)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis [i](#)

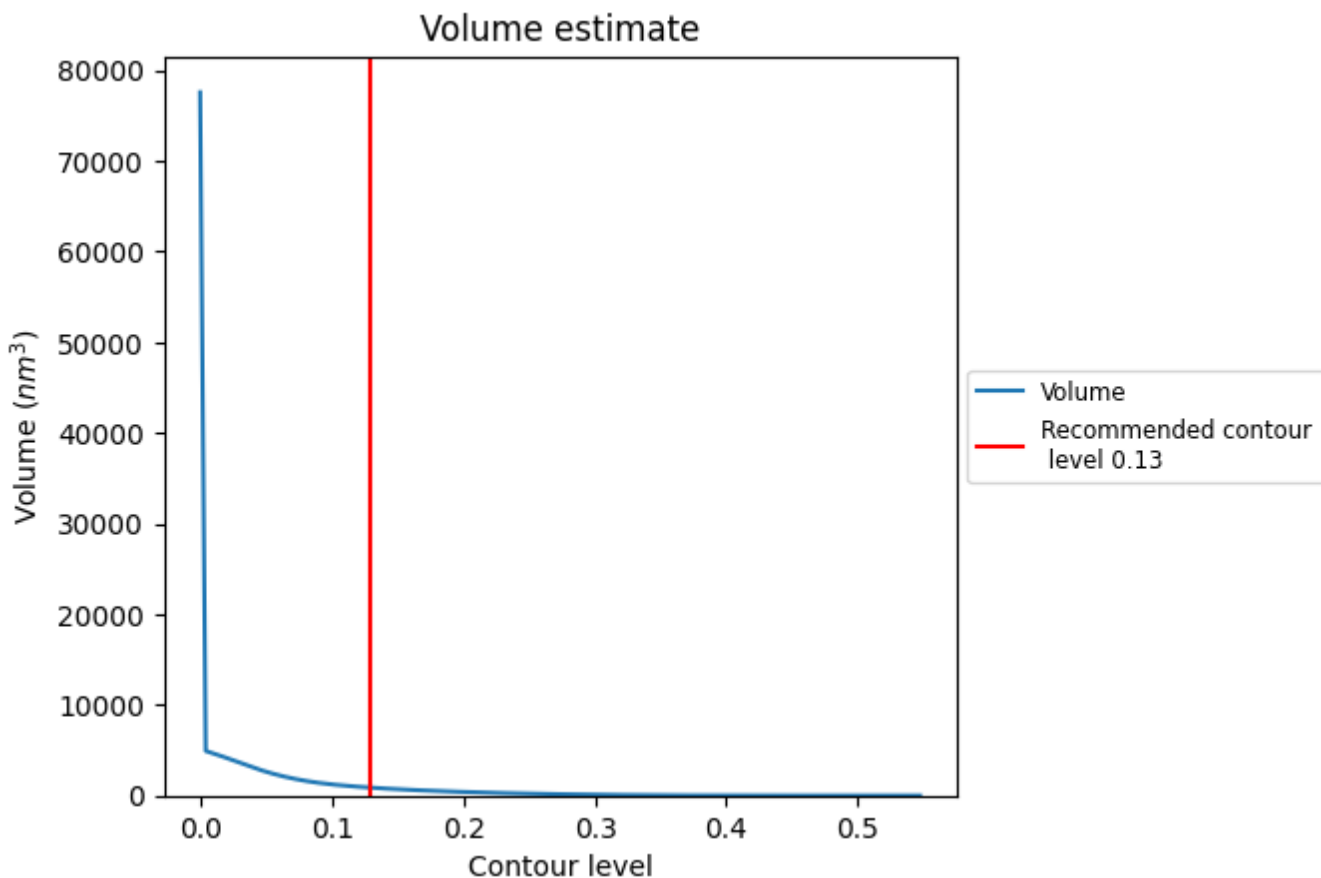
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

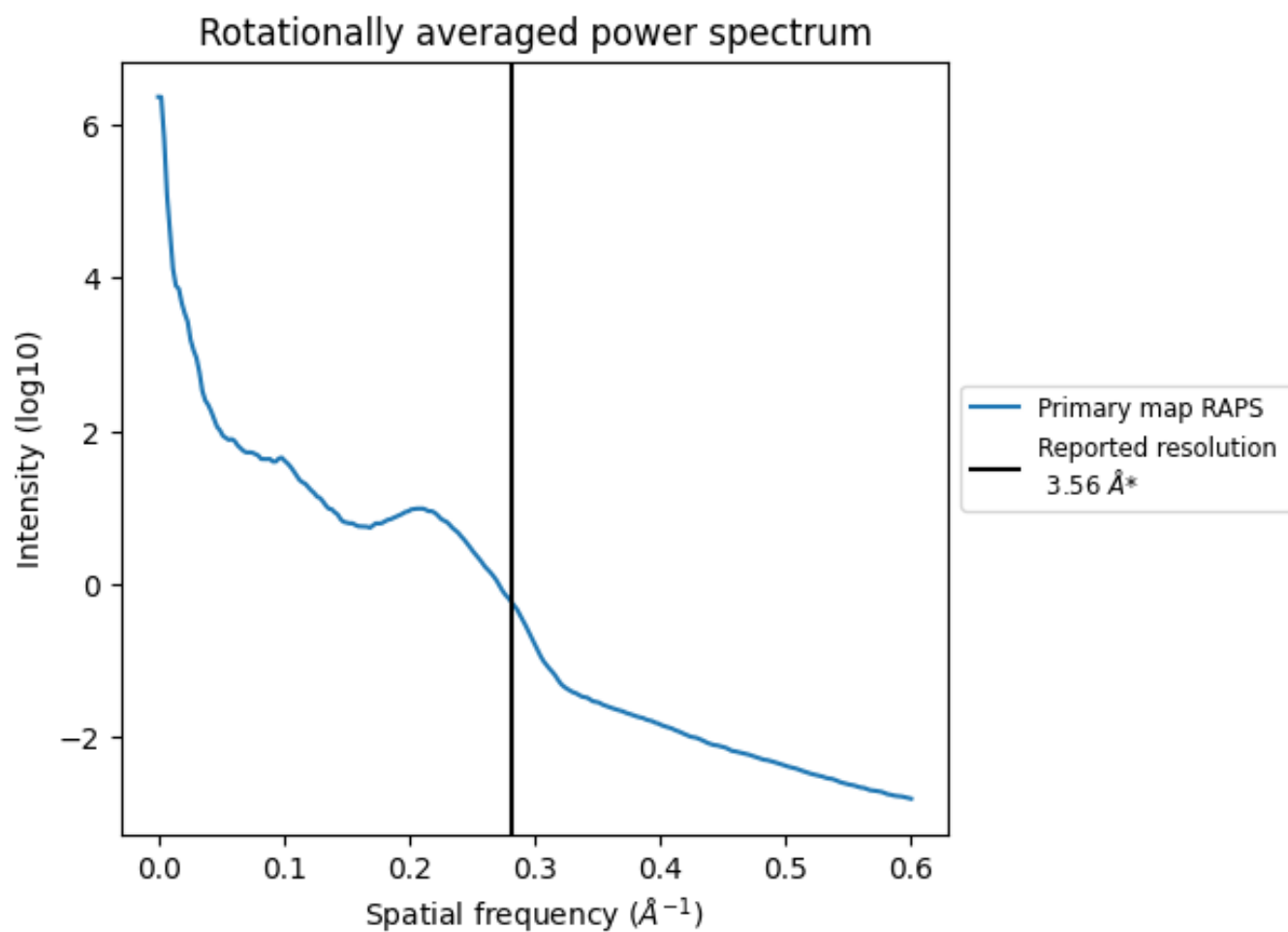
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 870 nm³; this corresponds to an approximate mass of 786 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum [i](#)



*Reported resolution corresponds to spatial frequency of 0.281\AA^{-1}

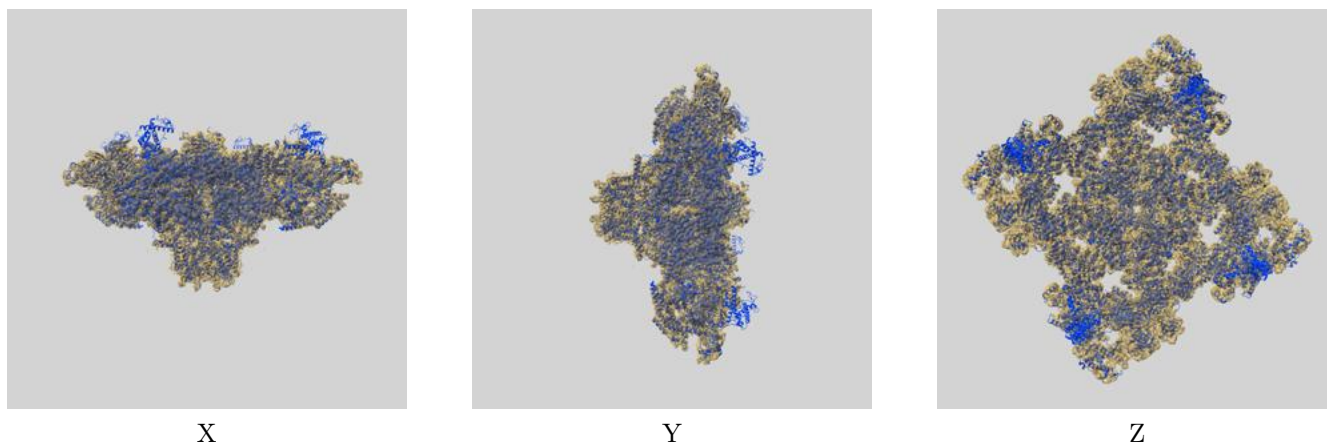
8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

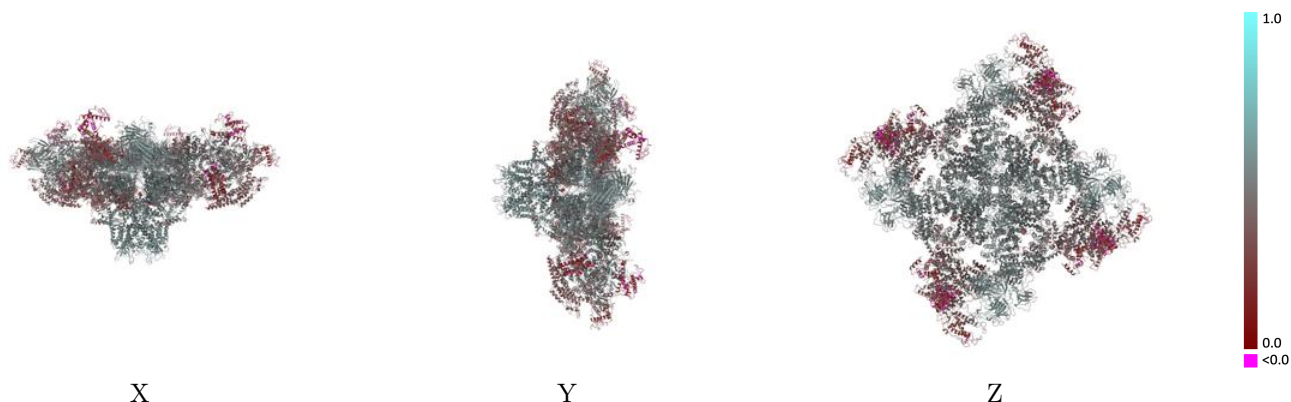
This section contains information regarding the fit between EMDB map EMD-43304 and PDB model 8VK4. Per-residue inclusion information can be found in section 3 on page 9.

9.1 Map-model overlay [i](#)



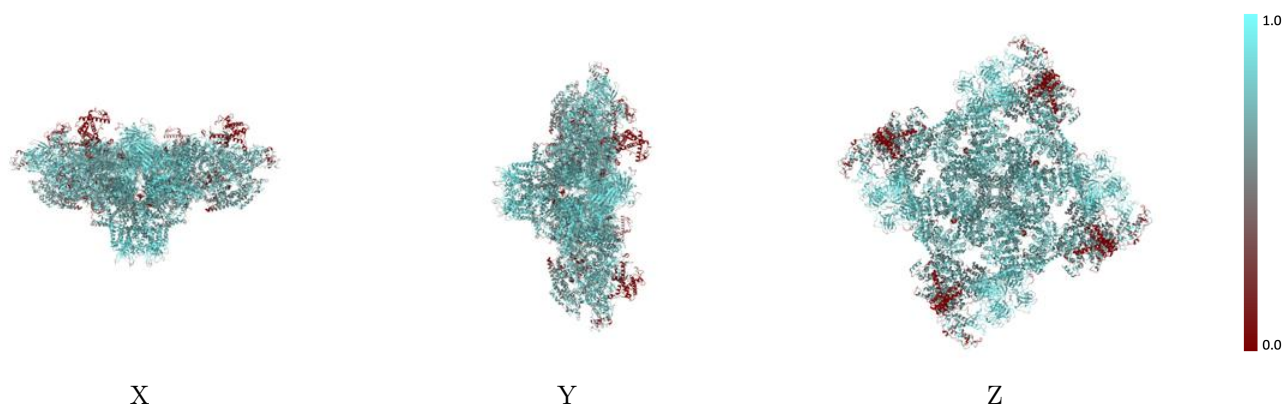
The images above show the 3D surface view of the map at the recommended contour level 0.13 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model [i](#)



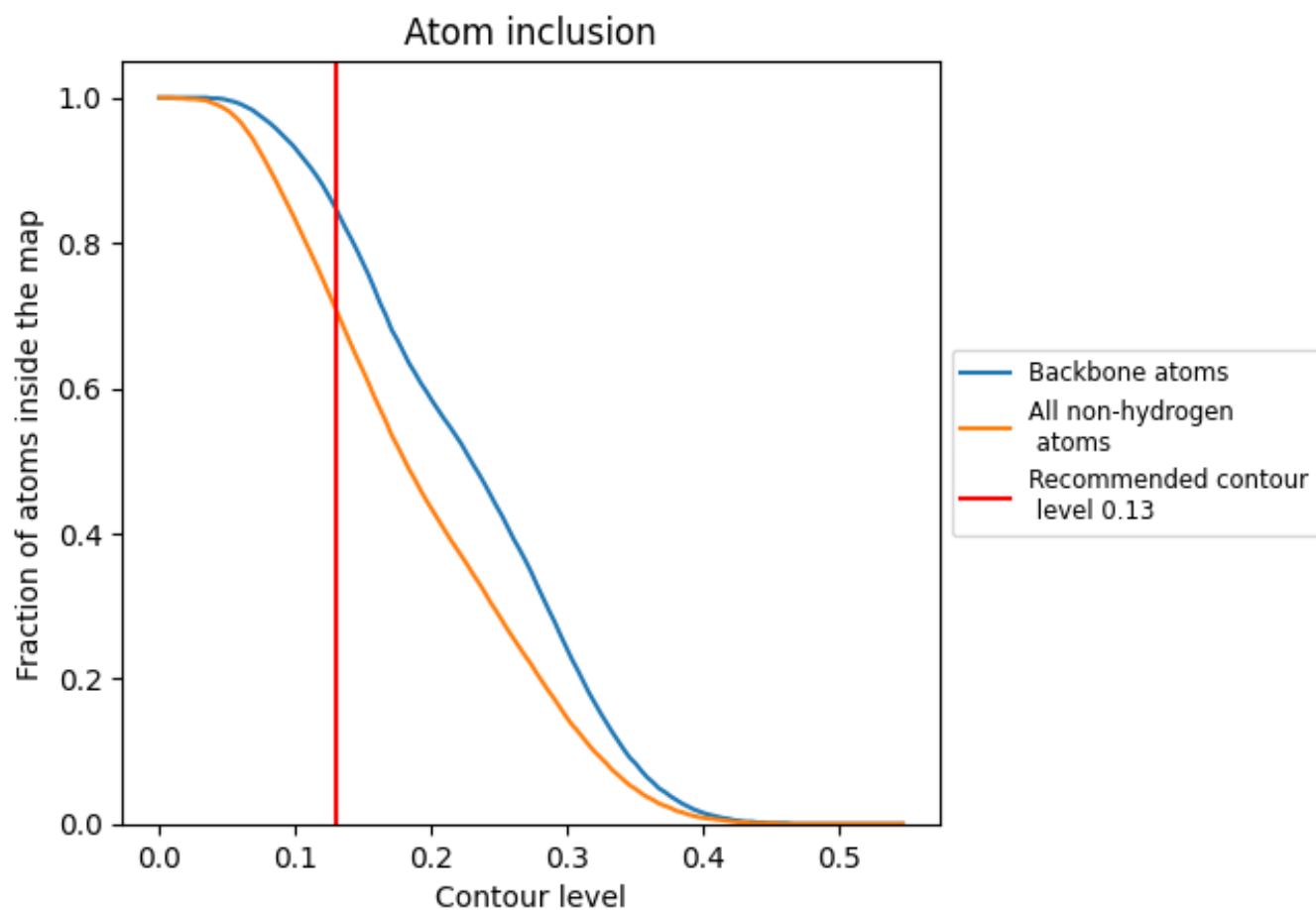
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.13).



































9.4 Atom inclusion [i](#)



At the recommended contour level, 85% of all backbone atoms, 71% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.13) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7080	 0.4400
A	 0.7140	 0.4500
B	 0.7140	 0.4490
C	 0.7140	 0.4500
D	 0.7140	 0.4500
E	 0.7630	 0.5070
F	 0.7700	 0.5060
G	 0.7670	 0.5050
H	 0.7690	 0.5070
I	 0.4960	 0.1660
J	 0.5800	 0.1760
K	 0.4990	 0.1680
L	 0.5820	 0.1770
M	 0.5000	 0.1690
N	 0.5820	 0.1790
O	 0.4970	 0.1650
P	 0.5810	 0.1770

