WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Jun 4, 2025 – 07:50 pm BST

PDB ID	:	9I2V / pdb_00009i2v
Title	:	Alpha-Methylacyl-CoA racemase from Mycobacterium tuberculosis in complex with fenoprofenoyl-CoA
Authors	:	Mojanaga, O.O.; Acharya, K.R.; Lloyd, M.D.
Deposited on	:	2025-01-22
Resolution	:	2.07 Å(reported)

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

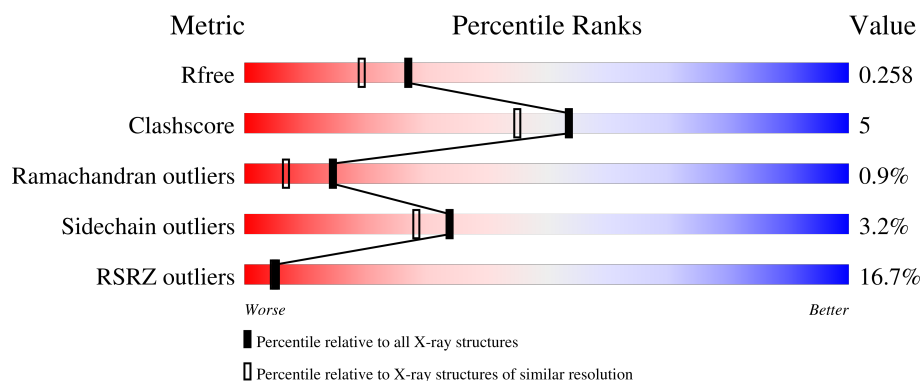|		
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.43.1

1   Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.07 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	Percentile Ranks	Value
Rfree		0.258
Clashscore		5
Ramachandran outliers		0.9%
Sidechain outliers		3.2%
RSRZ outliers		16.7%

Worse   *Better*

▮ Percentile relative to all X-ray structures

⌷ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	164625	3436 (2.08-2.04)
Clashscore	180529	3661 (2.08-2.04)
Ramachandran outliers	177936	3649 (2.08-2.04)
Sidechain outliers	177891	3649 (2.08-2.04)
RSRZ outliers	164620	3436 (2.08-2.04)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower 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 <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	364	17% / 86% / 10% · ·
1	B	364	8% / 88% / 9% ·
1	C	364	19% / 84% / 13% · ·
1	D	364	16% / 84% / 12% · · ·
1	E	364	22% / 80% / 17% ·

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Mol	Chain	Length	Quality of chain
1	F	364	23% ... 79% ... 16%
1	G	364	27% ... 77% ... 19%
1	H	364	20% ... 84% ... 12%
1	I	364	9% ... 89% ... 9%
1	J	364	7% ... 88% ... 10%
1	K	364	14% ... 85% ... 10%
1	L	364	15% ... 85% ... 12%

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 34666 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, 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 Alpha-methylacyl-CoA racemase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	358	Total	C	N	O	S	0	2	0
			2710	1700	485	509	16			
1	B	357	Total	C	N	O	S	0	1	0
			2700	1694	484	506	16			
1	C	358	Total	C	N	O	S	0	2	0
			2710	1700	485	509	16			
1	D	359	Total	C	N	O	S	0	1	0
			2715	1703	486	510	16			
1	E	356	Total	C	N	O	S	0	3	0
			2705	1697	484	508	16			
1	F	357	Total	C	N	O	S	0	1	0
			2703	1695	484	508	16			
1	G	358	Total	C	N	O	S	0	2	0
			2710	1700	485	509	16			
1	H	356	Total	C	N	O	S	0	1	0
			2694	1691	483	504	16			
1	I	359	Total	C	N	O	S	0	2	0
			2718	1704	486	512	16			
1	J	357	Total	C	N	O	S	0	1	0
			2700	1694	484	506	16			
1	K	357	Total	C	N	O	S	0	2	0
			2703	1695	484	508	16			
1	L	359	Total	C	N	O	S	0	1	0
			2715	1703	486	510	16			

There are 48 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	361	GLY	-	expression tag	UNP O06543
A	362	SER	-	expression tag	UNP O06543
A	363	GLY	-	expression tag	UNP O06543
A	364	CYS	-	expression tag	UNP O06543
B	361	GLY	-	expression tag	UNP O06543

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Chain	Residue	Modelled	Actual	Comment	Reference
B	362	SER	-	expression tag	UNP O06543
B	363	GLY	-	expression tag	UNP O06543
B	364	CYS	-	expression tag	UNP O06543
C	361	GLY	-	expression tag	UNP O06543
C	362	SER	-	expression tag	UNP O06543
C	363	GLY	-	expression tag	UNP O06543
C	364	CYS	-	expression tag	UNP O06543
D	361	GLY	-	expression tag	UNP O06543
D	362	SER	-	expression tag	UNP O06543
D	363	GLY	-	expression tag	UNP O06543
D	364	CYS	-	expression tag	UNP O06543
E	361	GLY	-	expression tag	UNP O06543
E	362	SER	-	expression tag	UNP O06543
E	363	GLY	-	expression tag	UNP O06543
E	364	CYS	-	expression tag	UNP O06543
F	361	GLY	-	expression tag	UNP O06543
F	362	SER	-	expression tag	UNP O06543
F	363	GLY	-	expression tag	UNP O06543
F	364	CYS	-	expression tag	UNP O06543
G	361	GLY	-	expression tag	UNP O06543
G	362	SER	-	expression tag	UNP O06543
G	363	GLY	-	expression tag	UNP O06543
G	364	CYS	-	expression tag	UNP O06543
H	361	GLY	-	expression tag	UNP O06543
H	362	SER	-	expression tag	UNP O06543
H	363	GLY	-	expression tag	UNP O06543
H	364	CYS	-	expression tag	UNP O06543
I	361	GLY	-	expression tag	UNP O06543
I	362	SER	-	expression tag	UNP O06543
I	363	GLY	-	expression tag	UNP O06543
I	364	CYS	-	expression tag	UNP O06543
J	361	GLY	-	expression tag	UNP O06543
J	362	SER	-	expression tag	UNP O06543
J	363	GLY	-	expression tag	UNP O06543
J	364	CYS	-	expression tag	UNP O06543
K	361	GLY	-	expression tag	UNP O06543
K	362	SER	-	expression tag	UNP O06543
K	363	GLY	-	expression tag	UNP O06543
K	364	CYS	-	expression tag	UNP O06543
L	361	GLY	-	expression tag	UNP O06543
L	362	SER	-	expression tag	UNP O06543
L	363	GLY	-	expression tag	UNP O06543

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Chain	Residue	Modelled	Actual	Comment	Reference
L	364	CYS	-	expression tag	UNP O06543

- Molecule 2 is (S)-Fenoprofenoyl-CoA (CCD ID: A1IY9) (formula: $C_{36}H_{48}N_7O_{18}P_3S$) (labeled as "Ligand of Interest" by depositor).
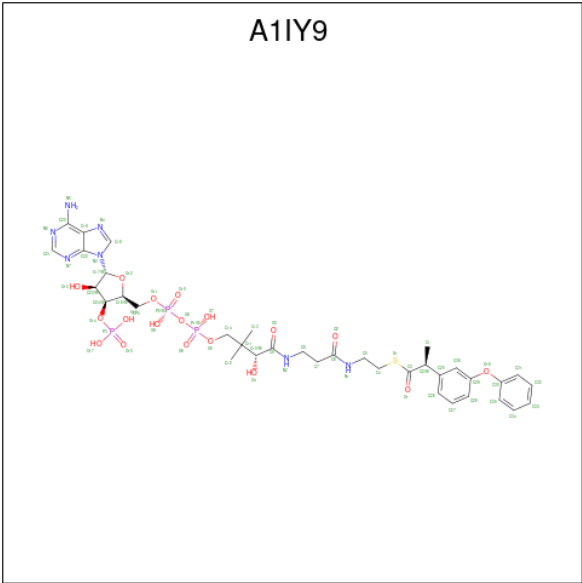
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	S	0	0
			65	36	7	18	3	1		
2	B	1	Total	C	N	O	P	S	0	0
			65	36	7	18	3	1		
2	C	1	Total	C	N	O	P	S	0	0
			65	36	7	18	3	1		
2	D	1	Total	C	N	O	P	S	0	0
			65	36	7	18	3	1		
2	E	1	Total	C	N	O	P	S	0	0
			65	36	7	18	3	1		
2	F	1	Total	C	N	O	P	S	0	0
			65	36	7	18	3	1		
2	G	1	Total	C	N	O	P	S	0	0
			65	36	7	18	3	1		
2	H	1	Total	C	N	O	P	S	0	0
			65	36	7	18	3	1		
2	I	1	Total	C	N	O	P	S	0	0
			65	36	7	18	3	1		
2	J	1	Total	C	N	O	P	S	0	0
			65	36	7	18	3	1		

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Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	K	1	Total 65	C 36	N 7	O 18	P 3	S 1	0	0
2	L	1	Total 65	C 36	N 7	O 18	P 3	S 1	0	0

• Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	120	Total 120	O 120	0	0
3	B	115	Total 115	O 115	0	0
3	C	128	Total 128	O 128	0	0
3	D	120	Total 120	O 120	0	0
3	E	112	Total 112	O 112	0	0
3	F	102	Total 102	O 102	0	0
3	G	104	Total 104	O 104	0	0
3	H	108	Total 108	O 108	0	0
3	I	127	Total 127	O 127	0	0
3	J	127	Total 127	O 127	0	0
3	K	121	Total 121	O 121	0	0
3	L	119	Total 119	O 119	0	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 electron 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 dot above a residue indicates a poor fit to the electron density (RSRZ > 2). 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.
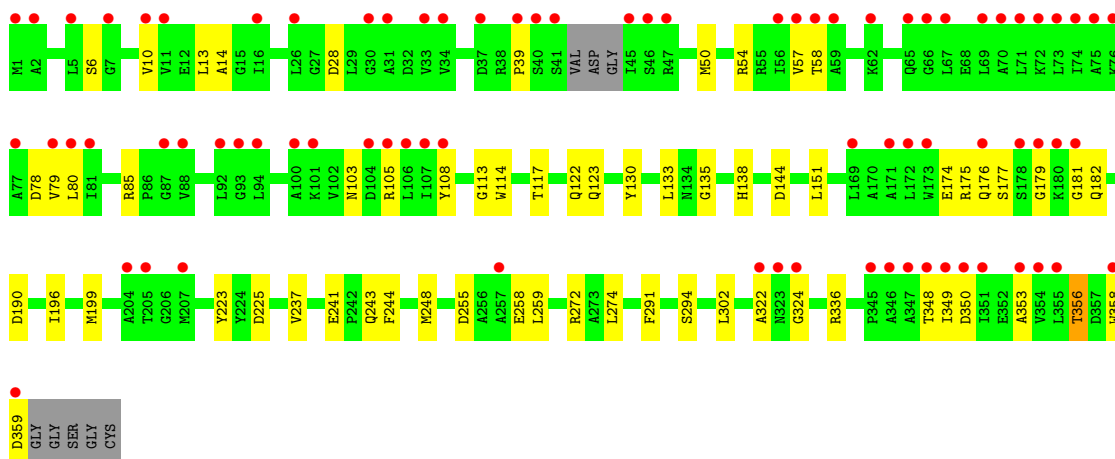
• Molecule 1: Alpha-methylacyl-CoA racemase

• Molecule 1: Alpha-methylacyl-CoA racemase
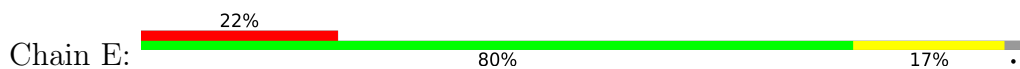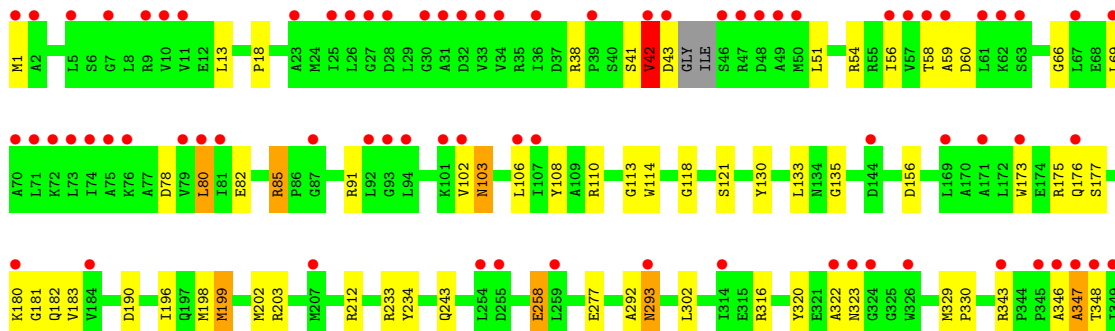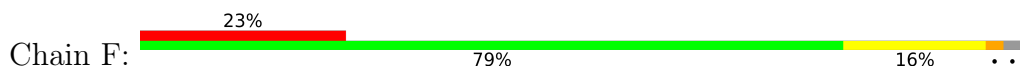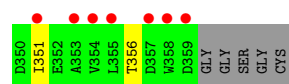

• Molecule 1: Alpha-methylacyl-CoA racemase

R272 A273 L274 F291 S294 D295 R316 Y320 E321 A322 N323 M329 P330 R343 P344 P345 A346 A347 T348 I349 D350 I351 E352 A353 V354 L355 W358 D359 GLY GLY SER GLY CYS
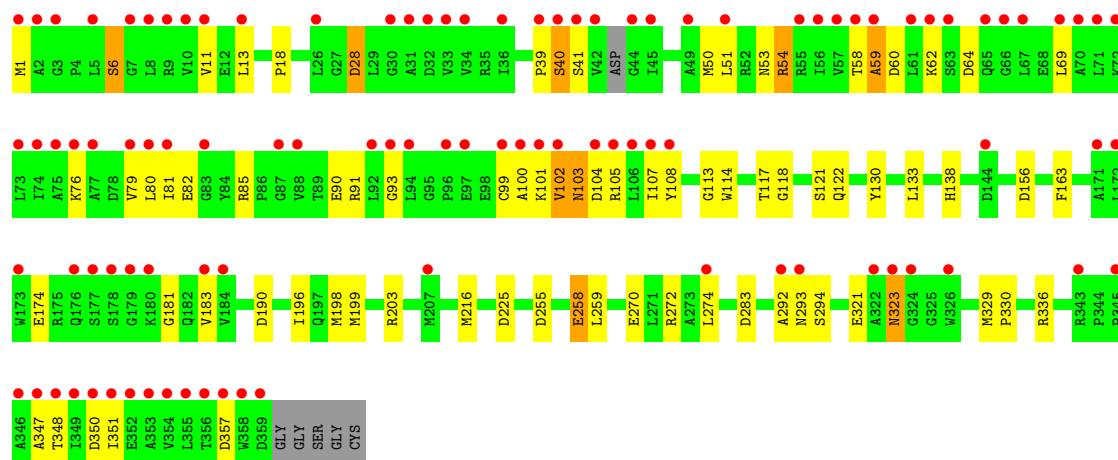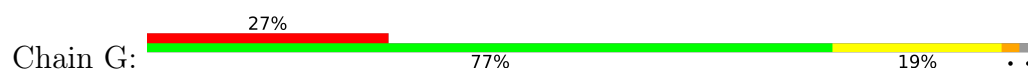
● Molecule 1: Alpha-methylacyl-CoA racemase

Chain D:

16%

84%   12%   •••

M1 A2 L5 S6 G7 L8 V11 G27 D28 L29 G30 A31 D32 V33 V34 S40 S41 V42 D43 G44 I45 S46 R47 D48 A49 M50 L51 R52 N53 I56 A59 D60 L61 K62 Q65 L69 L73 I74 A75 K76 A77 D78 V79 L80 R85 P86 G87 V88 R91

L92 G93 L94 G95 V102 N103 L106 I107 Y108 G113 T117 G118 S121 H126 D127 Y130 D144 A171 L172 W173 E174 R175 Q176 G181 I196 Q197 M198 M199 R212 D225 R233 M248 R265 W268 P269 R272 V290 N293 S294

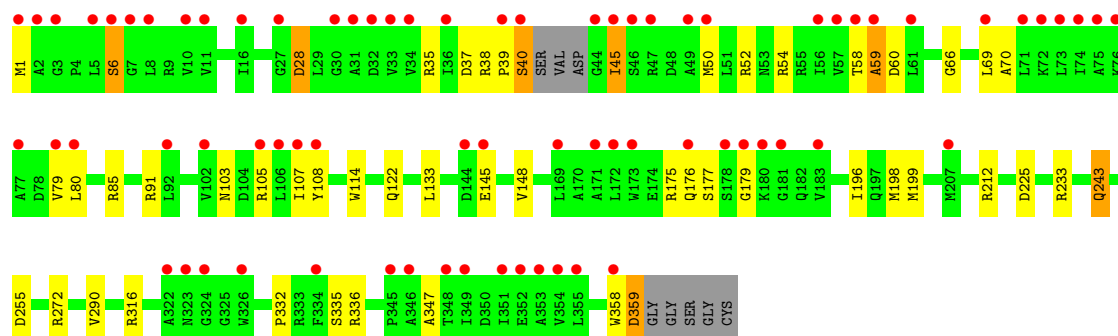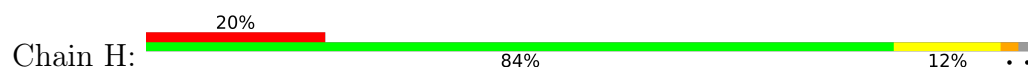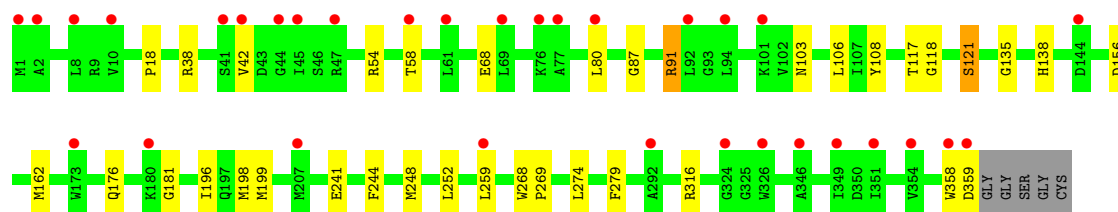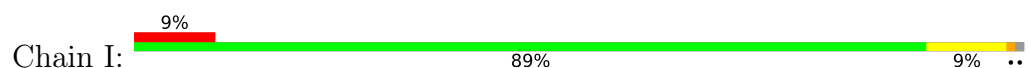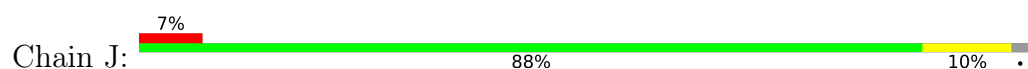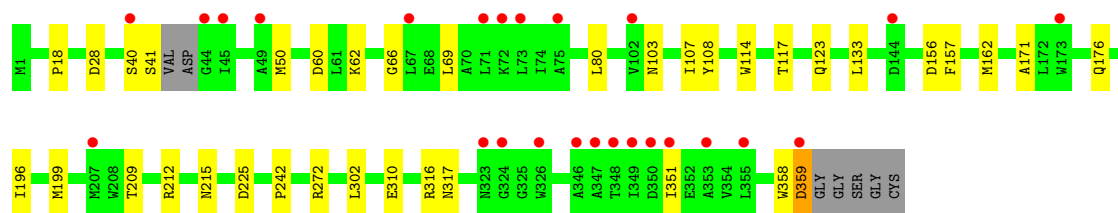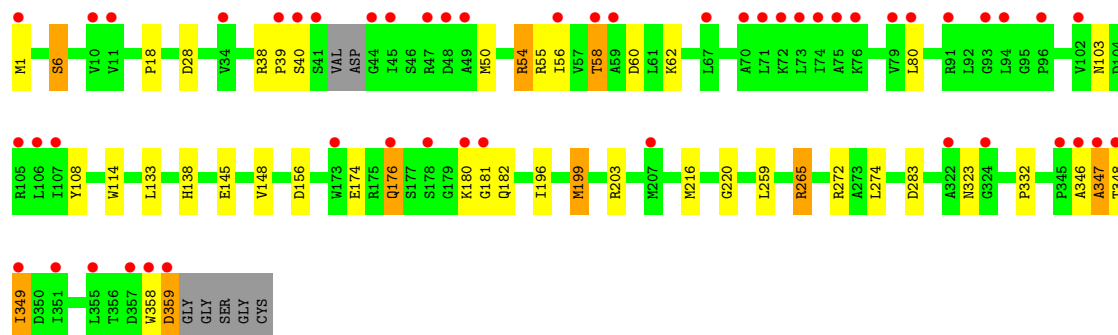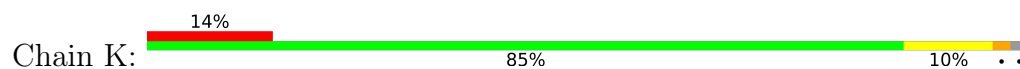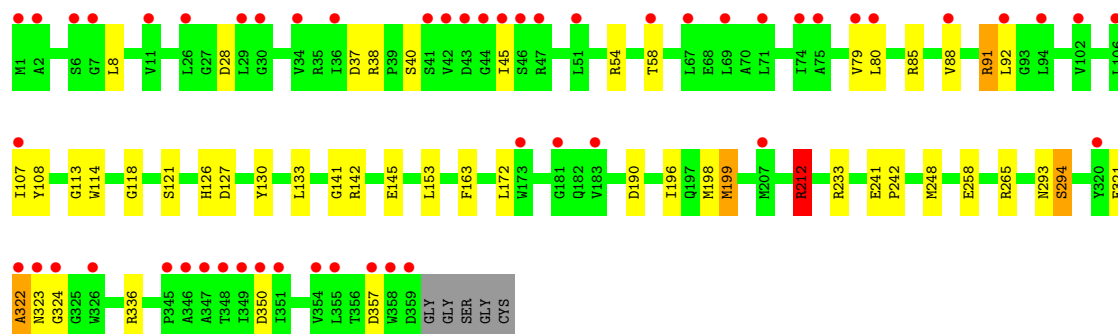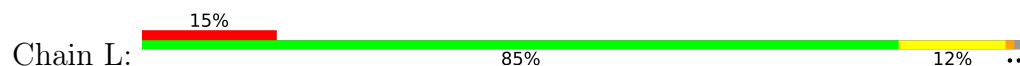L302 T318 F319 Y320 E321 A322 N323 G324 G325 W326 F334 P345 A346 A347 T348 I349 D350 I351 L355 T356 D357 W358 D359 GLY GLY SER GLY CYS

● Molecule 1: Alpha-methylacyl-CoA racemase

Chain E:

22%

80%   17%   •

M1 A2 L5 S6 G7 V10 V11 E12 L13 A14 G15 I16 L26 G27 D28 L29 G30 A31 D32 V33 V34 D37 R38 P39 S40 S41 VAL ASP GLY I45 S46 R47 M50 R54 R55 I56 V57 T58 A59 K62 Q65 G66 L67 E68 L69 A70 L71 K72 L73 I74 A75 K76

A77 D78 V79 L80 I81 R85 P86 G87 V88 L92 G93 L94 A100 K101 V102 N103 D104 R105 L106 I107 Y108 G113 W114 T117 Q122 Q123 Y130 L133 N134 G135 H138 D144 L151 L169 A170 A171 L172 W173 E174 R175 Q176 S177 S178 G179 K180 G181 Q182

D190 I196 M199 A204 T205 G206 M207 Y223 Y224 D225 V237 E241 P242 Q243 F244 M248 D255 A256 A257 E258 L259 R272 A273 L274 F291 S294 L302 A322 N323 G324 R336 P345 A346 A347 T348 I349 D350 I351 E352 A353 V354 L355 T356 D357 W358

D359 GLY GLY SER GLY CYS

● Molecule 1: Alpha-methylacyl-CoA racemase

Chain F:

23%

79%   16%   ••

M1 A2 L5 S6 G7 L8 R9 V10 V11 E12 L13 P18 A23 M24 I25 L26 G27 D28 L29 G30 A31 D32 V33 V34 R35 I36 D37 R38 P39 S40 S41 V42 D43 GLY ILE S46 R47 D48 A49 M50 L51 R54 R55 I56 V57 T58 A59 D60 L61 K62 S63 G66 L67 E68 L69

A70 L71 K72 L73 I74 A75 K76 A77 D78 V79 L80 I81 E82 R85 P86 G87 R91 L92 G93 L94 K101 V102 N103 L106 I107 Y108 A109 R110 G113 W114 G118 S121 Y130 L133 N134 G135 D144 D156 L169 A170 A171 L172 W173 E174 R175 Q176 S177

K180 G181 Q182 V183 V184 D190 I196 Q197 M198 M199 M202 R203 M207 R212 R233 Y234 Q243 L254 D255 E258 L259 E277 A292 N293 L302 I314 E315 R316 Y320 E321 A322 G324 G325 W326 M329 P330 R343 P344 P345 A346 A347 T348 I349

D350 I351 E352 A353 V354 L355 T356 D357 W358 D359 GLY GLY SER GLY CYS

• Molecule 1: Alpha-methylacyl-CoA racemase

Chain G:

27%

77%   19%

M1 A2 G3 P4 L5 S6 G7 L8 R9 V10 V11 E12 L13 P18 L26 G27 D28 L29 G30 A31 D32 V33 V34 R35 I36 P39 S40 S41 V42 ASP G44 I45 A49 M50 L51 R52 N53 R54 R55 I56 V57 T58 A59 D60 L61 K62 S63 D64 Q65 G66 L67 E68 L69 A70 L71 K72

L73 I74 A75 K76 A77 D78 V79 L80 I81 E82 G83 Y84 R85 P86 G87 V88 T89 E90 R91 L92 G93 L94 G95 P96 E97 E98 C99 A100 K101 V102 N103 D104 R105 L106 I107 Y108 G113 W114 T117 G118 S121 Q122 Y130 L133 H138 D144 D156 F163 A171 L172

W173 E174 R175 Q176 S177 S178 G179 K180 G181 Q182 V183 V184 D190 I196 Q197 M198 M199 R203 M207 M216 D225 D255 E258 L259 E270 L271 R272 A273 L274 D283 A292 N293 S294 E321 A322 N323 G324 G325 W326 M329 P330 R336 R343 P344 P345

A346 A347 T348 I349 D350 I351 E352 A353 V354 L355 T356 D357 W358 D359 GLY GLY SER GLY CYS

• Molecule 1: Alpha-methylacyl-CoA racemase

Chain H:

20%

84%   12%

M1 A2 G3 P4 L5 S6 G7 L8 R9 V10 V11 I16 G27 D28 L29 G30 A31 D32 V33 V34 R35 T36 D37 R38 P39 S40 SER VAL ASP G44 I45 S46 R47 D48 A49 M50 L51 R52 N53 R54 R55 I56 V57 T58 A59 D60 L61 G66 L69 A70 L71 K72 L73 I74 A75 K76

A77 D78 V79 L80 R85 R91 L92 V102 N103 D104 R105 L106 I107 Y108 W114 Q122 L133 D144 E145 V148 L169 A170 A171 L172 W173 E174 R175 Q176 S177 S178 G179 K180 G181 Q182 V183 I196 Q197 M198 M199 M207 R212 D225 R233 Q243

D255 R272 V290 R316 A322 N323 G324 G325 W326 P332 R333 F334 S335 R336 P345 A346 A347 T348 I349 D350 I351 E352 A353 V354 L355 W358 D359 GLY GLY SER GLY CYS

• Molecule 1: Alpha-methylacyl-CoA racemase

Chain I:

9%

89%   9%

M1 A2 L8 R9 V10 P18 R38 S41 V42 D43 G44 I45 S46 R47 R54 T58 L61 E68 L69 K76 A77 L80 G87 R91 L92 G93 L94 K101 V102 N103 L106 I107 Y108 T117 G118 S121 G135 H138 D144 D156

M162 W173 Q176 K180 G181 I196 Q197 M198 M199 M207 E241 F244 M248 L252 L259 W268 P269 L274 F279 A292 R316 G324 G325 W326 A346 I349 D350 I351 V354 W358 D359 GLY GLY SER GLY CYS

• Molecule 1: Alpha-methylacyl-CoA racemase

Chain J:

7%

88%   10%

• Molecule 1: Alpha-methylacyl-CoA racemase

Chain K:

• Molecule 1: Alpha-methylacyl-CoA racemase

Chain L:

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	I 4 2 2	Depositor
Cell constants a, b, c, α, β, γ	276.73Å 276.73Å 390.11Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	196.45 – 2.07 196.45 – 2.07	Depositor EDS
% Data completeness (in resolution range)	100.0 (196.45-2.07) 99.9 (196.45-2.07)	Depositor EDS
R_{merge}	0.19	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.37 (at 2.07Å)	Xtriage
Refinement program	REFMAC 5.8.0415	Depositor
R, R_{free}	0.208 , 0.248 0.217 , 0.258	Depositor DCC
R_{free} test set	22208 reflections (4.92%)	wwPDB-VP
Wilson B-factor (Å^2)	39.7	Xtriage
Anisotropy	0.038	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 46.5	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.008 for -1/2*h+1/2*k-1/2*l,1/2*h-1/2*k-1/2*l,-h-k 0.009 for -1/2*h-1/2*k+1/2*l,-1/2*h-1/2*k-1/2*l,h-k	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	34666	wwPDB-VP
Average B, all atoms (Å^2)	48.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.52% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5　Model quality ⓘ

5.1　Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: A1IY9

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	A	0.63	0/2783	1.02	3/3786 (0.1%)
1	B	0.64	0/2766	1.03	5/3761 (0.1%)
1	C	0.64	0/2782	1.06	3/3783 (0.1%)
1	D	0.64	0/2782	1.09	1/3785 (0.0%)
1	E	0.63	0/2780	1.03	3/3780 (0.1%)
1	F	0.63	0/2769	1.07	3/3766 (0.1%)
1	G	0.62	0/2782	1.07	3/3783 (0.1%)
1	H	0.63	0/2760	1.08	3/3753 (0.1%)
1	I	0.63	0/2791	1.05	1/3797 (0.0%)
1	J	0.64	0/2766	1.04	3/3761 (0.1%)
1	K	0.64	0/2775	1.05	3/3773 (0.1%)
1	L	0.64	0/2782	1.05	4/3785 (0.1%)
All	All	0.64	0/33318	1.05	35/45313 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	3
1	B	0	2
1	D	0	5
1	E	0	2
1	F	0	5
1	G	0	1
1	H	0	6
1	J	0	1
1	K	0	3
1	L	0	5
All	All	0	33

There are no bond length outliers.

The worst 5 of 35 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	203	ARG	CB-CA-C	-9.65	94.45	110.85
1	J	123	GLN	CB-CA-C	7.94	122.78	109.84
1	C	203	ARG	CB-CA-C	-7.75	97.68	110.85
1	L	38	ARG	CB-CA-C	7.57	120.39	109.26
1	B	203	ARG	N-CA-CB	7.53	121.30	110.16

There are no chirality outliers.

5 of 33 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	265	ARG	Sidechain
1	A	38	ARG	Sidechain
1	A	54	ARG	Peptide
1	B	35	ARG	Sidechain
1	B	85	ARG	Sidechain

5.2 Too-close contacts (i)

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	A	2710	0	2654	23	0
1	B	2700	0	2646	13	0
1	C	2710	0	2653	37	0
1	D	2715	0	2660	33	0
1	E	2705	0	2649	31	0
1	F	2703	0	2645	39	0
1	G	2710	0	2653	45	0
1	H	2694	0	2641	25	0
1	I	2718	0	2658	22	0
1	J	2700	0	2646	22	0
1	K	2703	0	2644	25	0
1	L	2715	0	2660	27	0
2	A	65	0	0	2	0
2	B	65	0	0	0	0
2	C	65	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	65	0	0	6	0
2	E	65	0	0	1	0
2	F	65	0	0	3	0
2	G	65	0	0	0	0
2	H	65	0	0	4	0
2	I	65	0	0	1	0
2	J	65	0	0	1	0
2	K	65	0	0	2	0
2	L	65	0	0	1	0
3	A	120	0	0	1	0
3	B	115	0	0	0	0
3	C	128	0	0	1	0
3	D	120	0	0	1	0
3	E	112	0	0	3	0
3	F	102	0	0	2	0
3	G	104	0	0	2	0
3	H	108	0	0	0	0
3	I	127	0	0	1	0
3	J	127	0	0	1	0
3	K	121	0	0	1	0
3	L	119	0	0	1	0
All	All	34666	0	31809	312	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 5.

The worst 5 of 312 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)
1:G:259:LEU:HD22	1:G:274:LEU:HD13	1.52	0.91
1:C:91:ARG:HG3	1:C:91:ARG:HH11	1.37	0.90
1:F:85:ARG:HD3	2:F:401:A1IY9:O9	1.74	0.88
1:F:320:TYR:CE2	1:F:322:ALA:HB2	2.13	0.84
1:D:85:ARG:HD3	2:D:401:A1IY9:O9	1.83	0.77

There are no symmetry-related clashes.

5.3   Torsion angles ⓘ

5.3.1   Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

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	A	358/364 (98%)	332 (93%)	21 (6%)	5 (1%)	9	3
1	B	354/364 (97%)	338 (96%)	11 (3%)	5 (1%)	9	3
1	C	356/364 (98%)	332 (93%)	21 (6%)	3 (1%)	16	8
1	D	358/364 (98%)	338 (94%)	18 (5%)	2 (1%)	22	13
1	E	355/364 (98%)	334 (94%)	18 (5%)	3 (1%)	16	8
1	F	354/364 (97%)	326 (92%)	21 (6%)	7 (2%)	6	1
1	G	356/364 (98%)	327 (92%)	23 (6%)	6 (2%)	7	2
1	H	353/364 (97%)	327 (93%)	24 (7%)	2 (1%)	22	13
1	I	359/364 (99%)	346 (96%)	12 (3%)	1 (0%)	37	31
1	J	354/364 (97%)	341 (96%)	12 (3%)	1 (0%)	37	31
1	K	355/364 (98%)	333 (94%)	18 (5%)	4 (1%)	12	4
1	L	358/364 (98%)	339 (95%)	19 (5%)	0	100	100
All	All	4270/4368 (98%)	4013 (94%)	218 (5%)	39 (1%)	14	7

5 of 39 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	103	ASN
1	C	347	ALA
1	D	103	ASN
1	F	41	SER
1	F	103	ASN

5.3.2   Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

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	A	276/277 (100%)	268 (97%)	8 (3%)	37	32
1	B	274/277 (99%)	268 (98%)	6 (2%)	47	43
1	C	276/277 (100%)	269 (98%)	7 (2%)	42	38
1	D	276/277 (100%)	264 (96%)	12 (4%)	25	18
1	E	276/277 (100%)	270 (98%)	6 (2%)	47	43
1	F	275/277 (99%)	263 (96%)	12 (4%)	24	18
1	G	276/277 (100%)	262 (95%)	14 (5%)	20	13
1	H	273/277 (99%)	264 (97%)	9 (3%)	33	27
1	I	277/277 (100%)	271 (98%)	6 (2%)	47	43
1	J	274/277 (99%)	271 (99%)	3 (1%)	70	70
1	K	275/277 (99%)	263 (96%)	12 (4%)	24	18
1	L	276/277 (100%)	265 (96%)	11 (4%)	27	21
All	All	3304/3324 (99%)	3198 (97%)	106 (3%)	34	28

5 of 106 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	104	ASP
1	H	255	ASP
1	L	212	ARG
1	G	293	ASN
1	H	6	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 42 such sidechains are listed below:

Mol	Chain	Res	Type
1	G	327	GLN
1	K	138	HIS
1	H	116	GLN
1	I	263	ASN
1	K	293	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

12 ligands are modelled in this entry.

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	#$|Z| > 2$
2	A1IY9	D	401	-	61,69,69	0.81	2 (3%)	78,101,101	1.48	8 (10%)
2	A1IY9	F	401	-	61,69,69	0.88	3 (4%)	78,101,101	1.82	11 (14%)
2	A1IY9	A	401	-	61,69,69	0.81	3 (4%)	78,101,101	1.75	15 (19%)
2	A1IY9	I	401	-	61,69,69	0.86	2 (3%)	78,101,101	1.40	10 (12%)
2	A1IY9	G	401	-	61,69,69	0.77	2 (3%)	78,101,101	1.74	13 (16%)
2	A1IY9	K	401	-	61,69,69	0.83	1 (1%)	78,101,101	1.49	9 (11%)
2	A1IY9	J	401	-	61,69,69	0.86	3 (4%)	78,101,101	1.53	11 (14%)
2	A1IY9	L	401	-	61,69,69	0.86	3 (4%)	78,101,101	1.45	7 (8%)
2	A1IY9	E	401	-	61,69,69	0.90	4 (6%)	78,101,101	1.80	11 (14%)
2	A1IY9	C	401	-	61,69,69	0.84	2 (3%)	78,101,101	1.28	10 (12%)
2	A1IY9	B	401	-	61,69,69	0.81	2 (3%)	78,101,101	1.76	13 (16%)
2	A1IY9	H	401	-	61,69,69	1.19	4 (6%)	78,101,101	1.55	14 (17%)

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
2	A1IY9	D	401	-	-	9/59/79/79	0/5/5/5
2	A1IY9	F	401	-	-	20/59/79/79	0/5/5/5
2	A1IY9	A	401	-	-	18/59/79/79	0/5/5/5
2	A1IY9	I	401	-	-	10/59/79/79	0/5/5/5
2	A1IY9	G	401	-	-	9/59/79/79	0/5/5/5
2	A1IY9	K	401	-	-	10/59/79/79	0/5/5/5
2	A1IY9	J	401	-	-	12/59/79/79	0/5/5/5
2	A1IY9	L	401	-	-	11/59/79/79	0/5/5/5
2	A1IY9	E	401	-	-	17/59/79/79	0/5/5/5
2	A1IY9	C	401	-	-	8/59/79/79	0/5/5/5
2	A1IY9	B	401	-	-	12/59/79/79	0/5/5/5
2	A1IY9	H	401	-	-	16/59/79/79	0/5/5/5

The worst 5 of 31 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	401	A1IY9	C2-C3	6.52	1.58	1.53
2	I	401	A1IY9	O1-C3	3.66	1.26	1.20
2	E	401	A1IY9	C2-C3	3.28	1.56	1.53
2	J	401	A1IY9	C2-C3	-3.22	1.51	1.53
2	H	401	A1IY9	O1-C3	3.14	1.25	1.20

The worst 5 of 132 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	401	A1IY9	C2-C3-S1	9.11	121.69	111.81
2	G	401	A1IY9	C2-C3-S1	7.99	120.48	111.81
2	D	401	A1IY9	C2-C3-S1	7.94	120.43	111.81
2	E	401	A1IY9	C2-C3-S1	7.94	120.42	111.81
2	B	401	A1IY9	C2-C3-S1	7.81	120.28	111.81

There are no chirality outliers.

5 of 152 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	A1IY9	C9-C10-C11-C14
2	A	401	A1IY9	C9-C10-C11-C12
2	A	401	A1IY9	C9-C10-C11-C13
2	A	401	A1IY9	C6-C7-C8-N2
2	A	401	A1IY9	C25-C2-C3-O1

There are no ring outliers.

9 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	401	A1IY9	6	0
2	F	401	A1IY9	3	0
2	A	401	A1IY9	2	0
2	I	401	A1IY9	1	0
2	K	401	A1IY9	2	0
2	J	401	A1IY9	1	0
2	L	401	A1IY9	1	0
2	E	401	A1IY9	1	0
2	H	401	A1IY9	4	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 then 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.

Ligand A1IY9 D 401
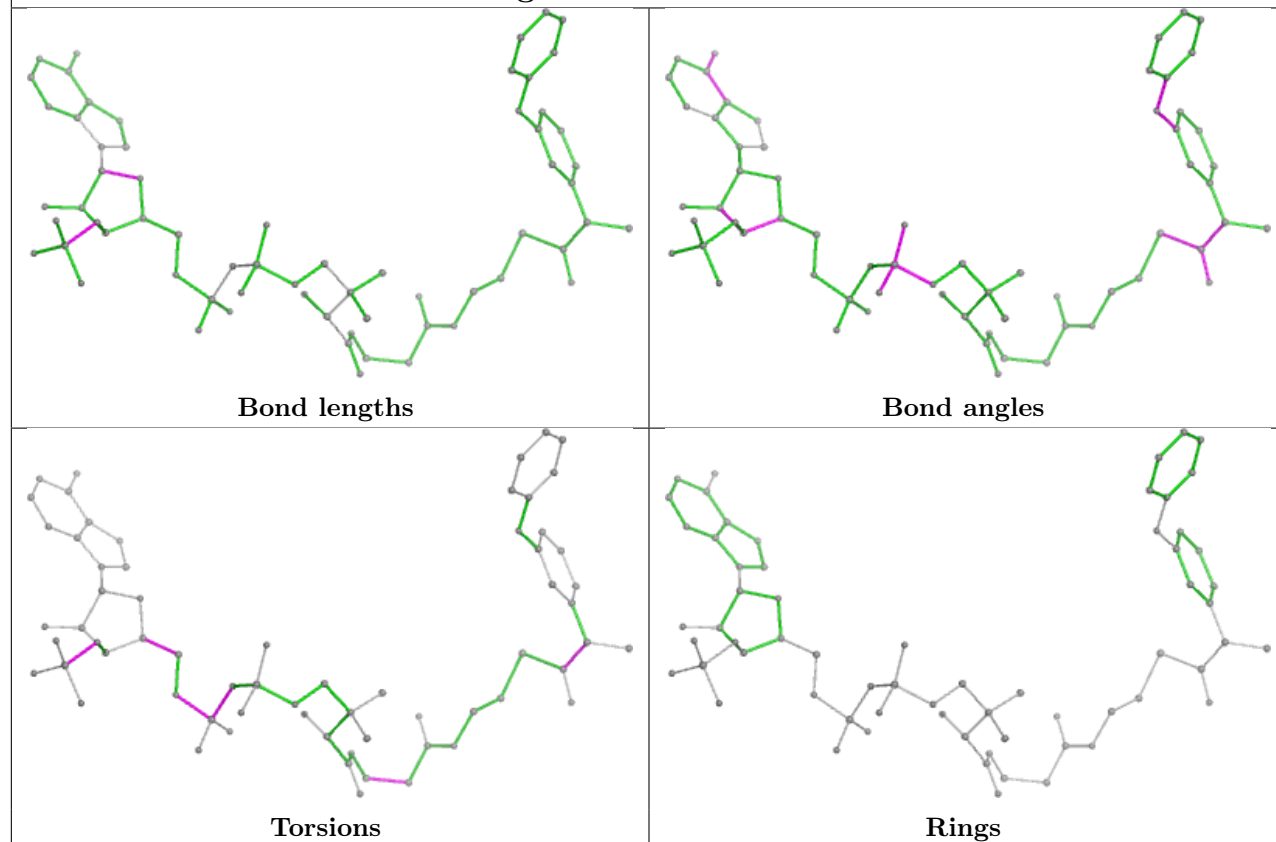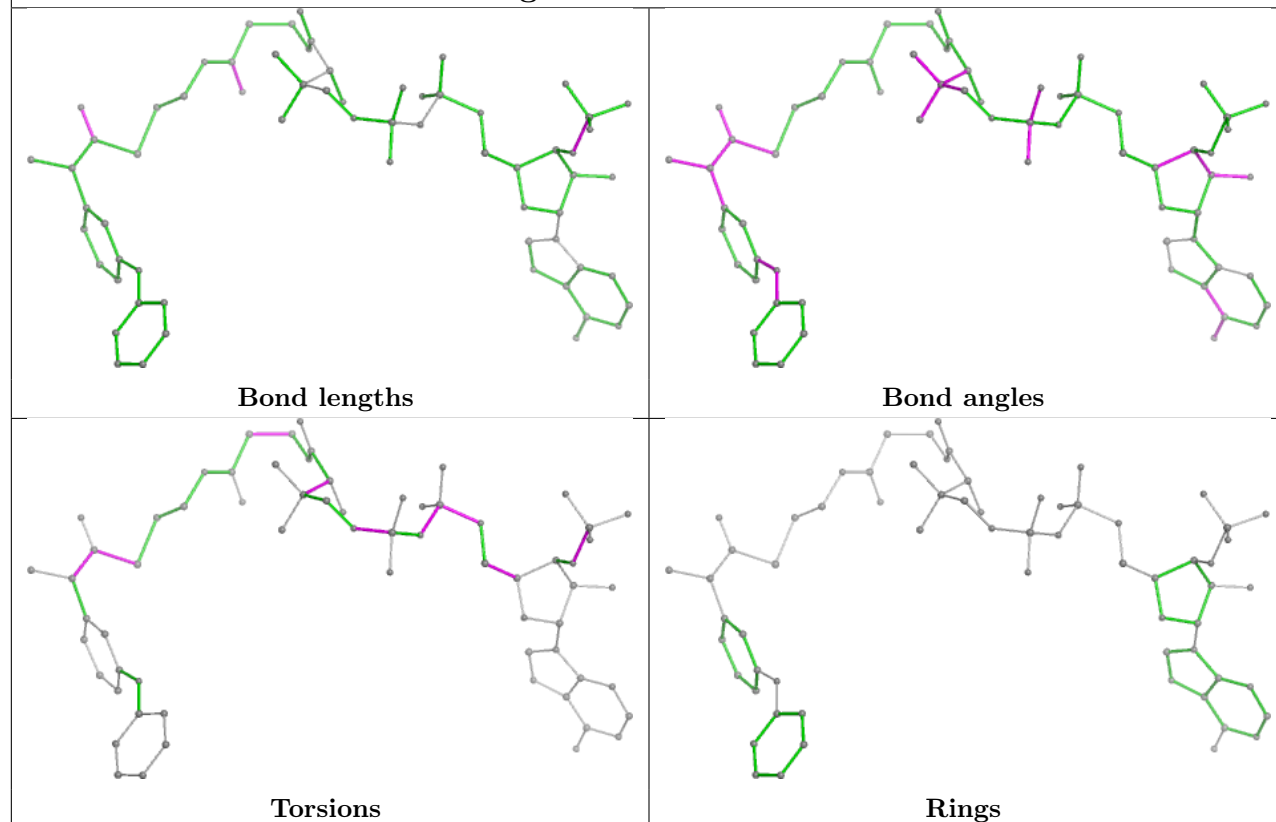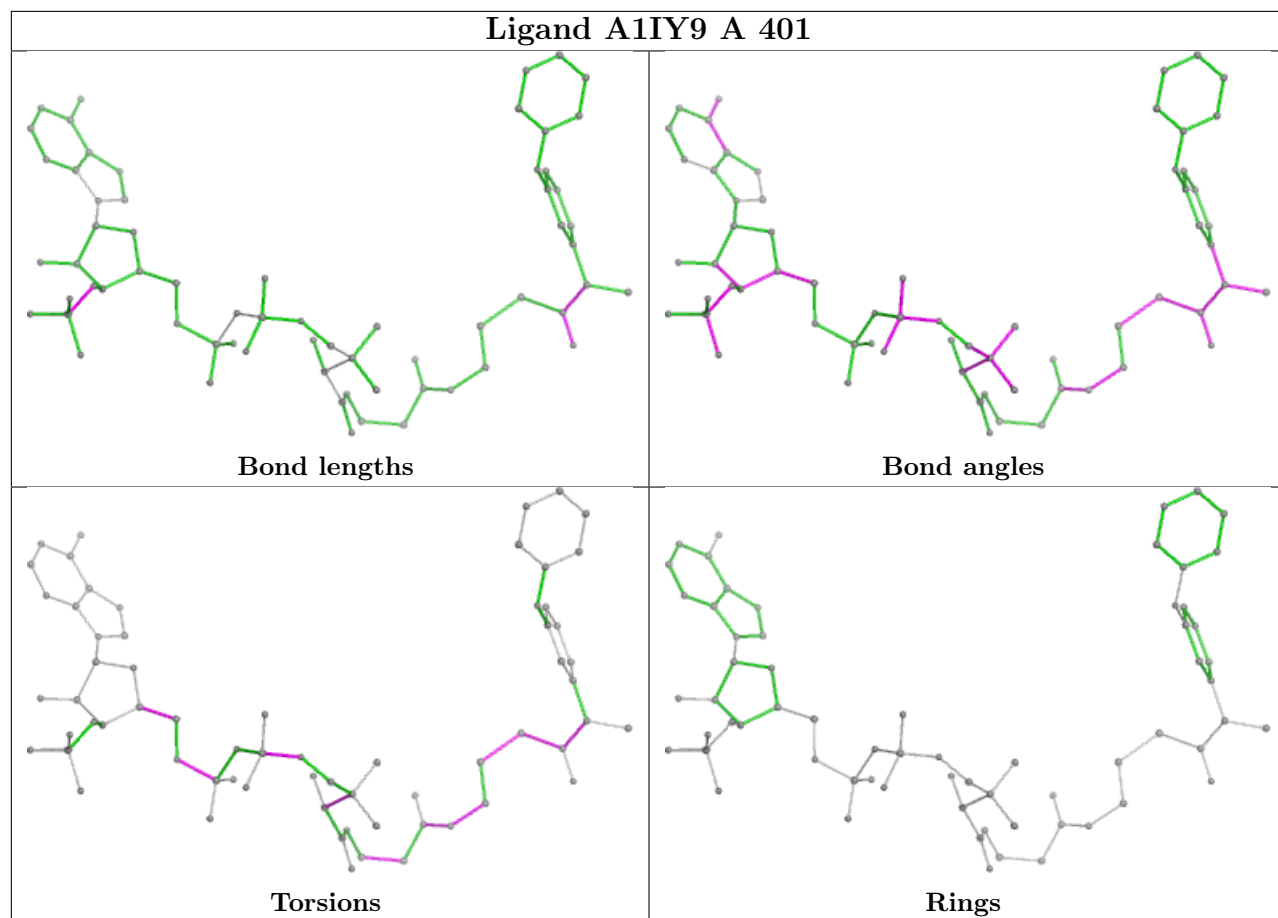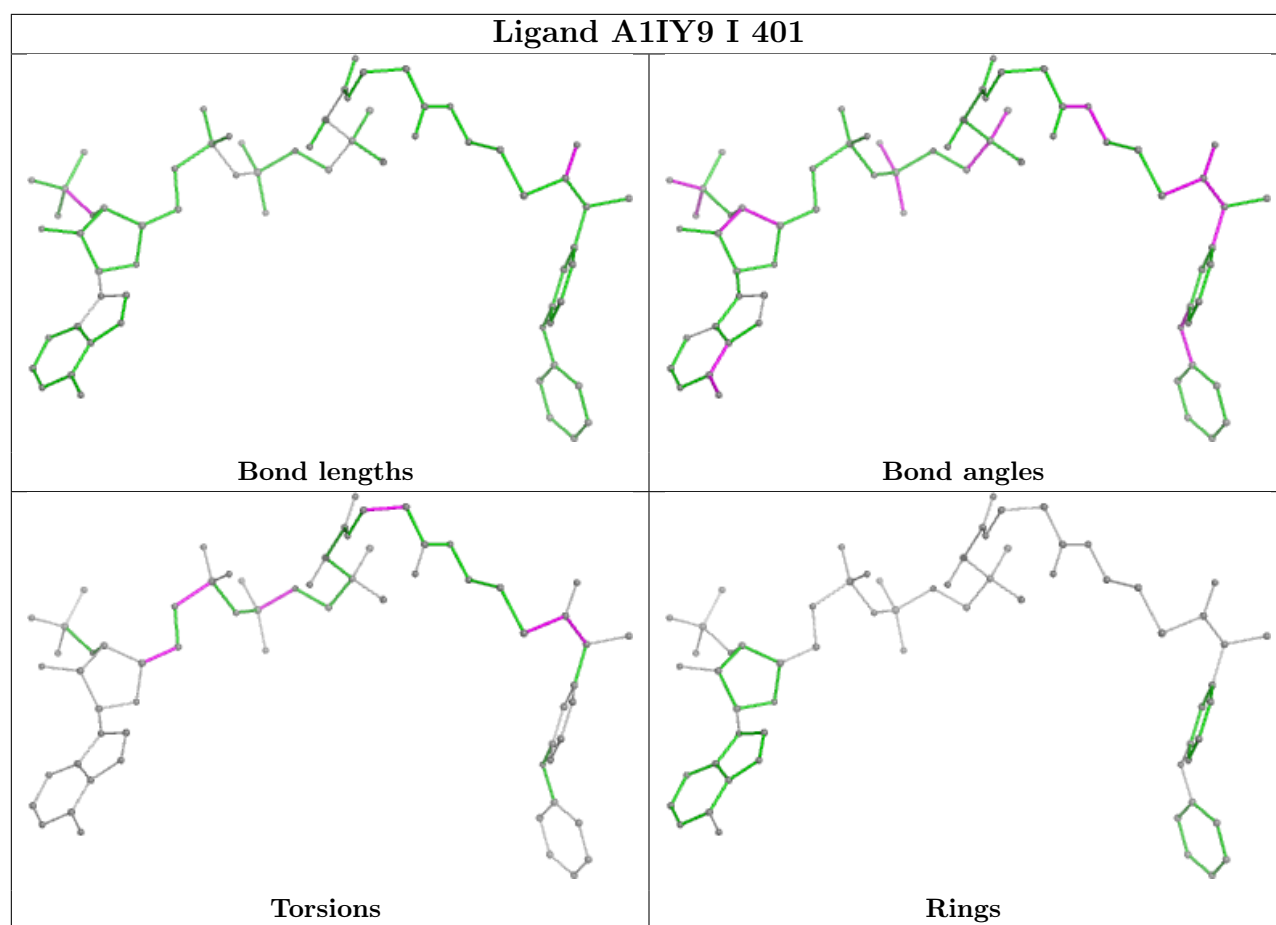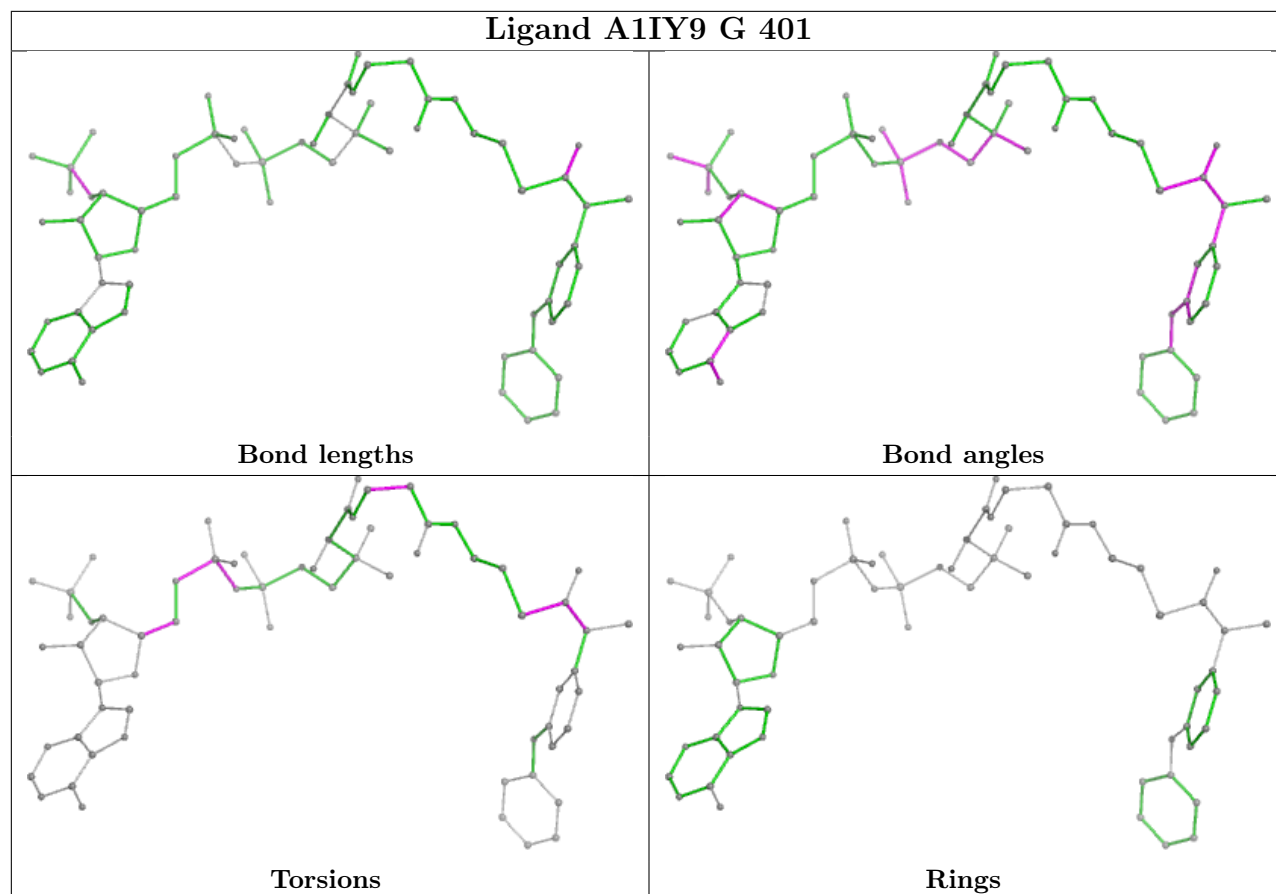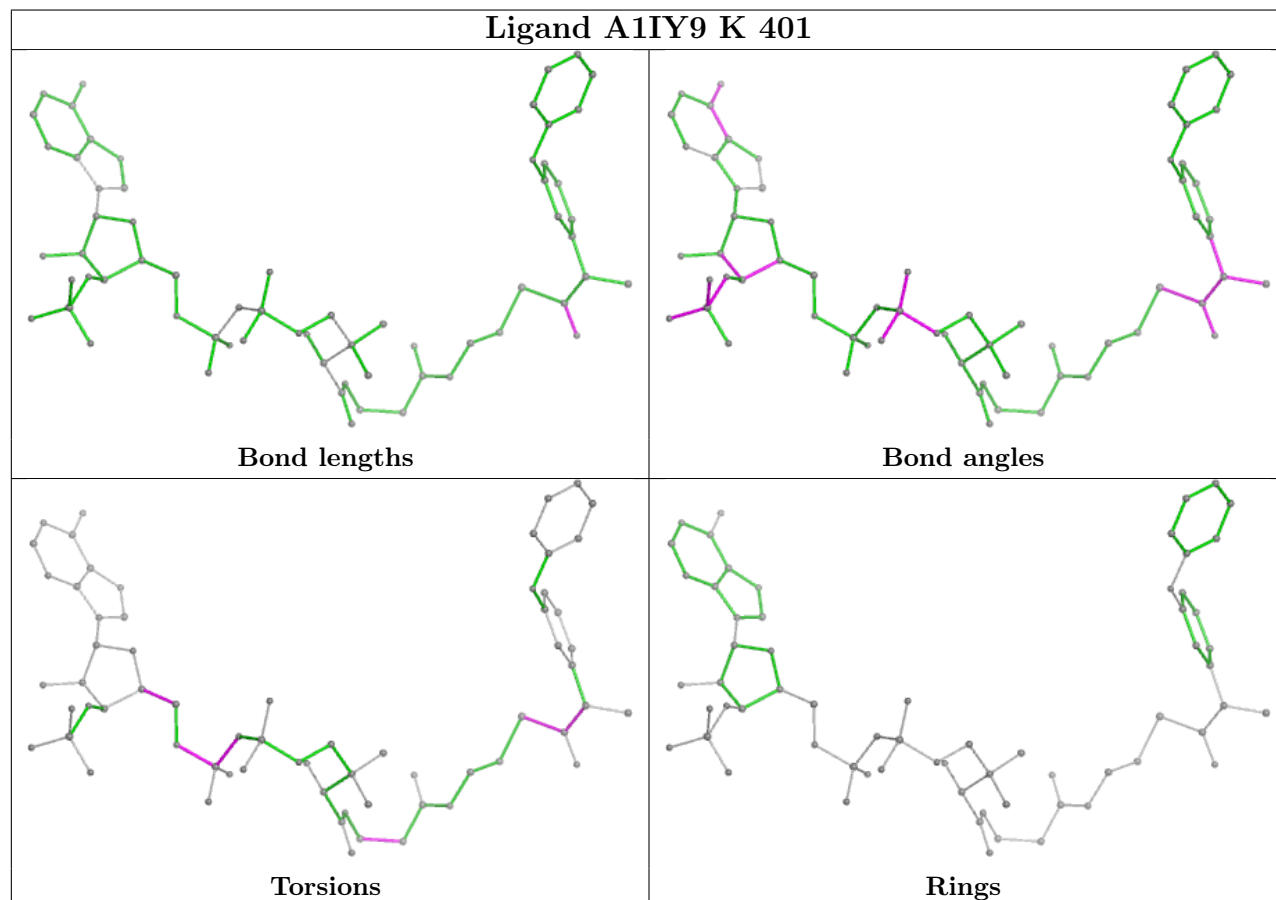
Bond lengths

Bond angles

Torsions

Rings

Ligand A1IY9 F 401

Bond lengths

Bond angles

Torsions

Rings

Ligand A1IY9 A 401

Bond lengths

Bond angles

Torsions

Rings

Ligand A1IY9 I 401

Bond lengths

Bond angles

Torsions

Rings

Ligand A1IY9 G 401

Bond lengths

Bond angles

Torsions

Rings

Ligand A1IY9 K 401

Bond lengths

Bond angles

Torsions

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Ligand A1IY9 J 401

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Ligand A1IY9 E 401

Bond lengths

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Torsions

Rings

Ligand A1IY9 C 401

Bond lengths

Bond angles

Torsions

Rings

Ligand A1IY9 B 401

Bond lengths

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Torsions

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Ligand A1IY9 H 401

Bond lengths

Bond angles

Torsions

Rings
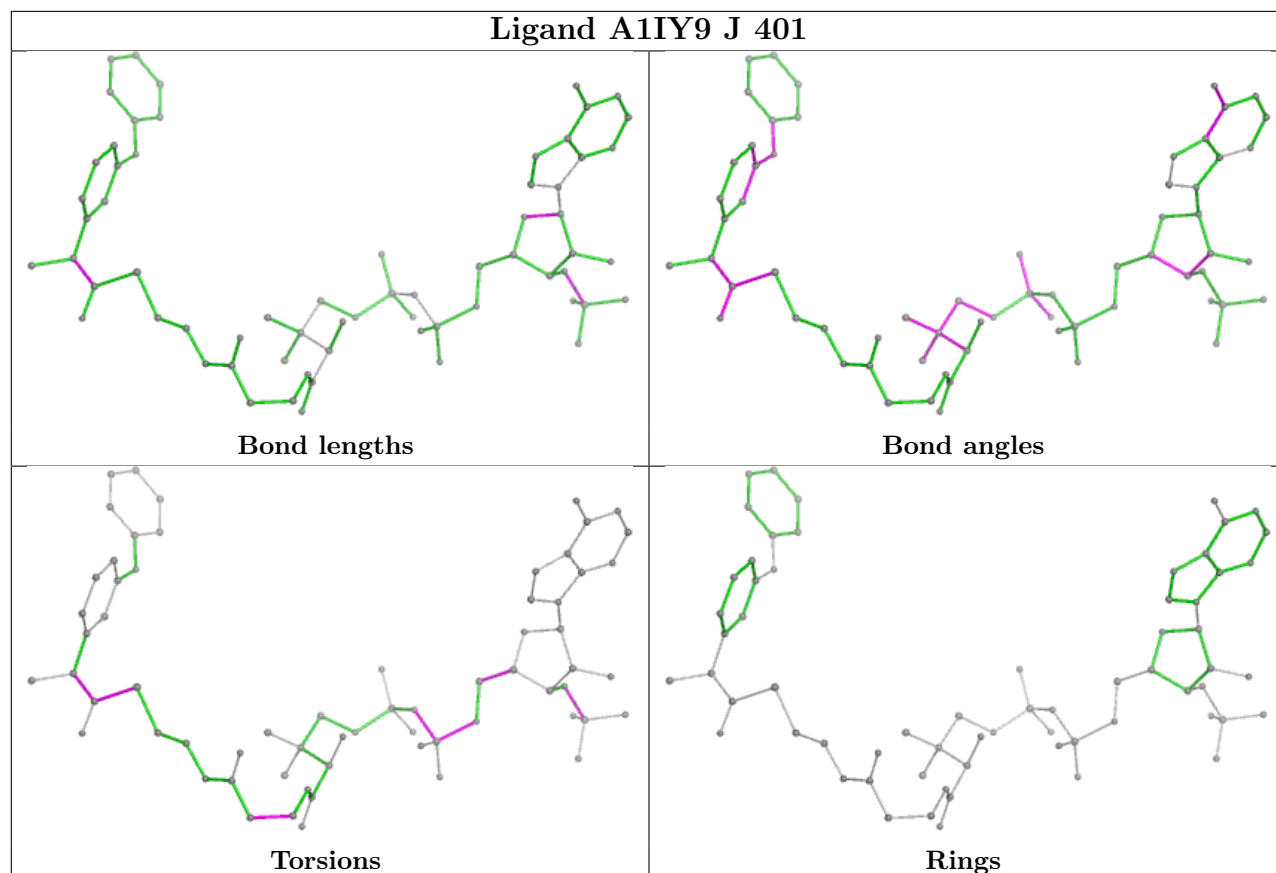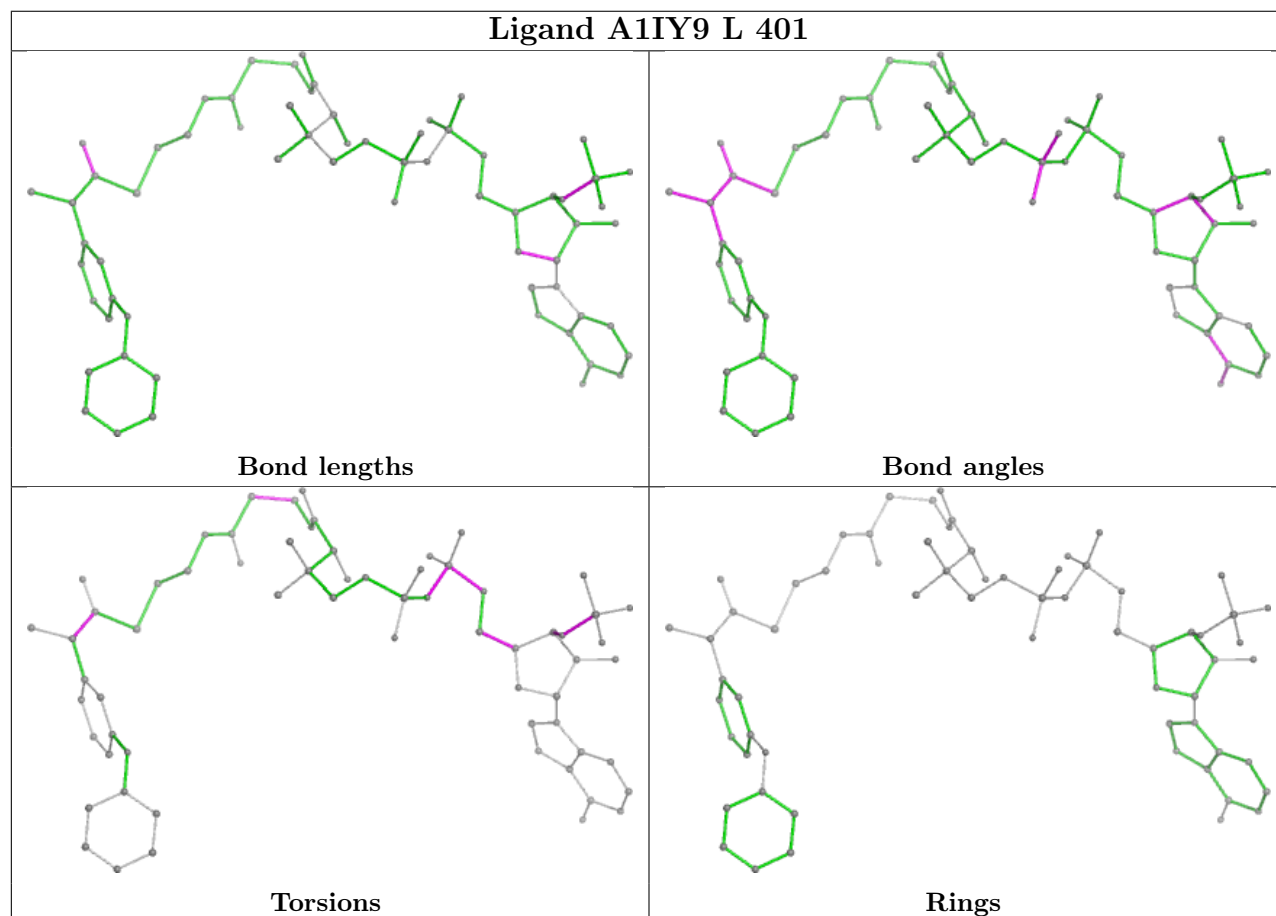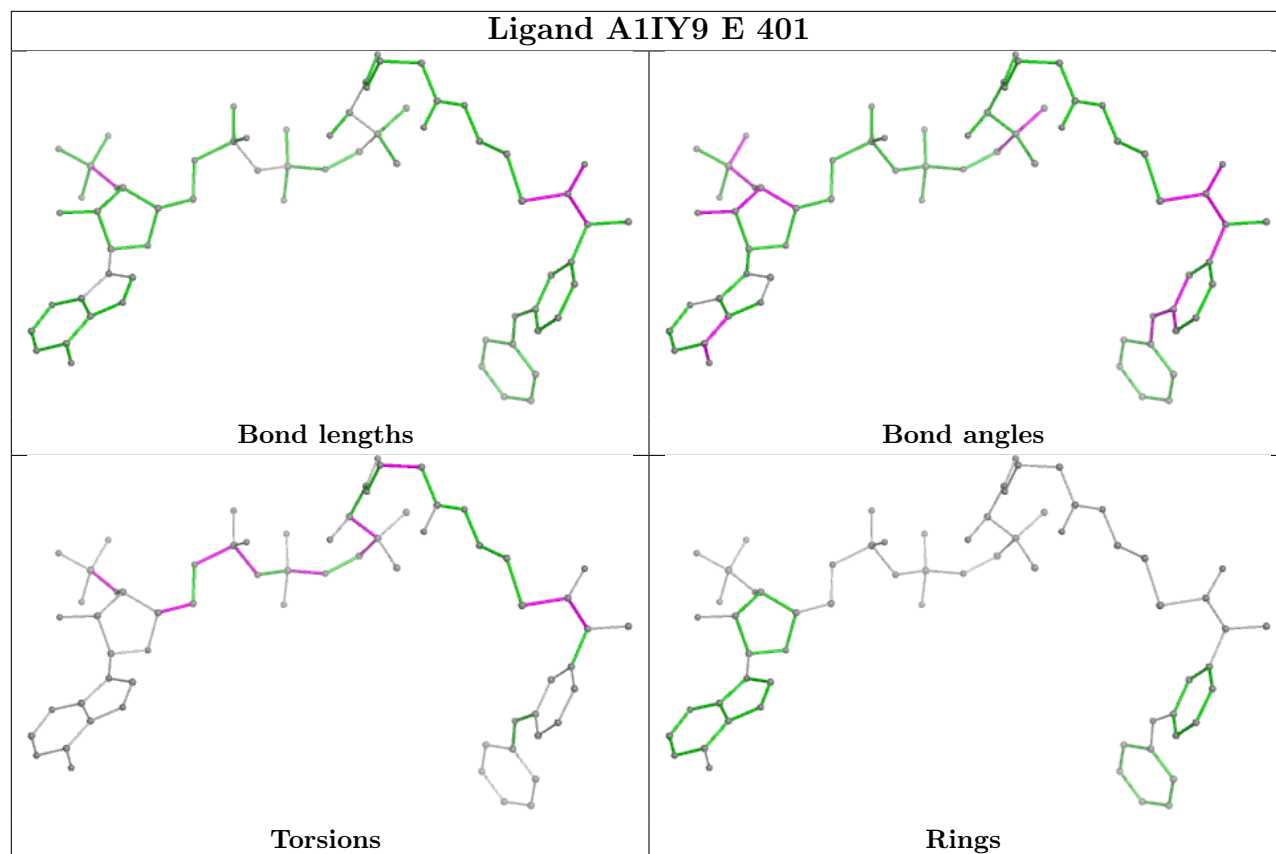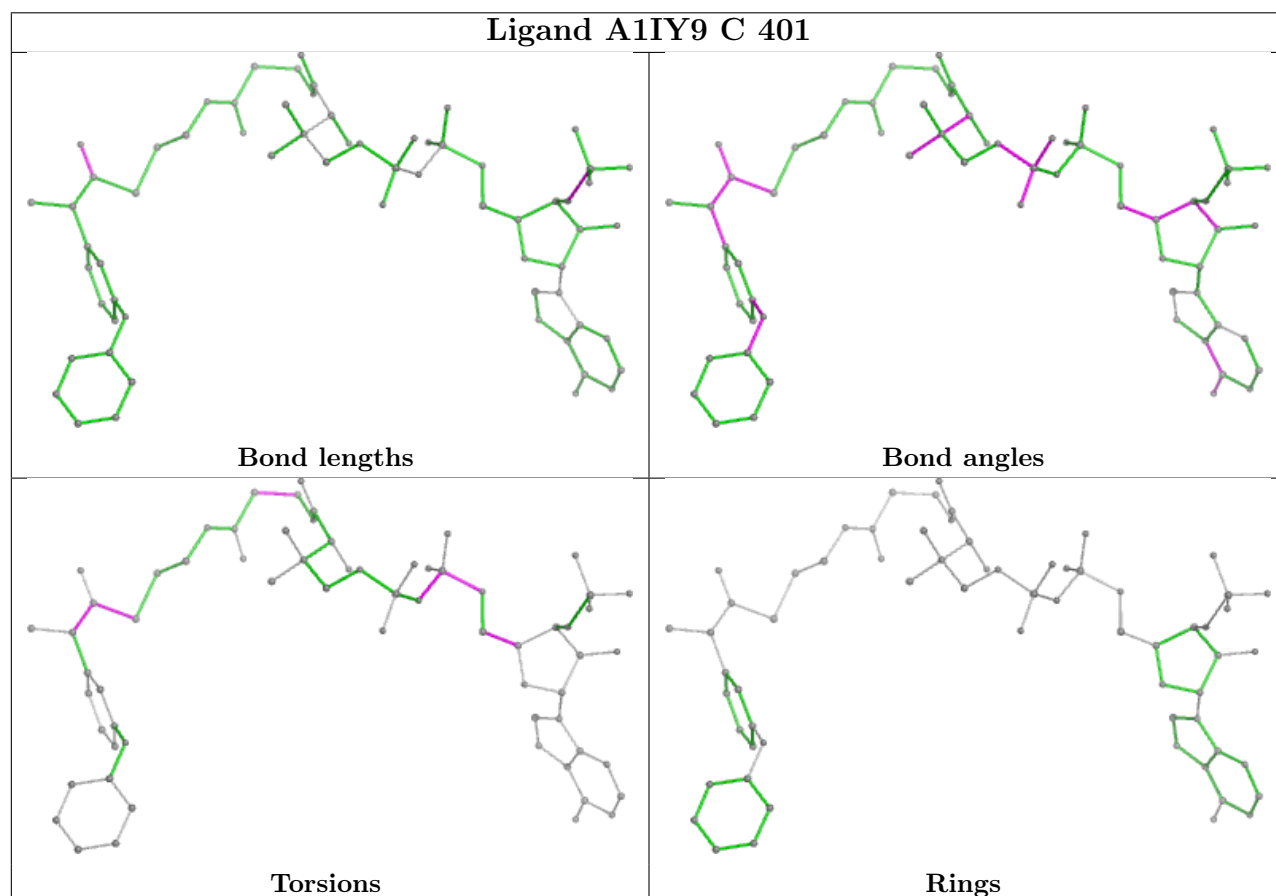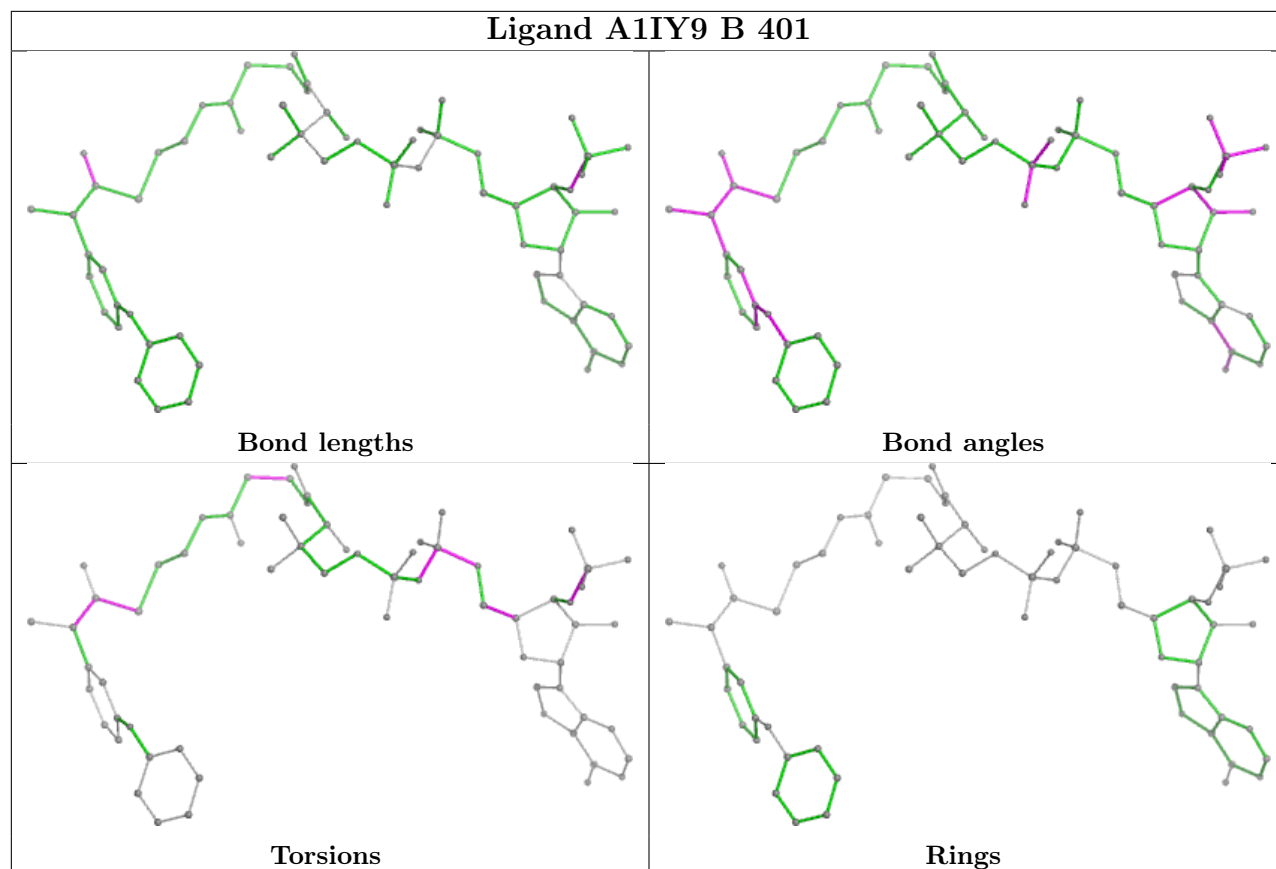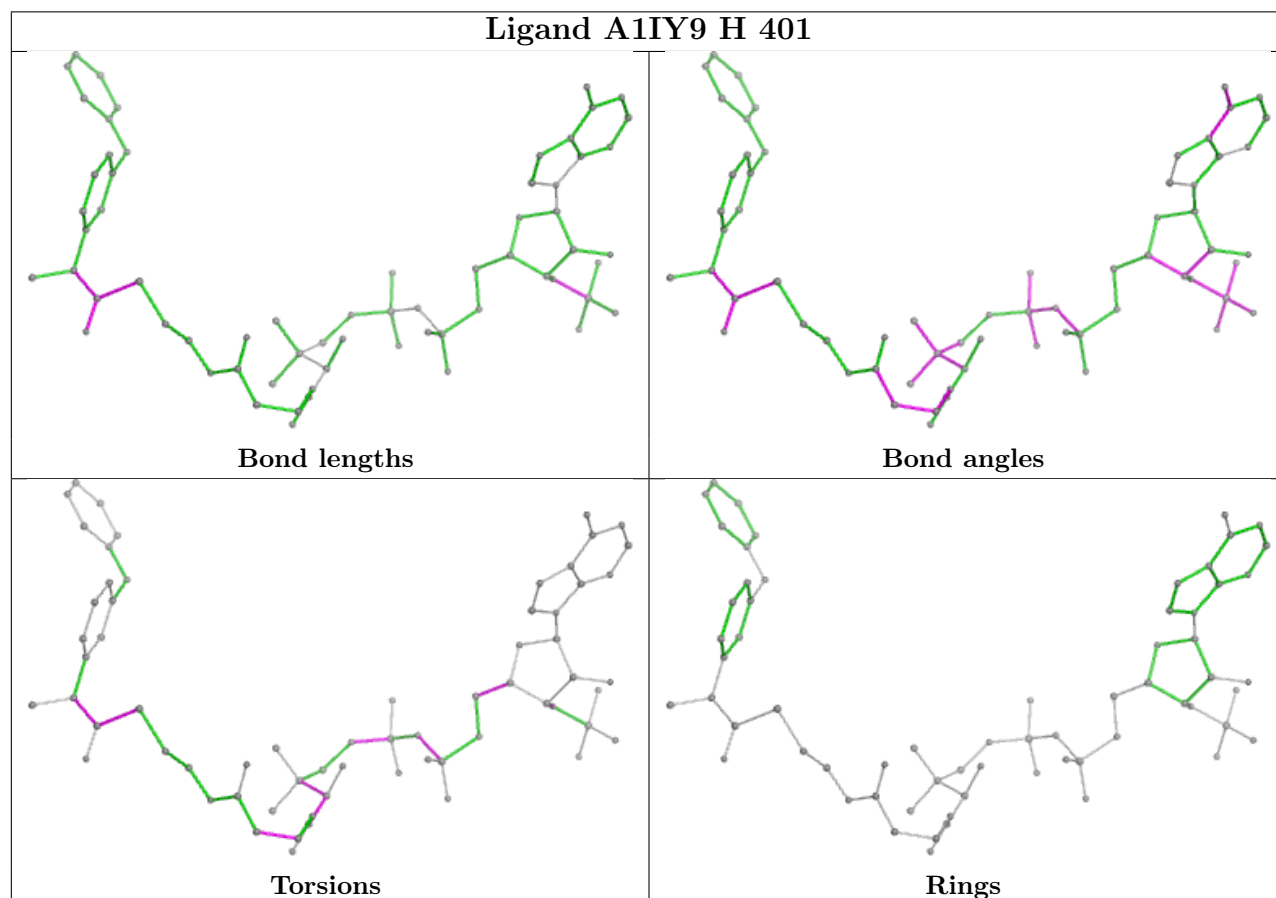
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	358/364 (98%)	0.87	62 (17%)	5	4	27, 42, 83, 112	2 (0%)
1	B	357/364 (98%)	0.64	30 (8%)	18	20	26, 42, 82, 114	1 (0%)
1	C	358/364 (98%)	0.86	68 (18%)	4	3	26, 43, 84, 113	2 (0%)
1	D	359/364 (98%)	0.91	59 (16%)	5	5	27, 43, 82, 121	1 (0%)
1	E	356/364 (97%)	1.03	79 (22%)	3	2	21, 44, 90, 118	3 (0%)
1	F	357/364 (98%)	1.11	83 (23%)	2	2	27, 46, 86, 120	1 (0%)
1	G	358/364 (98%)	1.28	100 (27%)	2	1	28, 47, 96, 119	2 (0%)
1	H	356/364 (97%)	1.02	74 (20%)	3	3	26, 46, 93, 122	1 (0%)
1	I	359/364 (98%)	0.69	32 (8%)	17	18	26, 41, 76, 115	2 (0%)
1	J	357/364 (98%)	0.60	25 (7%)	24	25	27, 41, 75, 114	1 (0%)
1	K	357/364 (98%)	0.79	51 (14%)	7	7	26, 42, 82, 109	2 (0%)
1	L	359/364 (98%)	0.87	53 (14%)	7	7	27, 43, 80, 118	1 (0%)
All	All	4291/4368 (98%)	0.89	716 (16%)	5	5	21, 43, 85, 122	19 (0%)

The worst 5 of 716 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	K	346	ALA	8.2
1	C	346	ALA	7.5
1	G	346	ALA	6.7
1	F	351	ILE	6.7
1	J	346	ALA	6.4

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($Å^2$)	Q<0.9
2	A1IY9	H	401	65/65	0.88	0.16	53,70,98,115	0
2	A1IY9	E	401	65/65	0.89	0.16	48,69,91,116	0
2	A1IY9	F	401	65/65	0.92	0.13	34,56,90,107	0
2	A1IY9	C	401	65/65	0.93	0.13	35,50,92,107	0
2	A1IY9	G	401	65/65	0.93	0.14	35,57,101,115	0
2	A1IY9	A	401	65/65	0.93	0.14	40,58,94,106	0
2	A1IY9	B	401	65/65	0.95	0.11	36,55,88,101	0
2	A1IY9	D	401	65/65	0.95	0.11	29,51,90,104	0
2	A1IY9	I	401	65/65	0.95	0.12	30,50,111,116	0
2	A1IY9	J	401	65/65	0.95	0.11	33,49,94,113	0
2	A1IY9	L	401	65/65	0.95	0.12	33,49,103,109	0
2	A1IY9	K	401	65/65	0.96	0.10	33,51,99,105	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.
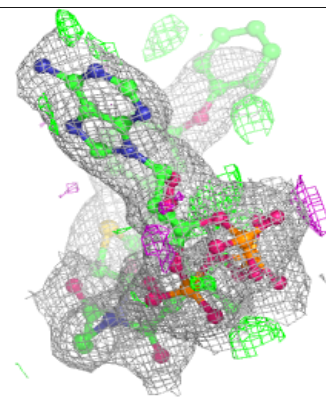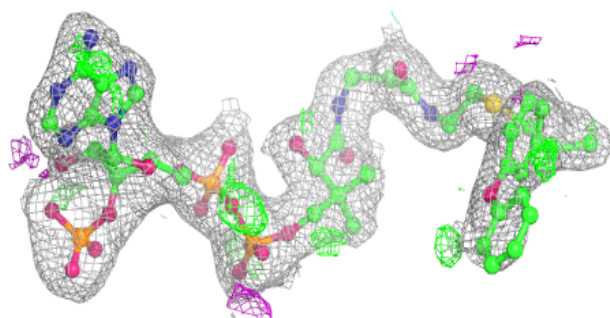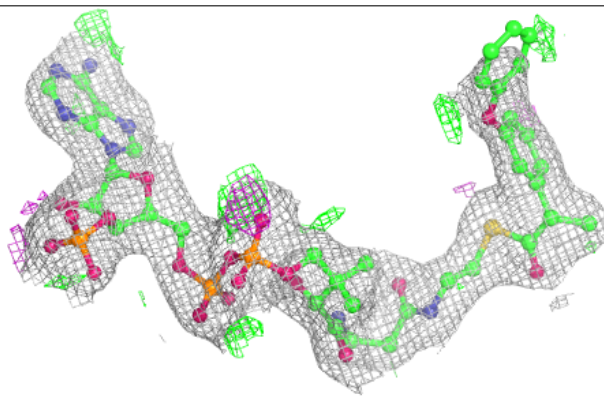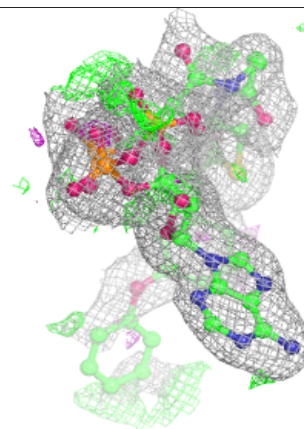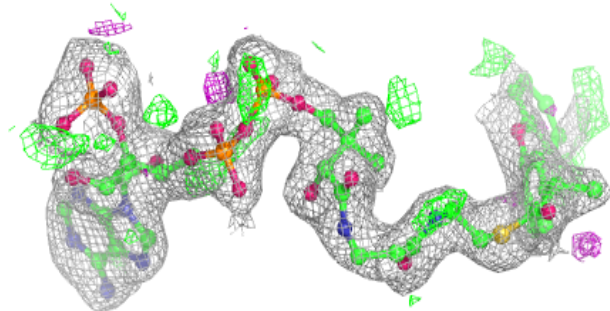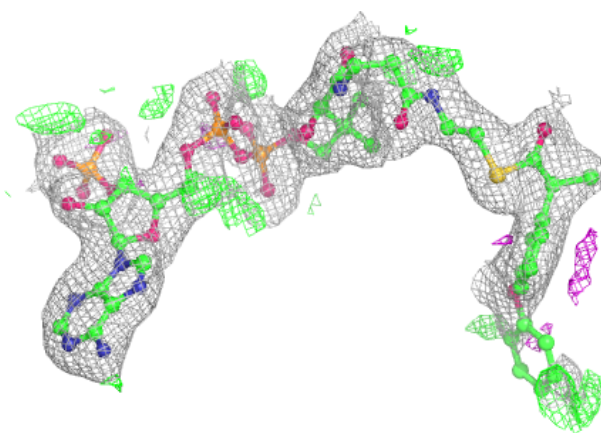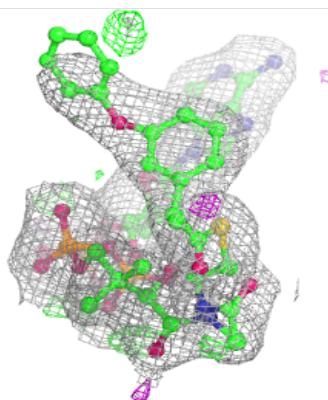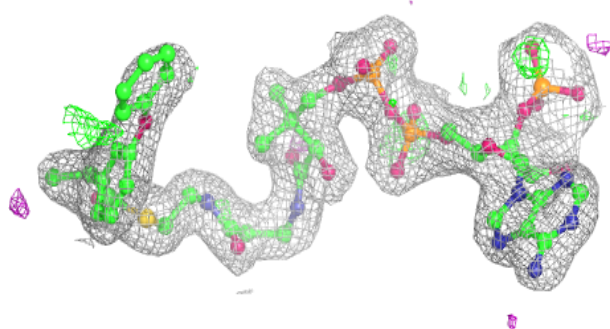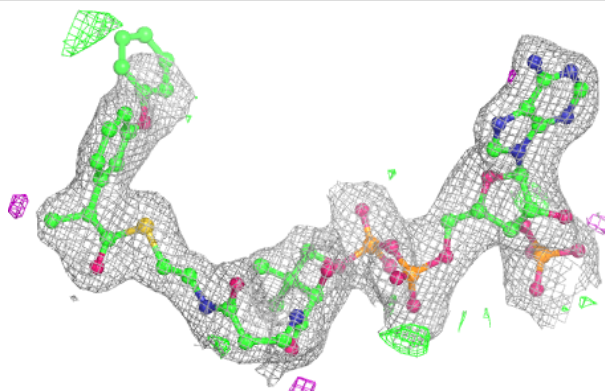
Electron density around A1IY9 H 401:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
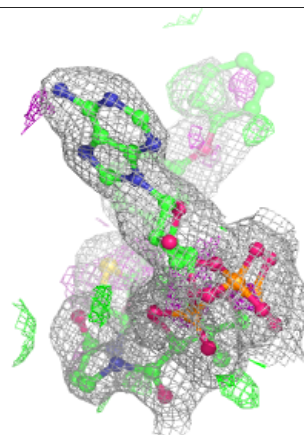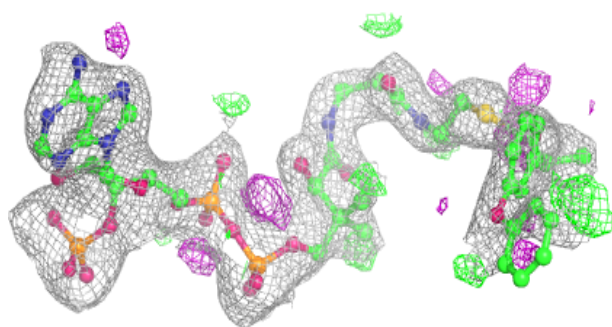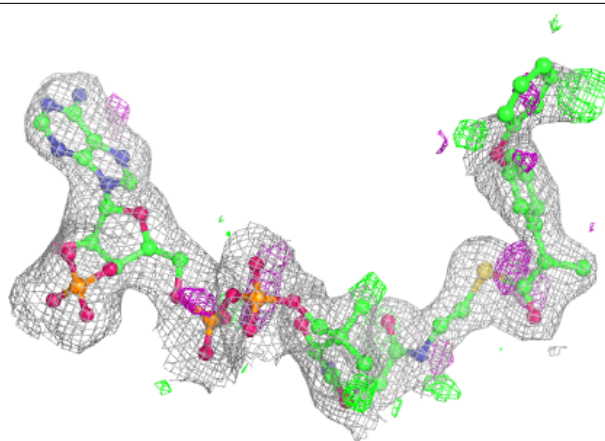
Electron density around A1IY9 E 401:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
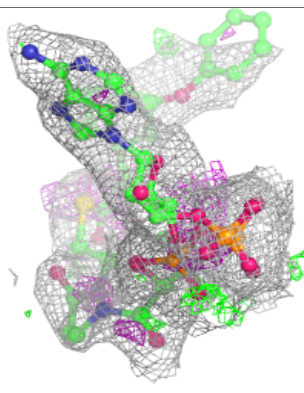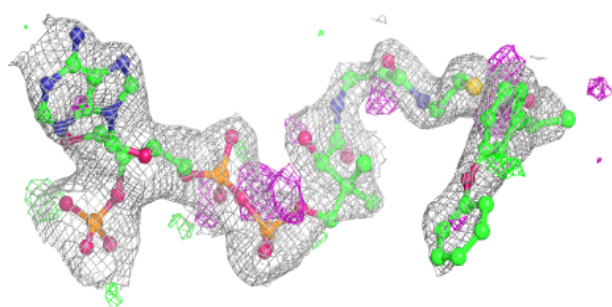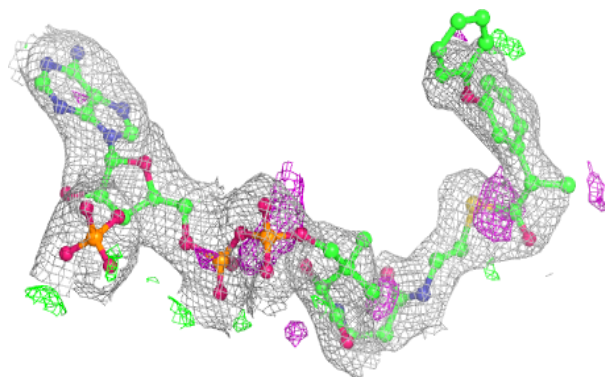
Electron density around A1IY9 F 401:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
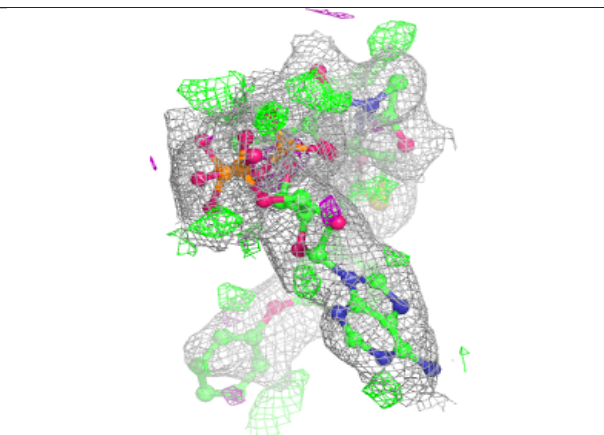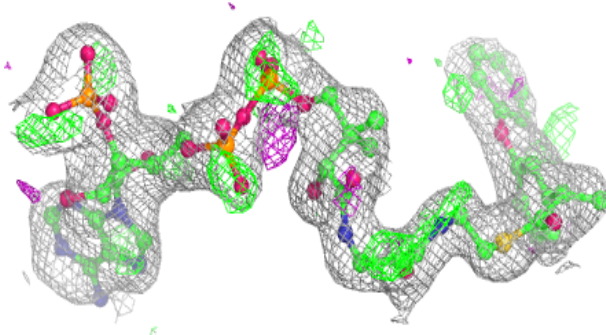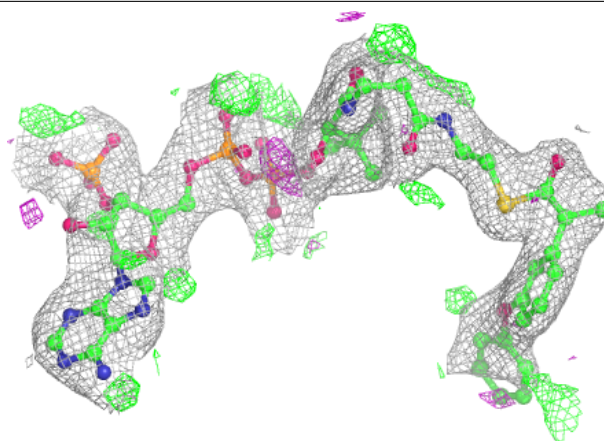
Electron density around A1IY9 C 401:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
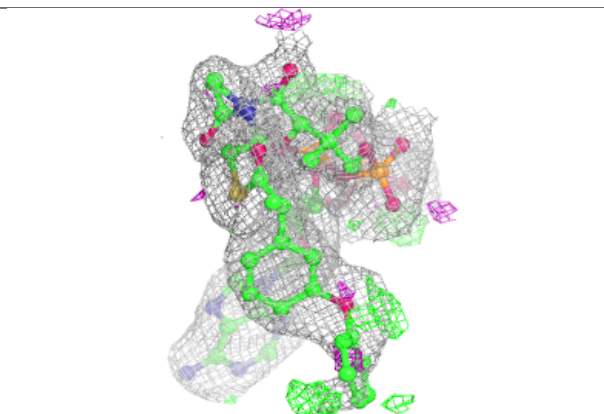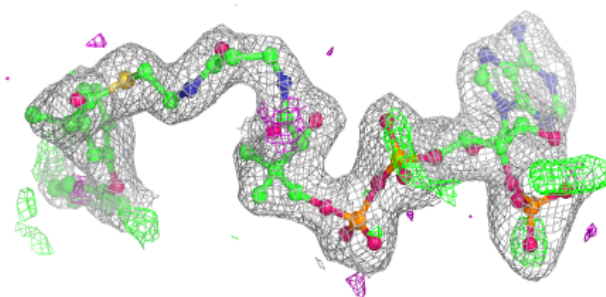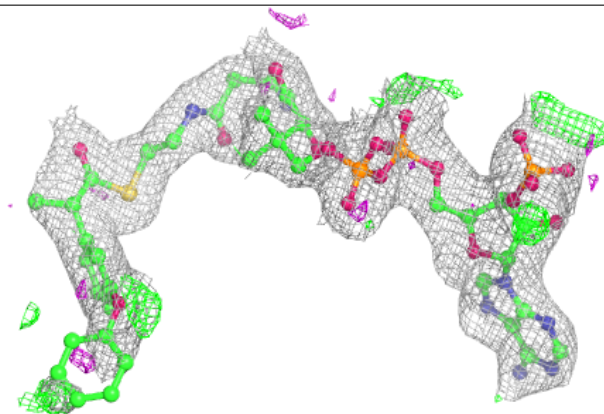
Electron density around A1IY9 G 401:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
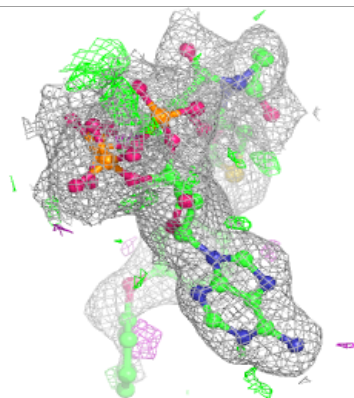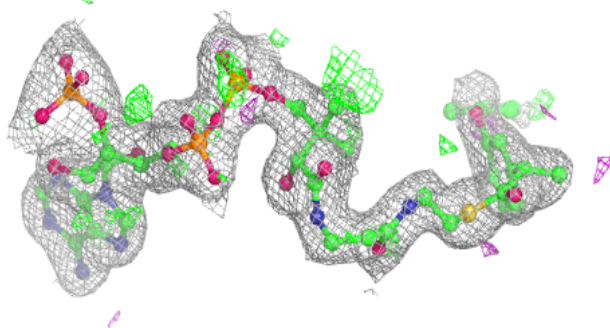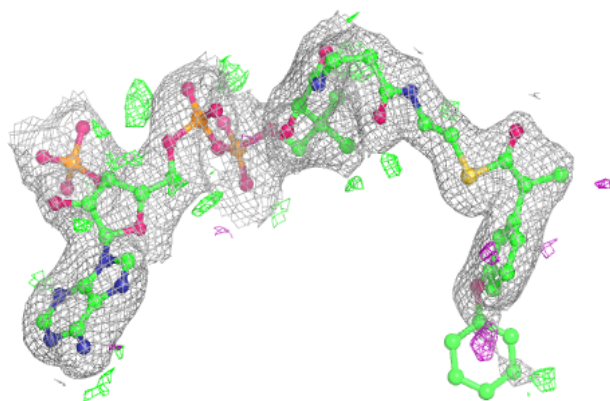and green (positive)
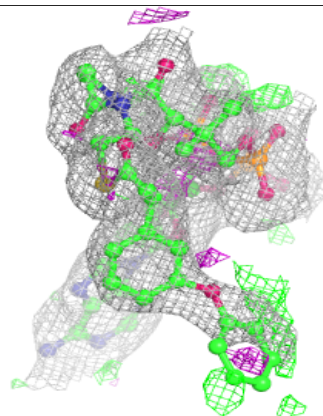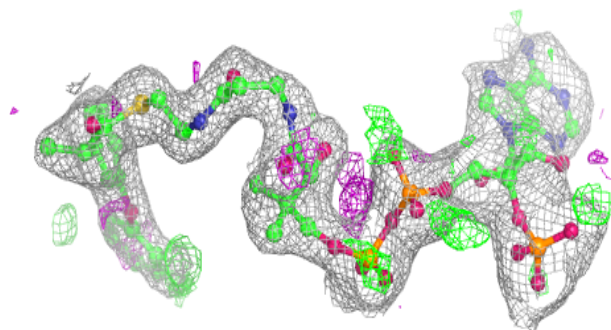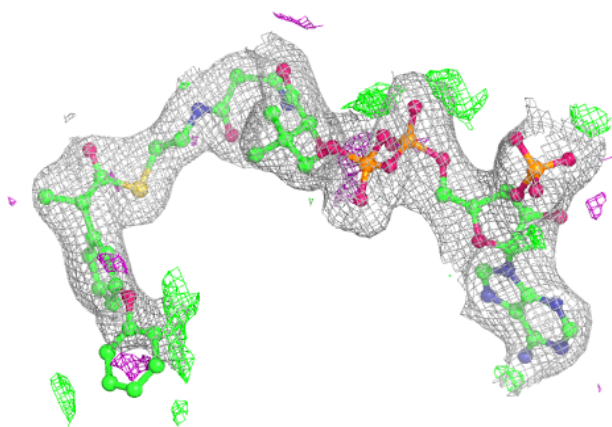
Electron density around A1IY9 A 401:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
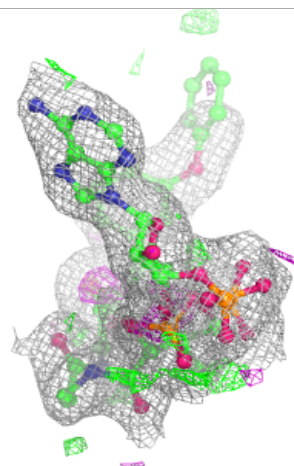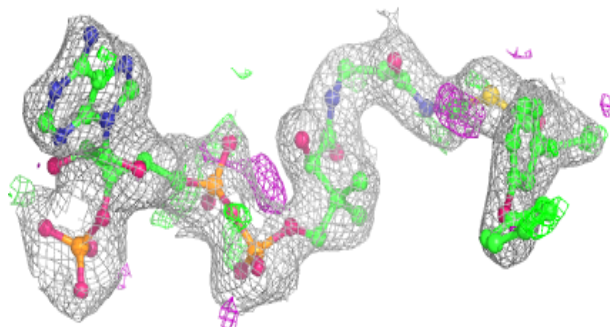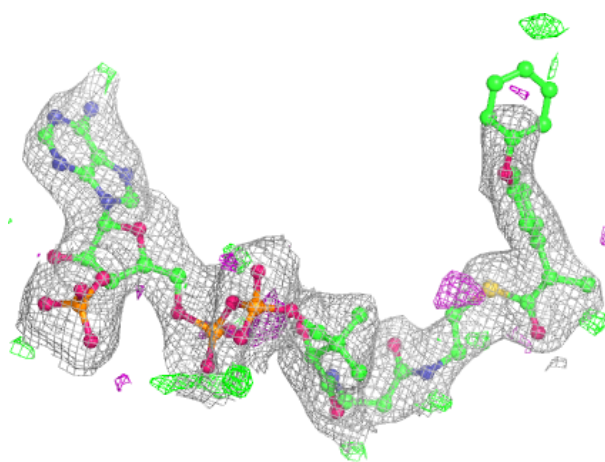
Electron density around A1IY9 B 401:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
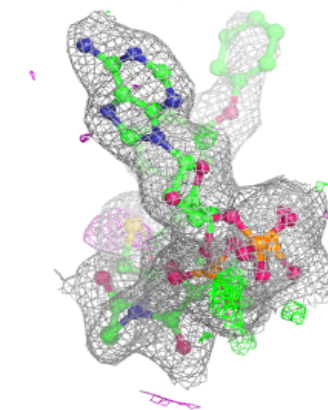and green (positive)
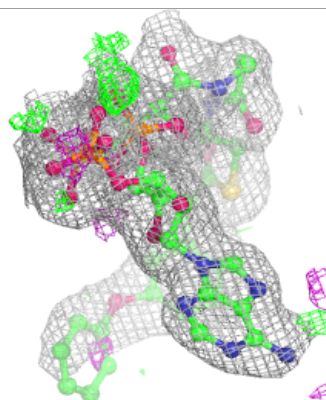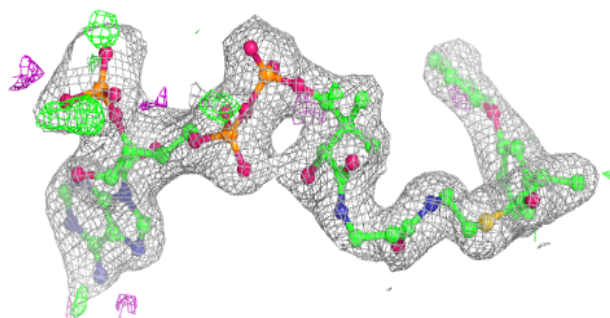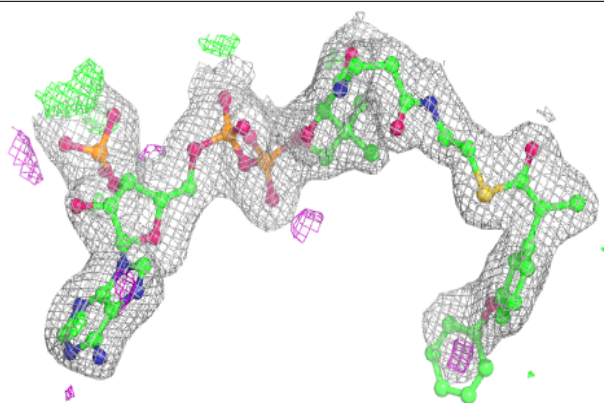
Electron density around A1IY9 D 401:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around A1IY9 I 401:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around A1IY9 J 401:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
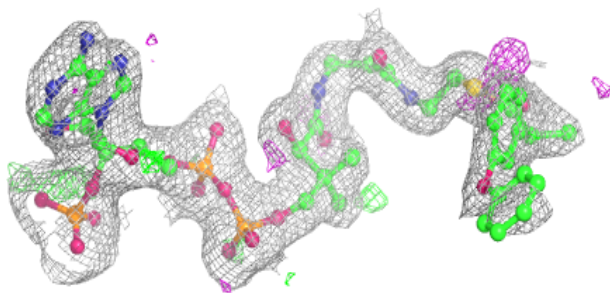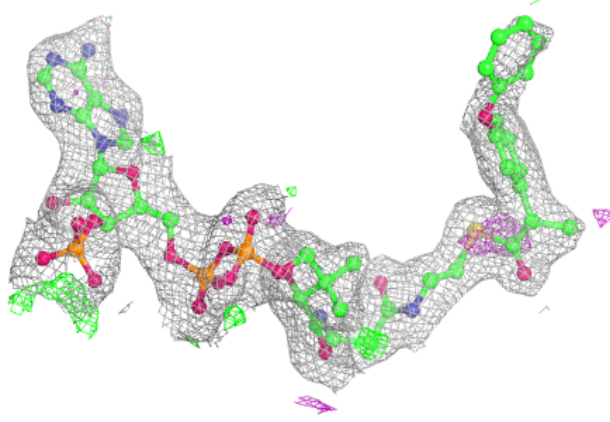mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around A1IY9 L 401:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around A1IY9 K 401:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

6.5 Other polymers ⓘ

There are no such residues in this entry.