



wwPDB X-ray Structure Validation Summary Report ⓘ

May 15, 2020 – 01:09 am BST

PDB ID : 3U9S
Title : Crystal structure of *P. aeruginosa* 3-methylcrotonyl-CoA carboxylase (MCC)
750 kD holoenzyme, CoA complex
Authors : Huang, C.S.; Tong, L.
Deposited on : 2011-10-19
Resolution : 3.50 Å(reported)

This is a wwPDB X-ray Structure 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/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

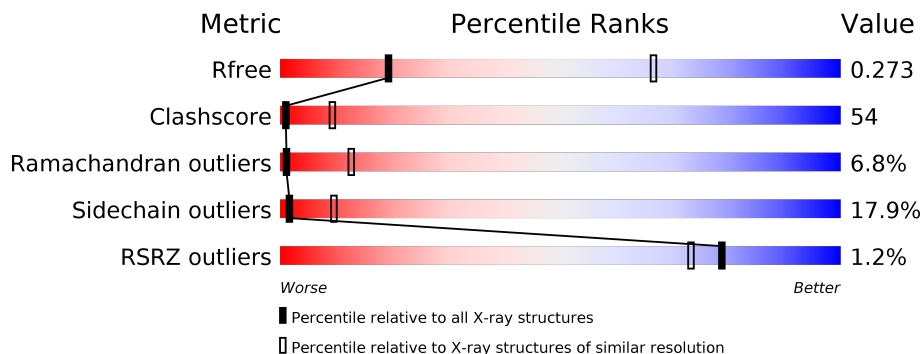
MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.11
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.11

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 3.50 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.





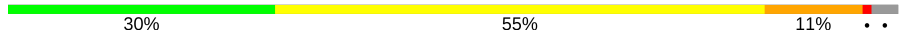
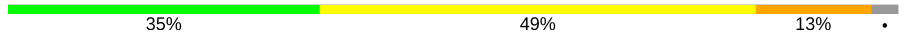
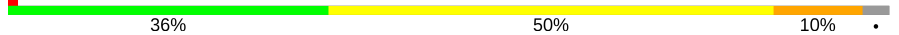
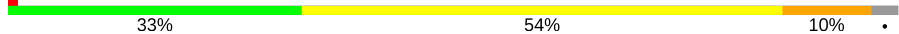
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1659 (3.60-3.40)
Clashscore	141614	1036 (3.58-3.42)
Ramachandran outliers	138981	1005 (3.58-3.42)
Sidechain outliers	138945	1006 (3.58-3.42)
RSRZ outliers	127900	1559 (3.60-3.40)

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 on 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 $\leq 5\%$. 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	655	 5% 27% 48% 17% • 5%
1	C	655	 % 24% 44% 14% • 16%
1	E	655	 25% 42% 16% • 16%
1	G	655	 % 25% 42% 15% • 16%
1	I	655	 % 23% 40% 12% • 24%
1	K	655	 % 23% 38% 13% • 24%

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Mol	Chain	Length	Quality of chain
2	B	555	 35% 51% 10% . .
2	D	555	 35% 50% 12% .
2	F	555	 30% 55% 11% . .
2	H	555	 35% 49% 13% .
2	J	555	 % 36% 50% 10% .
2	L	555	 % 33% 54% 10% .

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 49939 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 Methylcrotonyl-CoA carboxylase, alpha-subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	621	Total 4778	C 2978	N 892	O 886	S 22	0	0	0
1	C	552	Total 4280	C 2666	N 809	O 787	S 18	0	0	0
1	E	552	Total 4280	C 2666	N 809	O 787	S 18	0	0	0
1	G	552	Total 4280	C 2666	N 809	O 787	S 18	0	0	0
1	I	498	Total 3853	C 2399	N 731	O 707	S 16	0	0	0
1	K	497	Total 3844	C 2393	N 729	O 706	S 16	0	0	0

- Molecule 2 is a protein called Methylcrotonyl-CoA carboxylase, beta-subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	537	Total 4051	C 2560	N 728	O 741	S 22	0	0	0
2	D	537	Total 4051	C 2560	N 728	O 741	S 22	0	0	0
2	F	537	Total 4051	C 2560	N 728	O 741	S 22	0	0	0
2	H	537	Total 4051	C 2560	N 728	O 741	S 22	0	0	0
2	J	537	Total 4051	C 2560	N 728	O 741	S 22	0	0	0
2	L	537	Total 4051	C 2560	N 728	O 741	S 22	0	0	0

There are 120 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	8	MET	-	EXPRESSION TAG	UNP Q9I297

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Chain	Residue	Modelled	Actual	Comment	Reference
B	9	GLY	-	EXPRESSION TAG	UNP Q9I297
B	10	SER	-	EXPRESSION TAG	UNP Q9I297
B	11	SER	-	EXPRESSION TAG	UNP Q9I297
B	12	HIS	-	EXPRESSION TAG	UNP Q9I297
B	13	HIS	-	EXPRESSION TAG	UNP Q9I297
B	14	HIS	-	EXPRESSION TAG	UNP Q9I297
B	15	HIS	-	EXPRESSION TAG	UNP Q9I297
B	16	HIS	-	EXPRESSION TAG	UNP Q9I297
B	17	HIS	-	EXPRESSION TAG	UNP Q9I297
B	18	SER	-	EXPRESSION TAG	UNP Q9I297
B	19	SER	-	EXPRESSION TAG	UNP Q9I297
B	20	GLY	-	EXPRESSION TAG	UNP Q9I297
B	21	LEU	-	EXPRESSION TAG	UNP Q9I297
B	22	VAL	-	EXPRESSION TAG	UNP Q9I297
B	23	PRO	-	EXPRESSION TAG	UNP Q9I297
B	24	ARG	-	EXPRESSION TAG	UNP Q9I297
B	25	GLY	-	EXPRESSION TAG	UNP Q9I297
B	26	SER	-	EXPRESSION TAG	UNP Q9I297
B	27	HIS	-	EXPRESSION TAG	UNP Q9I297
D	8	MET	-	EXPRESSION TAG	UNP Q9I297
D	9	GLY	-	EXPRESSION TAG	UNP Q9I297
D	10	SER	-	EXPRESSION TAG	UNP Q9I297
D	11	SER	-	EXPRESSION TAG	UNP Q9I297
D	12	HIS	-	EXPRESSION TAG	UNP Q9I297
D	13	HIS	-	EXPRESSION TAG	UNP Q9I297
D	14	HIS	-	EXPRESSION TAG	UNP Q9I297
D	15	HIS	-	EXPRESSION TAG	UNP Q9I297
D	16	HIS	-	EXPRESSION TAG	UNP Q9I297
D	17	HIS	-	EXPRESSION TAG	UNP Q9I297
D	18	SER	-	EXPRESSION TAG	UNP Q9I297
D	19	SER	-	EXPRESSION TAG	UNP Q9I297
D	20	GLY	-	EXPRESSION TAG	UNP Q9I297
D	21	LEU	-	EXPRESSION TAG	UNP Q9I297
D	22	VAL	-	EXPRESSION TAG	UNP Q9I297
D	23	PRO	-	EXPRESSION TAG	UNP Q9I297
D	24	ARG	-	EXPRESSION TAG	UNP Q9I297
D	25	GLY	-	EXPRESSION TAG	UNP Q9I297
D	26	SER	-	EXPRESSION TAG	UNP Q9I297
D	27	HIS	-	EXPRESSION TAG	UNP Q9I297
F	8	MET	-	EXPRESSION TAG	UNP Q9I297
F	9	GLY	-	EXPRESSION TAG	UNP Q9I297
F	10	SER	-	EXPRESSION TAG	UNP Q9I297

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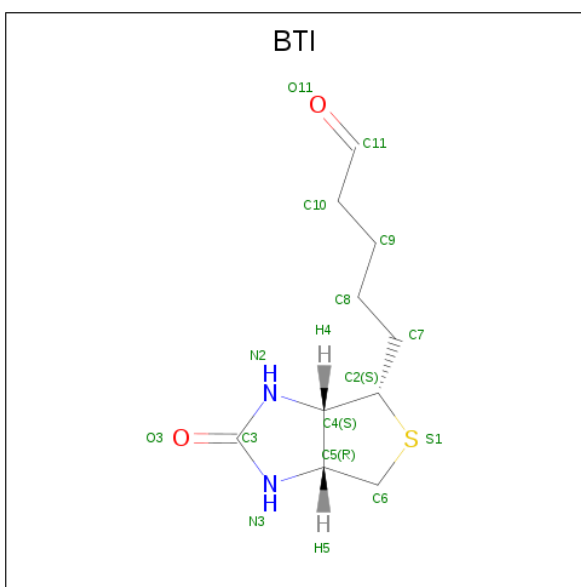
Chain	Residue	Modelled	Actual	Comment	Reference
F	11	SER	-	EXPRESSION TAG	UNP Q9I297
F	12	HIS	-	EXPRESSION TAG	UNP Q9I297
F	13	HIS	-	EXPRESSION TAG	UNP Q9I297
F	14	HIS	-	EXPRESSION TAG	UNP Q9I297
F	15	HIS	-	EXPRESSION TAG	UNP Q9I297
F	16	HIS	-	EXPRESSION TAG	UNP Q9I297
F	17	HIS	-	EXPRESSION TAG	UNP Q9I297
F	18	SER	-	EXPRESSION TAG	UNP Q9I297
F	19	SER	-	EXPRESSION TAG	UNP Q9I297
F	20	GLY	-	EXPRESSION TAG	UNP Q9I297
F	21	LEU	-	EXPRESSION TAG	UNP Q9I297
F	22	VAL	-	EXPRESSION TAG	UNP Q9I297
F	23	PRO	-	EXPRESSION TAG	UNP Q9I297
F	24	ARG	-	EXPRESSION TAG	UNP Q9I297
F	25	GLY	-	EXPRESSION TAG	UNP Q9I297
F	26	SER	-	EXPRESSION TAG	UNP Q9I297
F	27	HIS	-	EXPRESSION TAG	UNP Q9I297
H	8	MET	-	EXPRESSION TAG	UNP Q9I297
H	9	GLY	-	EXPRESSION TAG	UNP Q9I297
H	10	SER	-	EXPRESSION TAG	UNP Q9I297
H	11	SER	-	EXPRESSION TAG	UNP Q9I297
H	12	HIS	-	EXPRESSION TAG	UNP Q9I297
H	13	HIS	-	EXPRESSION TAG	UNP Q9I297
H	14	HIS	-	EXPRESSION TAG	UNP Q9I297
H	15	HIS	-	EXPRESSION TAG	UNP Q9I297
H	16	HIS	-	EXPRESSION TAG	UNP Q9I297
H	17	HIS	-	EXPRESSION TAG	UNP Q9I297
H	18	SER	-	EXPRESSION TAG	UNP Q9I297
H	19	SER	-	EXPRESSION TAG	UNP Q9I297
H	20	GLY	-	EXPRESSION TAG	UNP Q9I297
H	21	LEU	-	EXPRESSION TAG	UNP Q9I297
H	22	VAL	-	EXPRESSION TAG	UNP Q9I297
H	23	PRO	-	EXPRESSION TAG	UNP Q9I297
H	24	ARG	-	EXPRESSION TAG	UNP Q9I297
H	25	GLY	-	EXPRESSION TAG	UNP Q9I297
H	26	SER	-	EXPRESSION TAG	UNP Q9I297
H	27	HIS	-	EXPRESSION TAG	UNP Q9I297
J	8	MET	-	EXPRESSION TAG	UNP Q9I297
J	9	GLY	-	EXPRESSION TAG	UNP Q9I297
J	10	SER	-	EXPRESSION TAG	UNP Q9I297
J	11	SER	-	EXPRESSION TAG	UNP Q9I297
J	12	HIS	-	EXPRESSION TAG	UNP Q9I297

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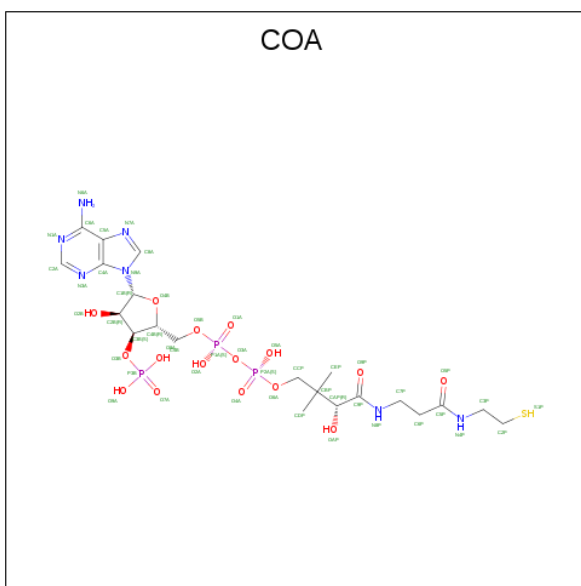
Chain	Residue	Modelled	Actual	Comment	Reference
J	13	HIS	-	EXPRESSION TAG	UNP Q9I297
J	14	HIS	-	EXPRESSION TAG	UNP Q9I297
J	15	HIS	-	EXPRESSION TAG	UNP Q9I297
J	16	HIS	-	EXPRESSION TAG	UNP Q9I297
J	17	HIS	-	EXPRESSION TAG	UNP Q9I297
J	18	SER	-	EXPRESSION TAG	UNP Q9I297
J	19	SER	-	EXPRESSION TAG	UNP Q9I297
J	20	GLY	-	EXPRESSION TAG	UNP Q9I297
J	21	LEU	-	EXPRESSION TAG	UNP Q9I297
J	22	VAL	-	EXPRESSION TAG	UNP Q9I297
J	23	PRO	-	EXPRESSION TAG	UNP Q9I297
J	24	ARG	-	EXPRESSION TAG	UNP Q9I297
J	25	GLY	-	EXPRESSION TAG	UNP Q9I297
J	26	SER	-	EXPRESSION TAG	UNP Q9I297
J	27	HIS	-	EXPRESSION TAG	UNP Q9I297
L	8	MET	-	EXPRESSION TAG	UNP Q9I297
L	9	GLY	-	EXPRESSION TAG	UNP Q9I297
L	10	SER	-	EXPRESSION TAG	UNP Q9I297
L	11	SER	-	EXPRESSION TAG	UNP Q9I297
L	12	HIS	-	EXPRESSION TAG	UNP Q9I297
L	13	HIS	-	EXPRESSION TAG	UNP Q9I297
L	14	HIS	-	EXPRESSION TAG	UNP Q9I297
L	15	HIS	-	EXPRESSION TAG	UNP Q9I297
L	16	HIS	-	EXPRESSION TAG	UNP Q9I297
L	17	HIS	-	EXPRESSION TAG	UNP Q9I297
L	18	SER	-	EXPRESSION TAG	UNP Q9I297
L	19	SER	-	EXPRESSION TAG	UNP Q9I297
L	20	GLY	-	EXPRESSION TAG	UNP Q9I297
L	21	LEU	-	EXPRESSION TAG	UNP Q9I297
L	22	VAL	-	EXPRESSION TAG	UNP Q9I297
L	23	PRO	-	EXPRESSION TAG	UNP Q9I297
L	24	ARG	-	EXPRESSION TAG	UNP Q9I297
L	25	GLY	-	EXPRESSION TAG	UNP Q9I297
L	26	SER	-	EXPRESSION TAG	UNP Q9I297
L	27	HIS	-	EXPRESSION TAG	UNP Q9I297

- Molecule 3 is 5-(HEXAHYDRO-2-OXO-1H-THIENO[3,4-D]IMIDAZOL-6-YL)PENTANAL (three-letter code: BTI) (formula: C₁₀H₁₆N₂O₂S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
3	A	1	15	10	2	2	1	0	0
3	I	1	15	10	2	2	1	0	0

- Molecule 4 is COENZYME A (three-letter code: COA) (formula: $C_{21}H_{36}N_7O_{16}P_3S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	N	O	P			S
4	B	1	48	21	7	16	3	1	0	0
4	D	1	48	21	7	16	3	1	0	0

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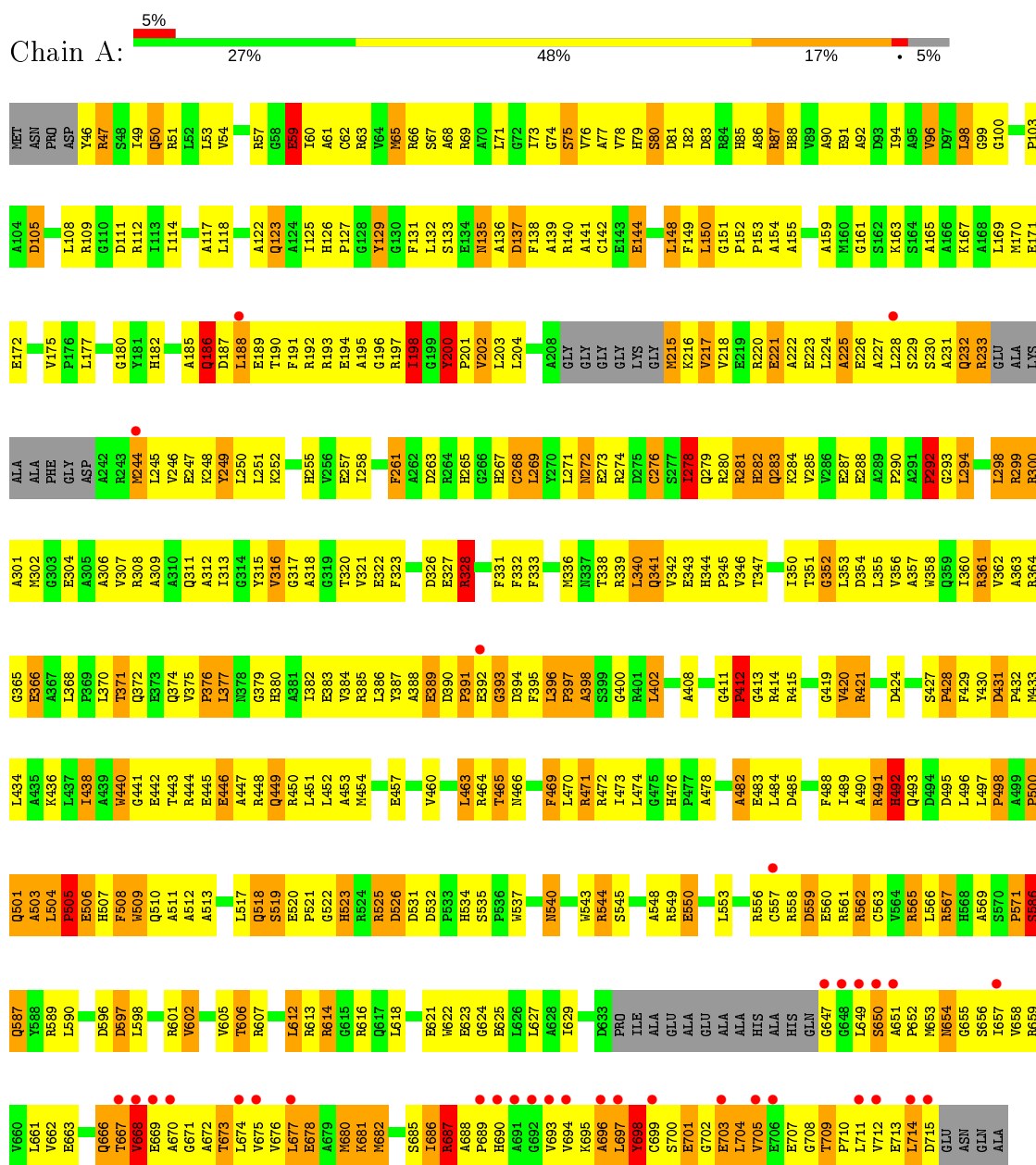
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Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
			Total	C	N	O	P	S		
4	F	1	Total 48	C 21	N 7	O 16	P 3	S 1	0	0
4	H	1	Total 48	C 21	N 7	O 16	P 3	S 1	0	0
4	J	1	Total 48	C 21	N 7	O 16	P 3	S 1	0	0
4	L	1	Total 48	C 21	N 7	O 16	P 3	S 1	0	0

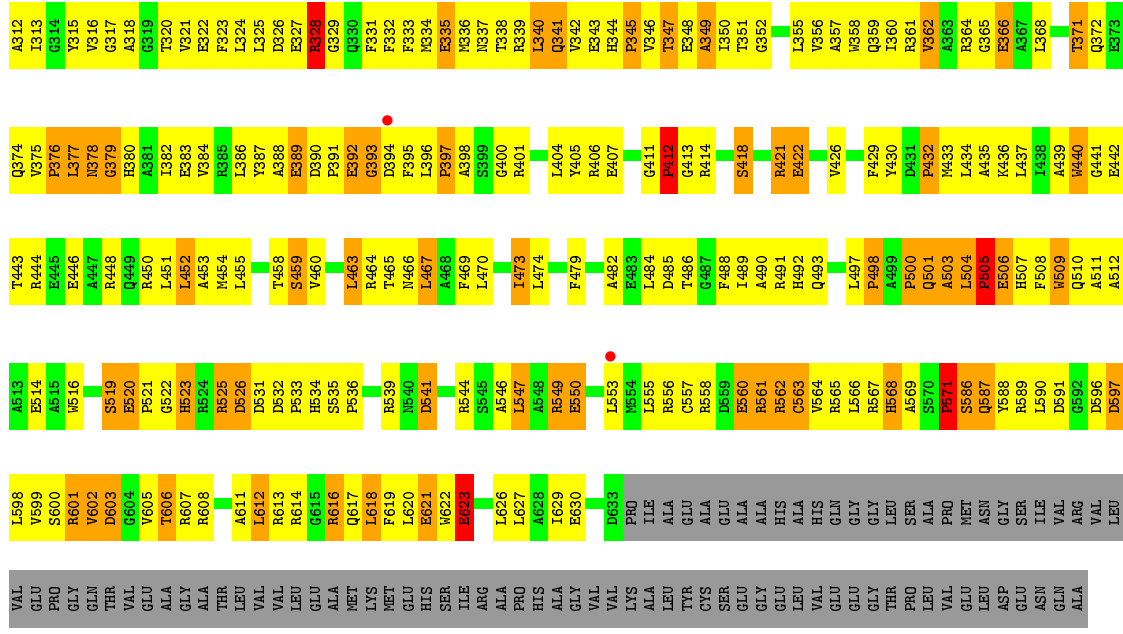
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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.

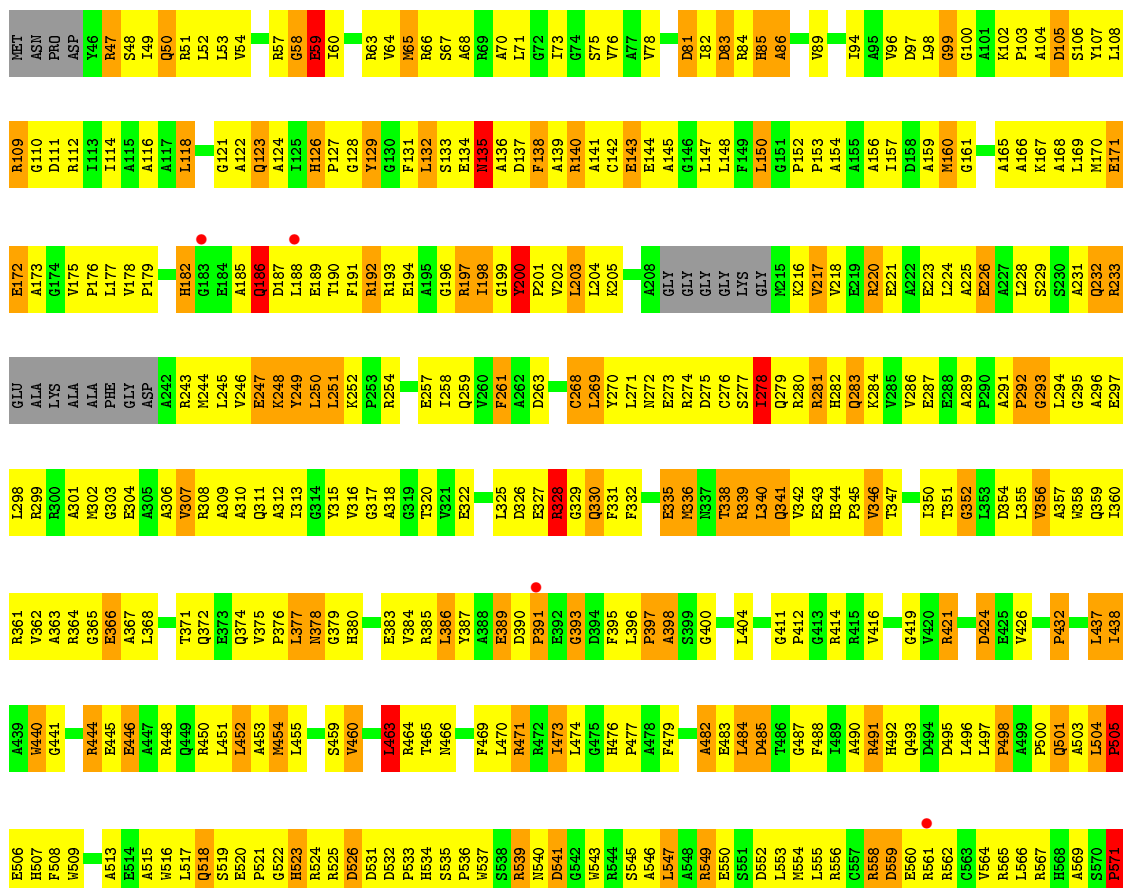
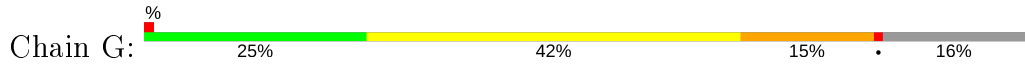
- Molecule 1: Methylcrotonyl-CoA carboxylase, alpha-subunit

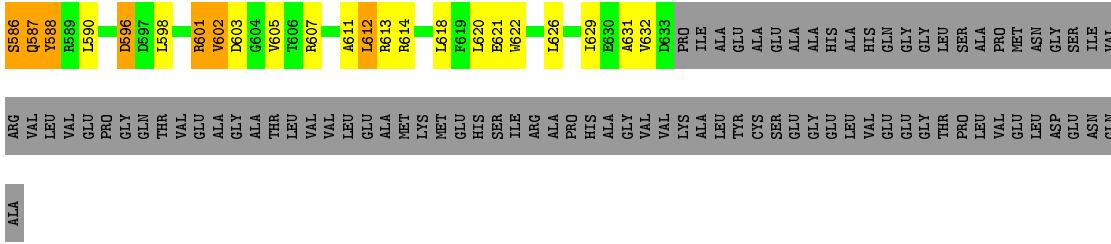


- Molecule 1: Methylcrotonyl-CoA carboxylase, alpha-subunit

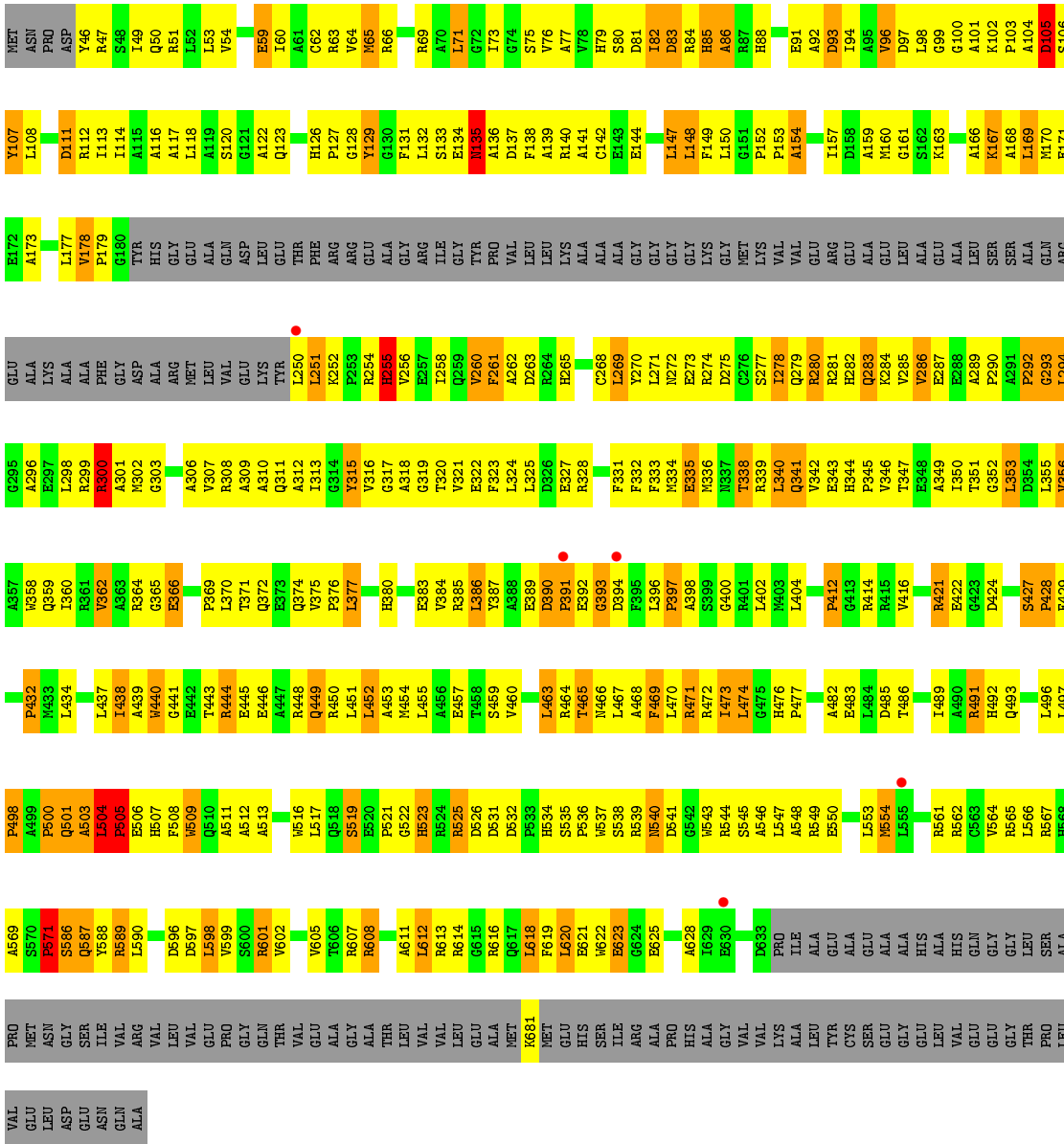
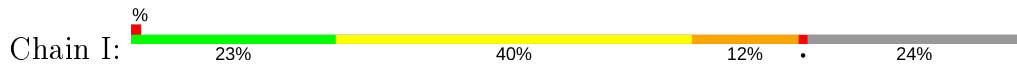


• Molecule 1: Methylcrotonyl-CoA carboxylase, alpha-subunit

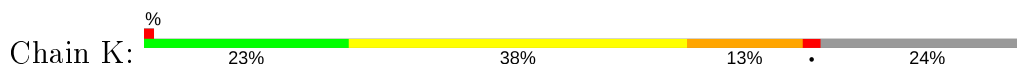


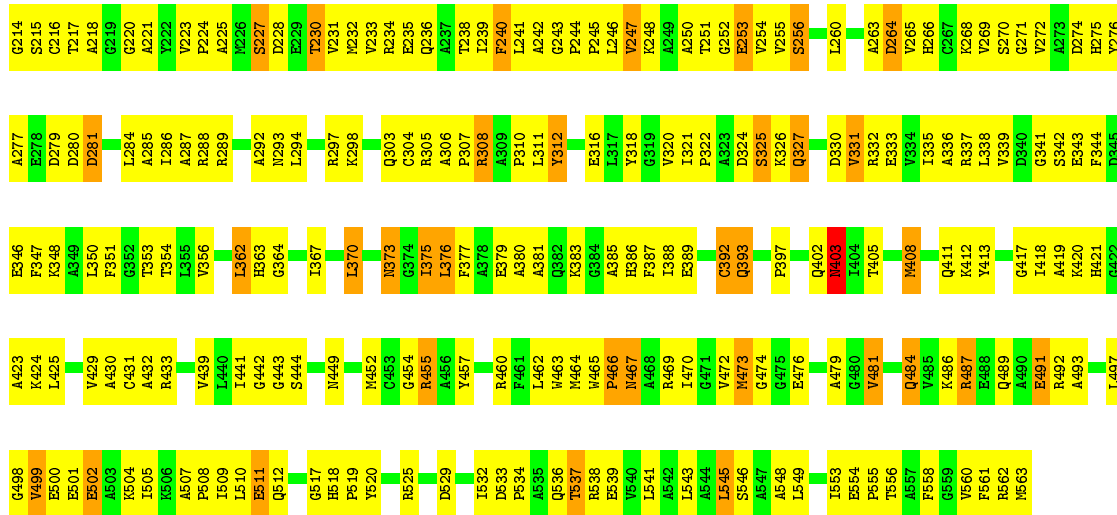


• Molecule 1: Methylcrotonyl-CoA carboxylase, alpha-subunit

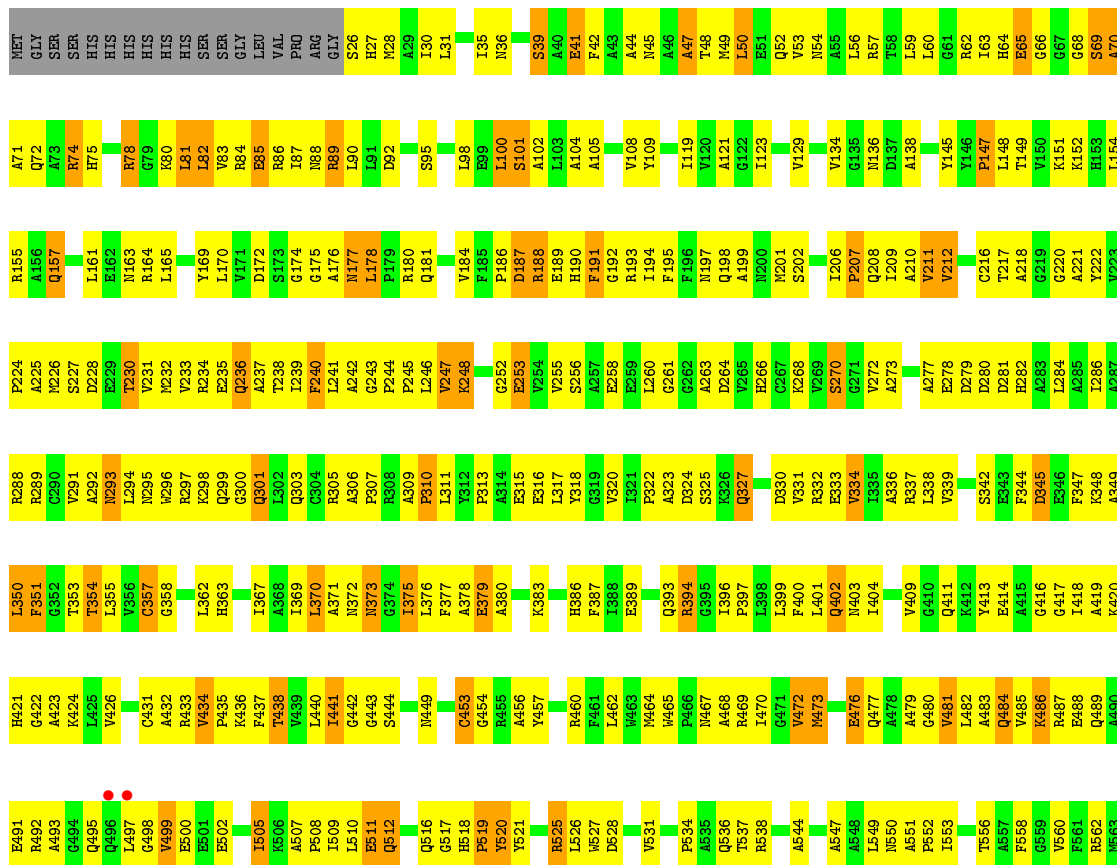
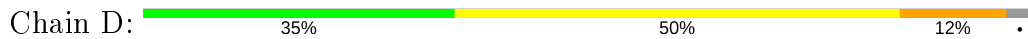


• Molecule 1: Methylcrotonyl-CoA carboxylase, alpha-subunit

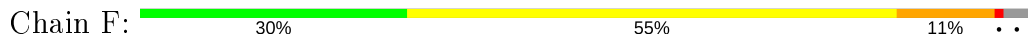


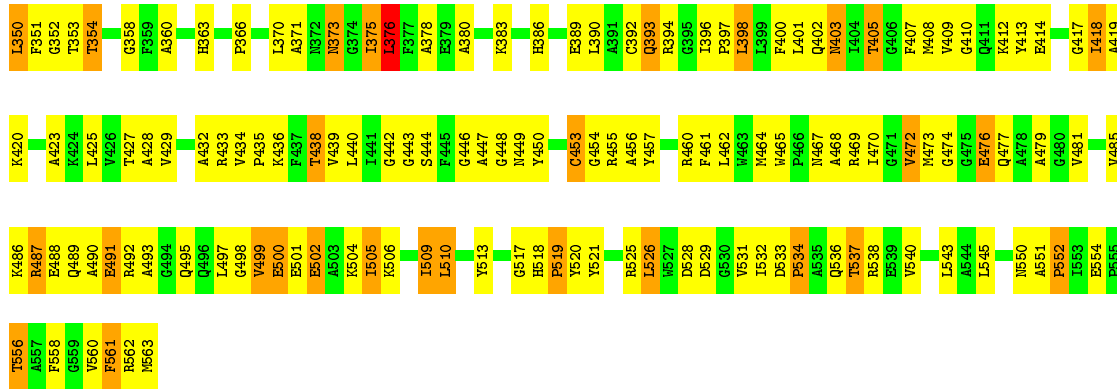


• Molecule 2: Methylcrotonyl-CoA carboxylase, beta-subunit

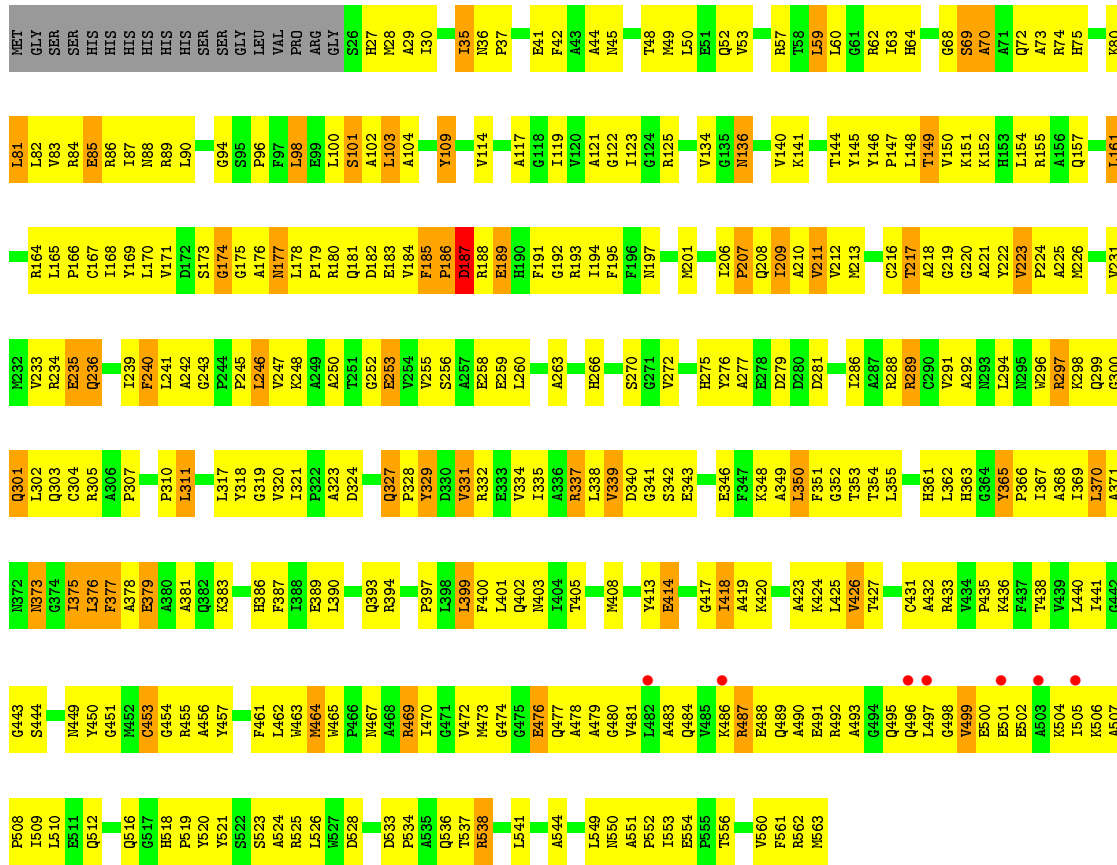


• Molecule 2: Methylcrotonyl-CoA carboxylase, beta-subunit

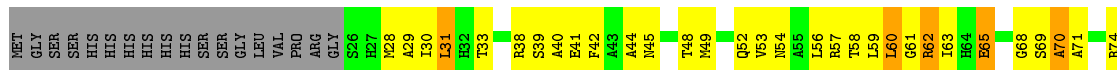


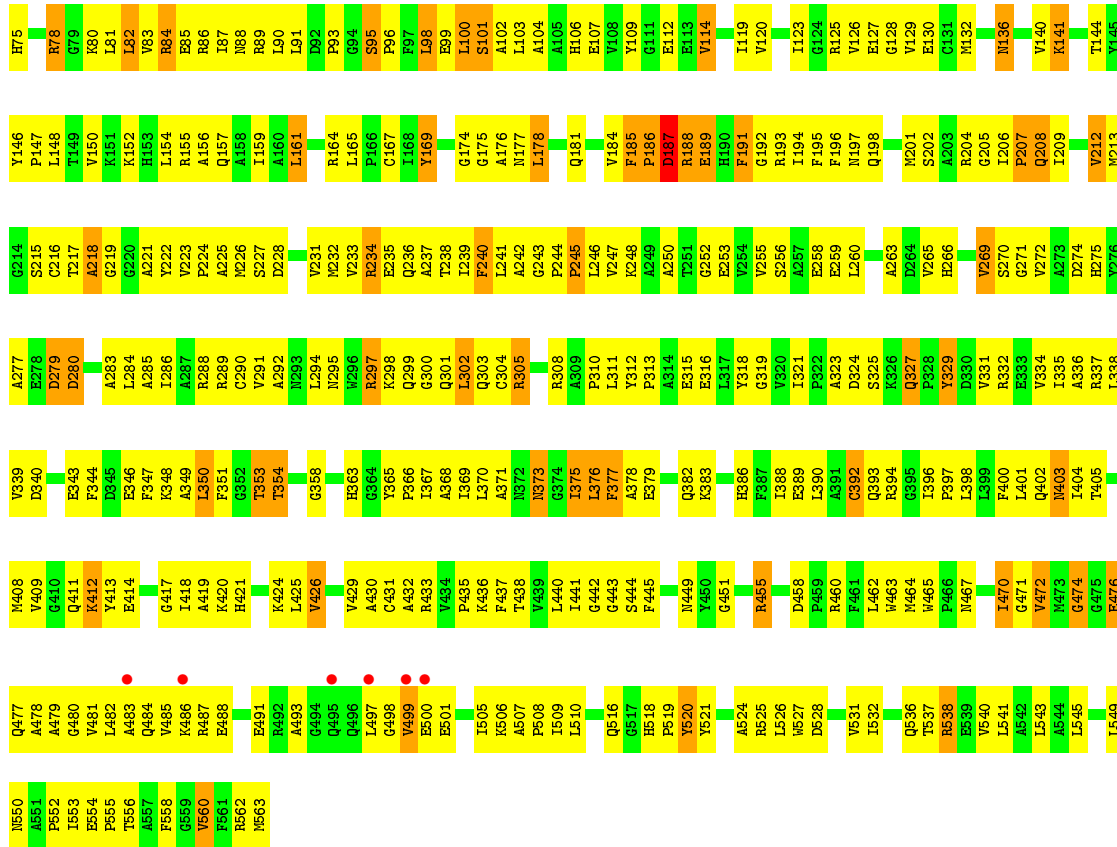


● Molecule 2: Methylcrotonyl-CoA carboxylase, beta-subunit



● Molecule 2: Methylcrotonyl-CoA carboxylase, beta-subunit





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	131.51Å 255.34Å 152.67Å 90.00° 95.74° 90.00°	Depositor
Resolution (Å)	48.90 – 3.50 48.90 – 3.28	Depositor EDS
% Data completeness (in resolution range)	83.0 (48.90-3.50) 76.9 (48.90-3.28)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.98 (at 3.25Å)	Xtrriage
Refinement program	CNS 1.2	Depositor
R, R_{free}	0.234 , 0.292 0.213 , 0.273	Depositor DCC
R_{free} test set	6800 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	61.9	Xtrriage
Anisotropy	0.971	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 73.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	49939	wwPDB-VP
Average B, all atoms (Å ²)	105.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.28% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality i

5.1 Standard geometry i

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

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	0.68	0/4866	0.87	4/6581 (0.1%)
1	C	0.63	0/4362	0.86	3/5897 (0.1%)
1	E	0.65	1/4362 (0.0%)	0.85	3/5897 (0.1%)
1	G	0.65	0/4362	0.87	0/5897
1	I	0.66	0/3929	0.84	1/5315 (0.0%)
1	K	0.68	0/3921	0.85	2/5307 (0.0%)
2	B	0.67	0/4135	0.86	1/5605 (0.0%)
2	D	0.67	0/4135	0.86	3/5605 (0.1%)
2	F	0.64	0/4135	0.87	3/5605 (0.1%)
2	H	0.67	3/4135 (0.1%)	0.83	1/5605 (0.0%)
2	J	0.68	0/4135	0.87	2/5605 (0.0%)
2	L	0.67	0/4135	0.87	0/5605
All	All	0.66	4/50612 (0.0%)	0.86	23/68524 (0.0%)

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	1
1	E	0	1
1	G	0	2
1	I	0	1
2	B	0	1
2	H	0	1
2	J	0	2
All	All	0	9

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	131	CYS	CB-SG	-7.11	1.70	1.82
1	E	563	CYS	CB-SG	5.92	1.92	1.82
2	H	189	GLU	CB-CG	5.11	1.61	1.52
2	H	189	GLU	CG-CD	5.11	1.59	1.51

The worst 5 of 23 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	J	399	LEU	CB-CG-CD2	-7.14	98.86	111.00
1	E	506	GLU	N-CA-C	-6.63	93.10	111.00
1	C	506	GLU	N-CA-C	-6.45	93.60	111.00
1	E	566	LEU	CA-CB-CG	6.09	129.31	115.30
1	A	298	LEU	CA-CB-CG	-5.94	101.63	115.30

There are no chirality outliers.

5 of 9 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	698	TYR	Sidechain
2	B	109	TYR	Sidechain
1	E	129	TYR	Sidechain
1	G	129	TYR	Sidechain
1	G	588	TYR	Sidechain

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	A	4778	0	4730	583	0
1	C	4280	0	4227	535	0
1	E	4280	0	4227	519	0
1	G	4280	0	4227	516	0
1	I	3853	0	3795	477	0
1	K	3844	0	3786	485	0
2	B	4051	0	4023	401	0
2	D	4051	0	4023	425	0
2	F	4051	0	4023	437	0
2	H	4051	0	4023	422	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	J	4051	0	4023	425	0
2	L	4051	0	4023	419	0
3	A	15	0	15	3	0
3	I	15	0	15	4	0
4	B	48	0	32	4	0
4	D	48	0	32	3	0
4	F	48	0	32	3	0
4	H	48	0	32	6	0
4	J	48	0	32	4	0
4	L	48	0	32	2	0
All	All	49939	0	49352	5408	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 54.

The worst 5 of 5408 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:C:504:LEU:HB3	1:C:505:PRO:HD2	1.23	1.17
1:G:200:TYR:CE1	1:G:221:GLU:HA	1.82	1.15
1:G:278:ILE:H	1:G:278:ILE:HD12	1.10	1.14
1:K:101:ALA:HB1	1:K:429:PHE:CE1	1.83	1.14
2:F:231:VAL:HG22	2:F:275:HIS:HB2	1.18	1.12

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 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	613/655 (94%)	427 (70%)	114 (19%)	72 (12%)	0 5
1	C	546/655 (83%)	382 (70%)	113 (21%)	51 (9%)	0 8

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	E	546/655 (83%)	384 (70%)	109 (20%)	53 (10%)	0	7
1	G	546/655 (83%)	381 (70%)	113 (21%)	52 (10%)	0	8
1	I	493/655 (75%)	353 (72%)	101 (20%)	39 (8%)	1	10
1	K	493/655 (75%)	364 (74%)	88 (18%)	41 (8%)	1	9
2	B	535/555 (96%)	448 (84%)	63 (12%)	24 (4%)	2	21
2	D	535/555 (96%)	456 (85%)	62 (12%)	17 (3%)	4	29
2	F	535/555 (96%)	439 (82%)	73 (14%)	23 (4%)	2	22
2	H	535/555 (96%)	450 (84%)	60 (11%)	25 (5%)	2	20
2	J	535/555 (96%)	452 (84%)	65 (12%)	18 (3%)	3	28
2	L	535/555 (96%)	438 (82%)	76 (14%)	21 (4%)	3	25
All	All	6447/7260 (89%)	4974 (77%)	1037 (16%)	436 (7%)	1	13

5 of 436 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	186	GLN
1	A	225	ALA
1	A	230	SER
1	A	294	LEU
1	A	366	GLU

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 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	477/496 (96%)	384 (80%)	93 (20%)	1	7
1	C	423/496 (85%)	336 (79%)	87 (21%)	1	6
1	E	423/496 (85%)	330 (78%)	93 (22%)	1	5
1	G	423/496 (85%)	329 (78%)	94 (22%)	1	5
1	I	382/496 (77%)	305 (80%)	77 (20%)	1	6
1	K	381/496 (77%)	300 (79%)	81 (21%)	1	5

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	B	401/418 (96%)	341 (85%)	60 (15%)	3	17
2	D	401/418 (96%)	340 (85%)	61 (15%)	3	17
2	F	401/418 (96%)	339 (84%)	62 (16%)	2	16
2	H	401/418 (96%)	338 (84%)	63 (16%)	2	15
2	J	401/418 (96%)	354 (88%)	47 (12%)	5	26
2	L	401/418 (96%)	341 (85%)	60 (15%)	3	17
All	All	4915/5484 (90%)	4037 (82%)	878 (18%)	2	9

5 of 878 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	F	57	ARG
1	G	250	LEU
1	K	606	THR
2	F	119	ILE
2	F	435	PRO

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 176 such sidechains are listed below:

Mol	Chain	Res	Type
2	F	236	GLN
1	G	372	GLN
2	L	157	GLN
2	F	293	ASN
2	F	467	ASN

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 carbohydrates in this entry.

5.6 Ligand geometry

8 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
3	BTI	A	801	1	16,16,16	1.66	1 (6%)	21,21,21	2.73	8 (38%)
4	COA	H	591	-	41,50,50	0.83	1 (2%)	52,75,75	1.07	2 (3%)
4	COA	J	591	-	41,50,50	0.83	1 (2%)	52,75,75	1.14	3 (5%)
4	COA	L	591	-	41,50,50	0.82	0	52,75,75	1.22	4 (7%)
4	COA	B	591	-	41,50,50	0.83	0	52,75,75	1.09	3 (5%)
4	COA	D	591	-	41,50,50	0.83	0	52,75,75	1.12	4 (7%)
4	COA	F	591	-	41,50,50	0.83	1 (2%)	52,75,75	1.21	3 (5%)
3	BTI	I	801	1	16,16,16	1.67	1 (6%)	21,21,21	2.67	8 (38%)

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
3	BTI	A	801	1	-	5/5/27/27	0/2/2/2
4	COA	H	591	-	-	13/44/64/64	0/3/3/3
4	COA	J	591	-	-	14/44/64/64	0/3/3/3
4	COA	L	591	-	-	15/44/64/64	0/3/3/3
4	COA	B	591	-	-	12/44/64/64	0/3/3/3
4	COA	D	591	-	-	12/44/64/64	0/3/3/3
4	COA	F	591	-	-	13/44/64/64	0/3/3/3
3	BTI	I	801	1	-	5/5/27/27	0/2/2/2

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	I	801	BTI	O3-C3	6.23	1.36	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	801	BTI	O3-C3	6.19	1.36	1.23
4	F	591	COA	O4B-C1B	2.06	1.43	1.41
4	J	591	COA	O4B-C1B	2.05	1.43	1.41
4	H	591	COA	O4B-C1B	2.02	1.43	1.41

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	801	BTI	C4-N2-C3	-6.72	106.36	112.62
3	I	801	BTI	C4-N2-C3	-5.80	107.22	112.62
3	I	801	BTI	N2-C3-N3	4.87	113.33	108.76
4	D	591	COA	N3A-C2A-N1A	-4.68	121.36	128.68
4	L	591	COA	P2A-O3A-P1A	-4.55	117.23	132.83

There are no chirality outliers.

5 of 89 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	801	BTI	C11-C10-C9-C8
3	A	801	BTI	S1-C2-C7-C8
3	A	801	BTI	C4-C2-C7-C8
4	H	591	COA	O4B-C4B-C5B-O5B
4	H	591	COA	C5B-O5B-P1A-O2A

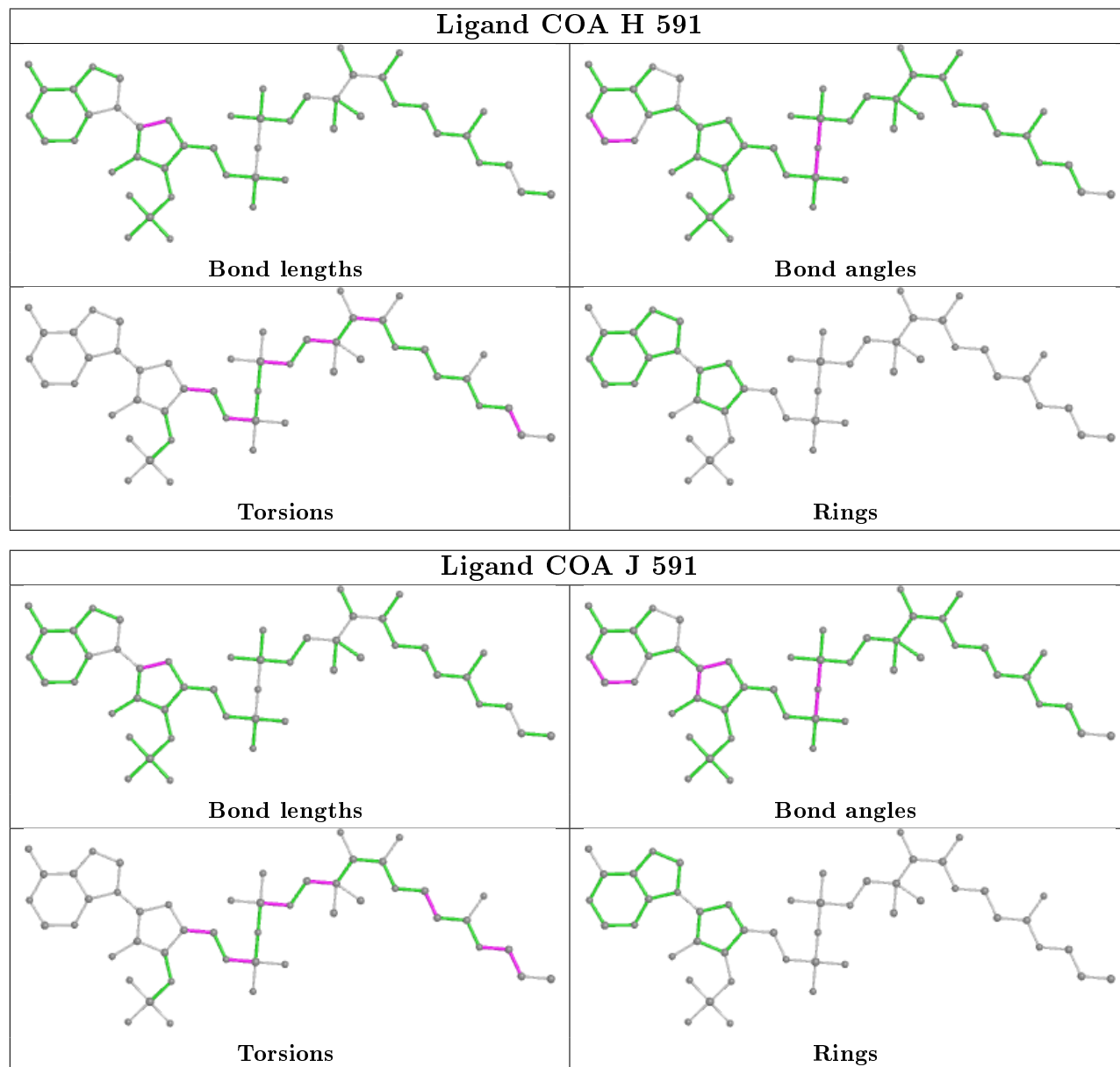
There are no ring outliers.

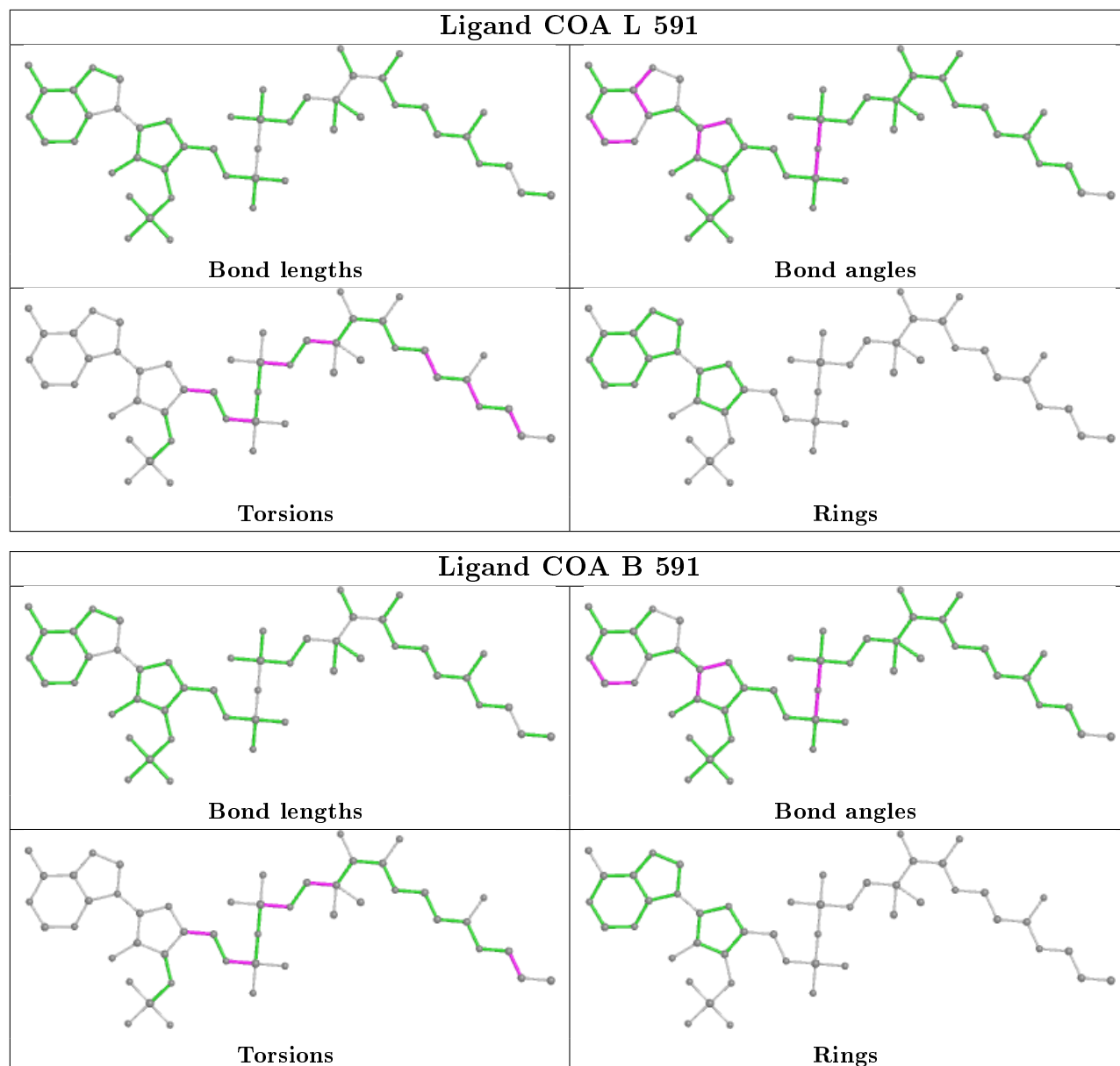
8 monomers are involved in 29 short contacts:

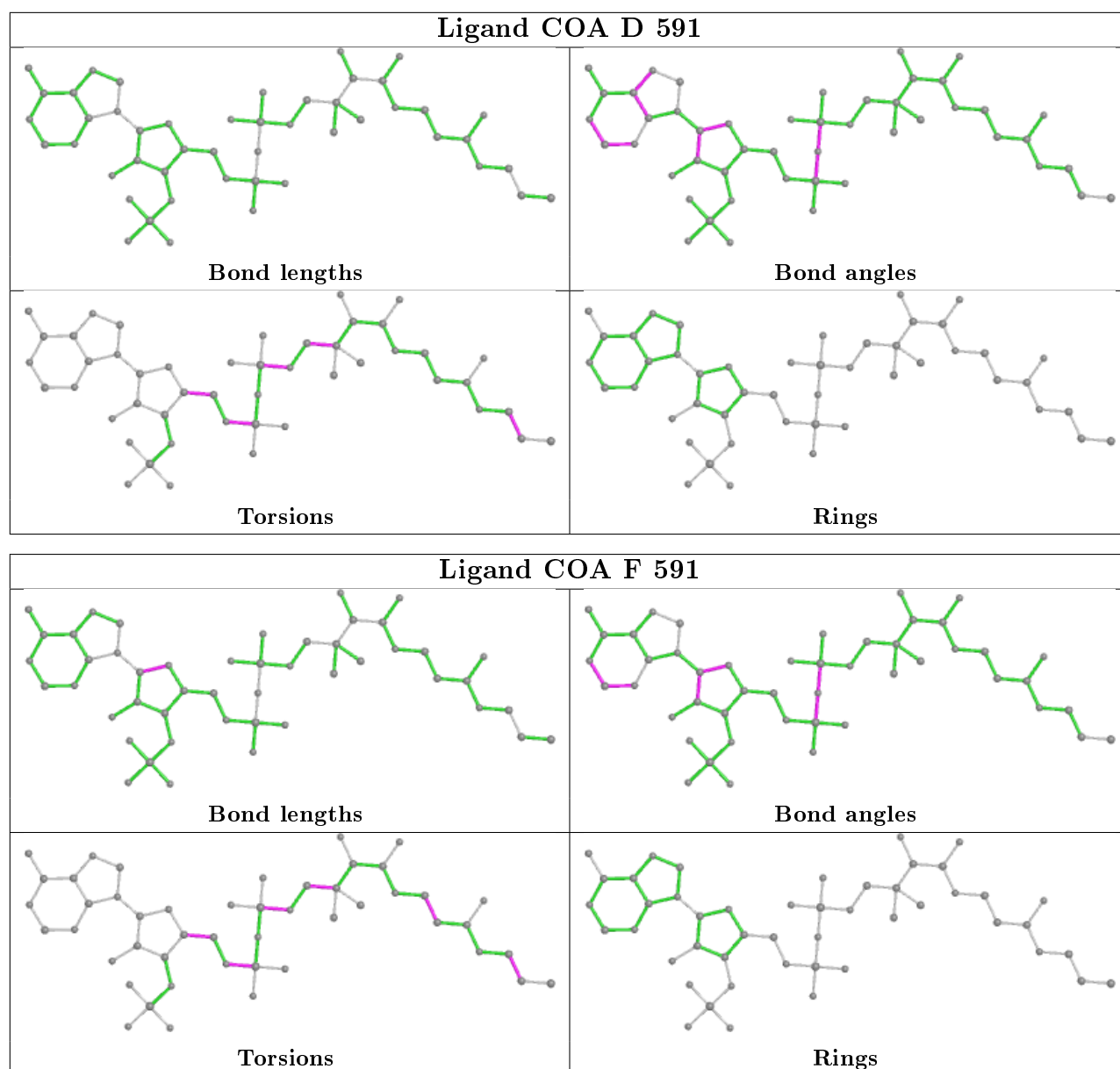
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	801	BTI	3	0
4	H	591	COA	6	0
4	J	591	COA	4	0
4	L	591	COA	2	0
4	B	591	COA	4	0
4	D	591	COA	3	0
4	F	591	COA	3	0
3	I	801	BTI	4	0

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 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 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	621/655 (94%)	0.12	34 (5%) 25 22	71, 115, 170, 200	0
1	C	552/655 (84%)	-0.03	8 (1%) 75 69	69, 113, 154, 187	0
1	E	552/655 (84%)	-0.05	3 (0%) 91 88	71, 113, 154, 189	0
1	G	552/655 (84%)	-0.04	4 (0%) 87 83	76, 112, 155, 187	0
1	I	498/655 (76%)	-0.02	5 (1%) 82 77	73, 113, 146, 193	0
1	K	497/655 (75%)	0.05	8 (1%) 72 66	65, 115, 146, 187	0
2	B	537/555 (96%)	-0.39	0 100 100	60, 87, 140, 169	0
2	D	537/555 (96%)	-0.33	2 (0%) 92 90	58, 89, 143, 171	0
2	F	537/555 (96%)	-0.36	1 (0%) 95 93	58, 88, 142, 167	0
2	H	537/555 (96%)	-0.35	0 100 100	59, 88, 138, 169	0
2	J	537/555 (96%)	-0.21	7 (1%) 77 71	55, 88, 142, 168	0
2	L	537/555 (96%)	-0.29	6 (1%) 80 75	57, 88, 139, 167	0
All	All	6494/7260 (89%)	-0.16	78 (1%) 79 73	55, 103, 153, 200	0

The worst 5 of 78 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	647	GLY	6.4
1	A	648	GLY	5.0
1	C	391	PRO	4.5
1	A	715	ASP	4.4
2	L	497	LEU	4.2

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

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

6.3 Carbohydrates

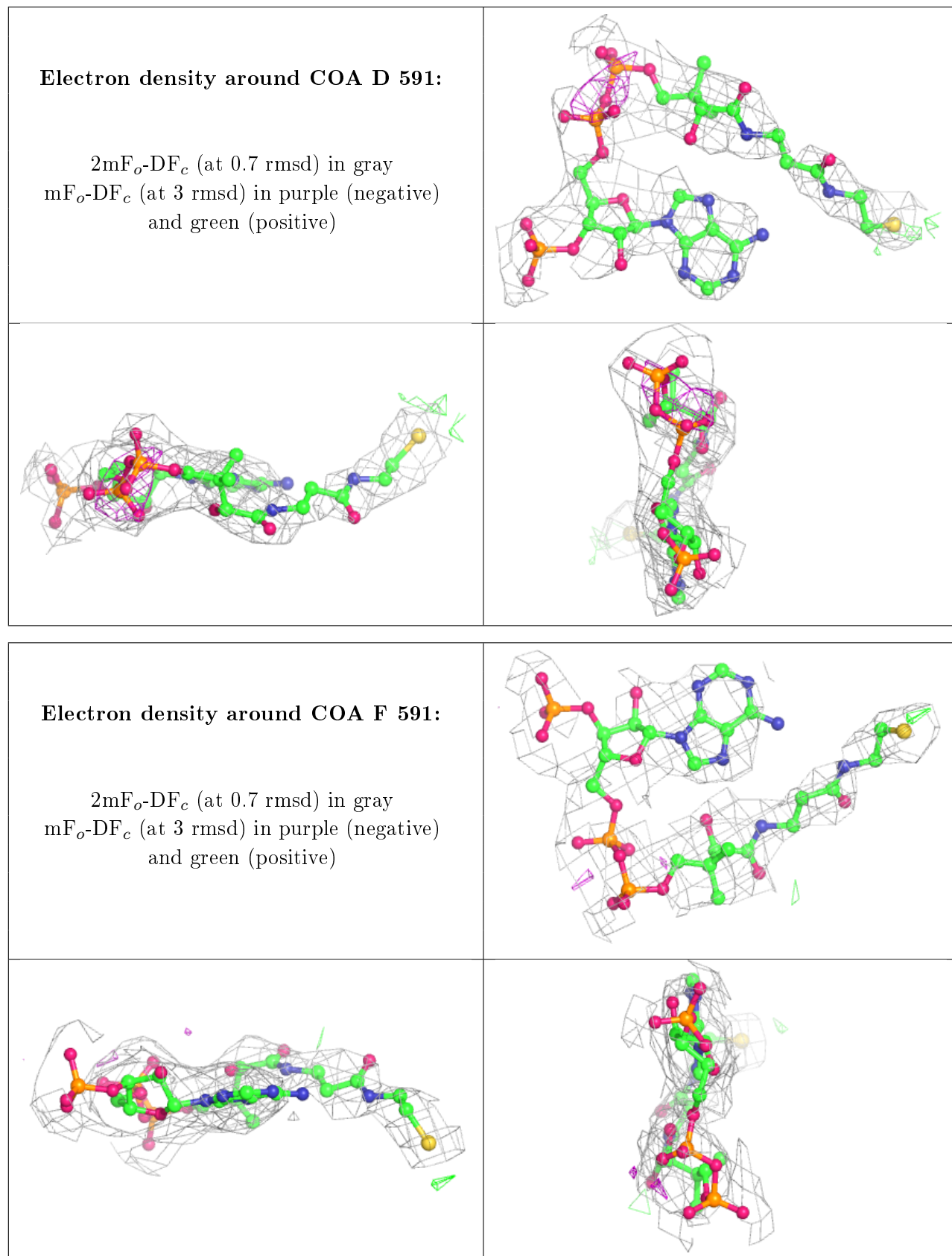
There are no carbohydrates in this entry.

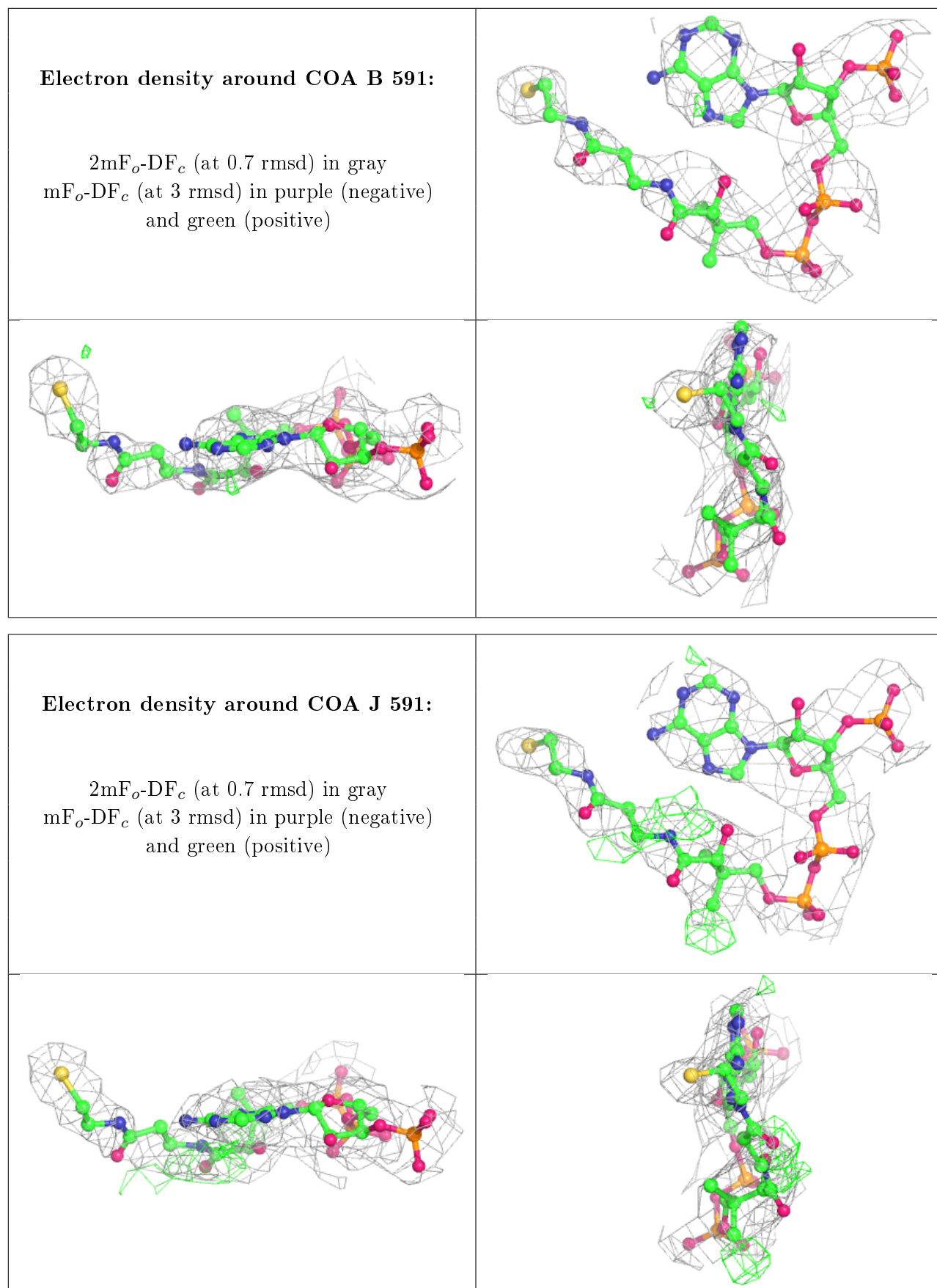
6.4 Ligands

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
3	BTI	A	801	15/15	0.84	0.50	140,152,154,155	0
3	BTI	I	801	15/15	0.84	0.43	142,152,155,158	0
4	COA	D	591	48/48	0.88	0.28	102,129,142,145	0
4	COA	F	591	48/48	0.89	0.28	97,124,134,135	0
4	COA	B	591	48/48	0.89	0.24	103,129,139,142	0
4	COA	J	591	48/48	0.91	0.21	101,127,136,137	0
4	COA	L	591	48/48	0.91	0.29	98,125,132,135	0
4	COA	H	591	48/48	0.93	0.22	102,128,137,139	0

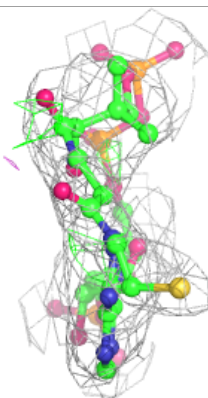
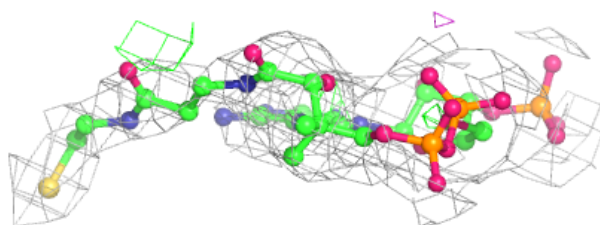
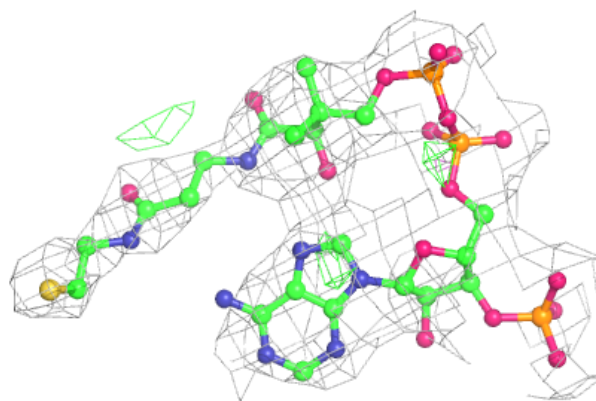
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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



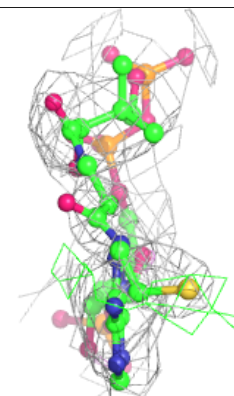
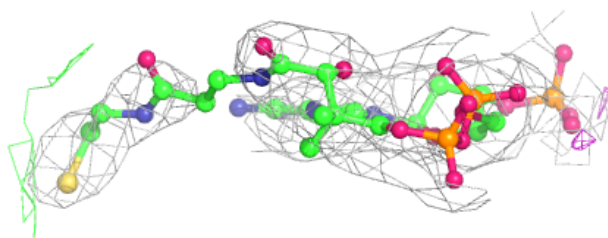
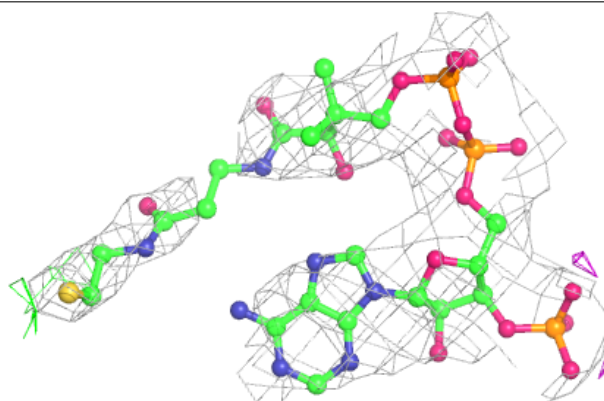


Electron density around COA L 591:

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

**Electron density around COA H 591:**

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



6.5 Other polymers

There are no such residues in this entry.