Full wwPDB X-ray Structure Validation Report ⓘ

Mar 12, 2026 – 01:54 PM UTC

PDB ID	:	9X0I / pdb_00009x0i
Title	:	Glyoxysomal Citrate Synthase 3 from Arabidopsis thaliana in complex with OAA and CoA
Authors	:	Nishio, K.; Takagi, K.; Mizushima, T.
Deposited on	:	2025-09-30
Resolution	:	1.70 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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 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:

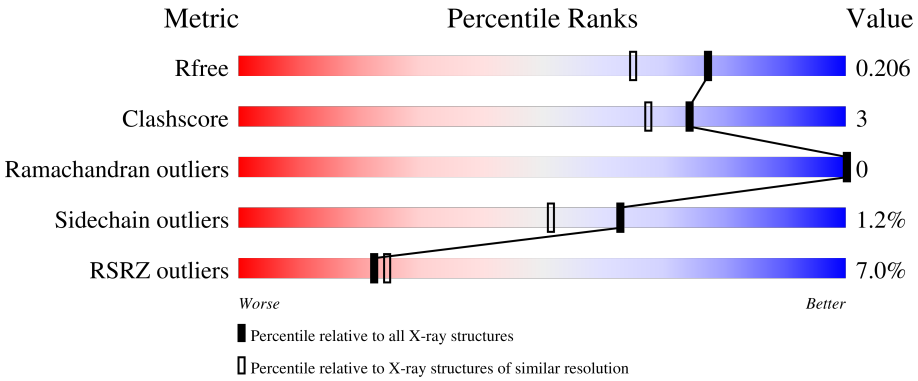
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 1.70 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}	180053	5551 (1.70-1.70)
Clashscore	190562	5924 (1.70-1.70)
Ramachandran outliers	187476	5846 (1.70-1.70)
Sidechain outliers	187428	5846 (1.70-1.70)
RSRZ outliers	180081	5554 (1.70-1.70)

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	479	2% 86% 6% 8%
1	B	479	11% 82% 10% 8%

2 Entry composition (i)

There are 8 unique types of molecules in this entry. The entry contains 7902 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.

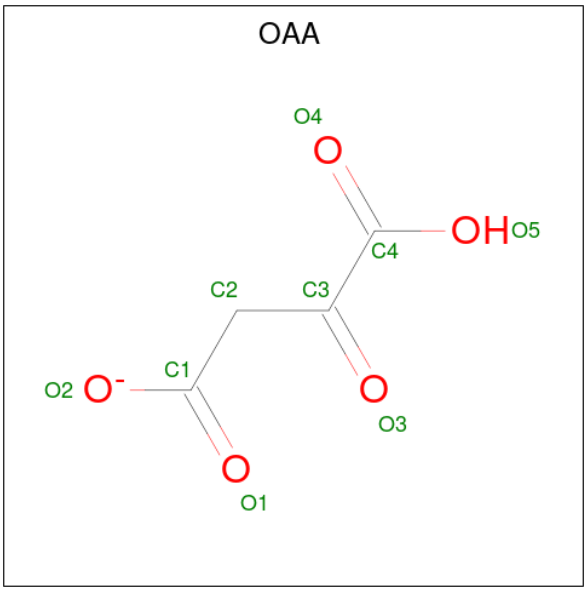
- Molecule 1 is a protein called Citrate synthase 3, peroxisomal.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	441	Total	C	N	O	S	0	5	0
			3475	2232	590	635	18			
1	B	440	Total	C	N	O	S	0	7	0
			3485	2237	595	637	16			

There are 10 discrepancies between the modelled and reference sequences:

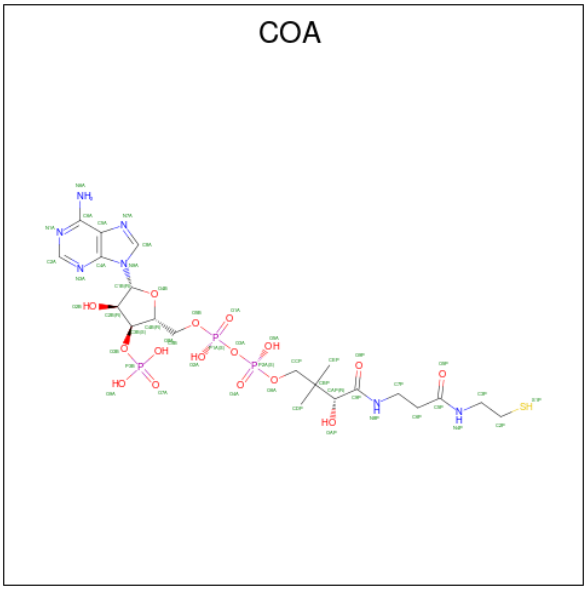
Chain	Residue	Modelled	Actual	Comment	Reference
A	31	GLY	-	expression tag	UNP Q9SJH7
A	32	PRO	-	expression tag	UNP Q9SJH7
A	33	LEU	-	expression tag	UNP Q9SJH7
A	34	GLY	-	expression tag	UNP Q9SJH7
A	35	SER	-	expression tag	UNP Q9SJH7
B	31	GLY	-	expression tag	UNP Q9SJH7
B	32	PRO	-	expression tag	UNP Q9SJH7
B	33	LEU	-	expression tag	UNP Q9SJH7
B	34	GLY	-	expression tag	UNP Q9SJH7
B	35	SER	-	expression tag	UNP Q9SJH7

- Molecule 2 is OXALOACETATE ION (CCD ID: OAA) (formula: $C_4H_3O_5$).



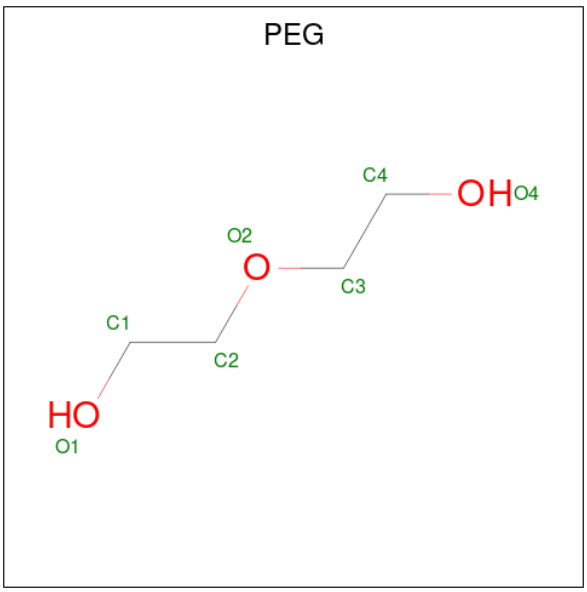
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 9 4 5	0	0
2	B	1	Total C O 9 4 5	0	0

- Molecule 3 is COENZYME A (CCD ID: COA) (formula: $C_{21}H_{36}N_7O_{16}P_3S$).



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

- Molecule 4 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).

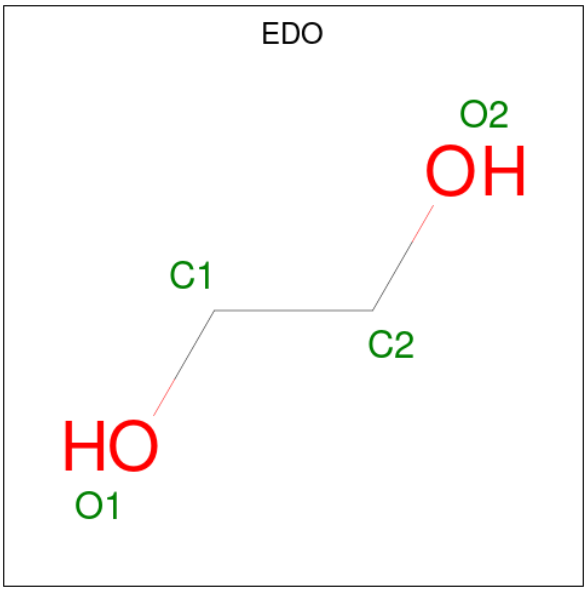


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 7 4 3	0	0
4	A	1	Total C O 7 4 3	0	0

- Molecule 5 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

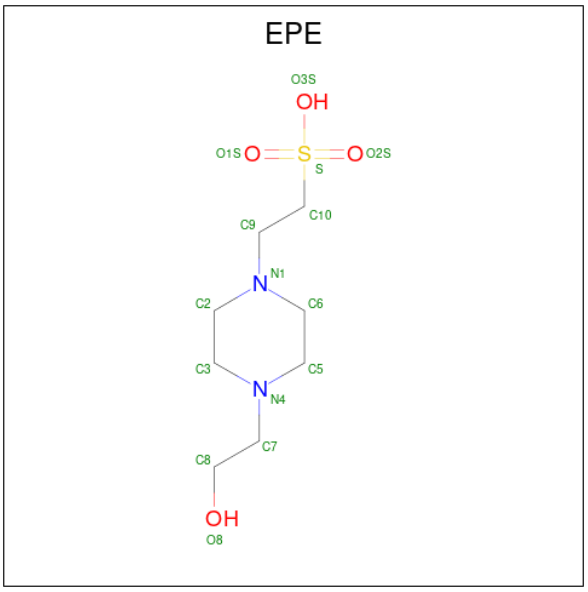
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	3	Total Mg 3 3	0	0
5	B	2	Total Mg 2 2	0	0

- Molecule 6 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 7 is 4-(2-HYDROXYETHYL)-1-PIPERAZINE ETHANESULFONIC ACID (CCD ID: EPE) (formula: $C_8H_{18}N_2O_4S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	B	1	Total	C	N	O	S	0	0
			15	8	2	4	1		

- Molecule 8 is water.

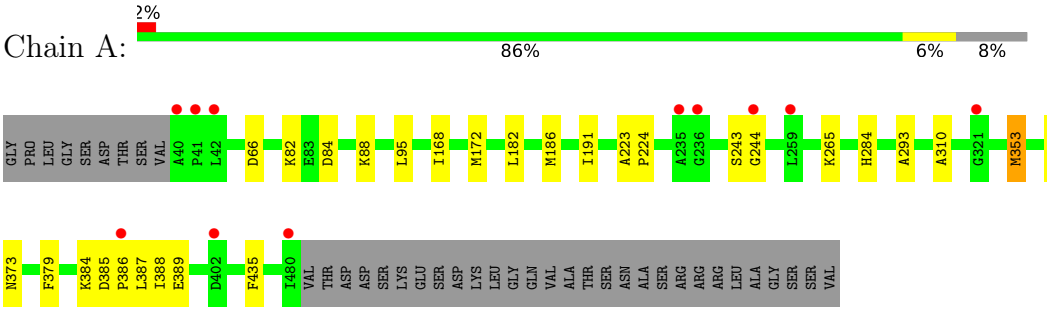
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	443	Total O 446 446	0	3
8	B	344	Total O 344 344	0	0

3 Residue-property plots (i)

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.

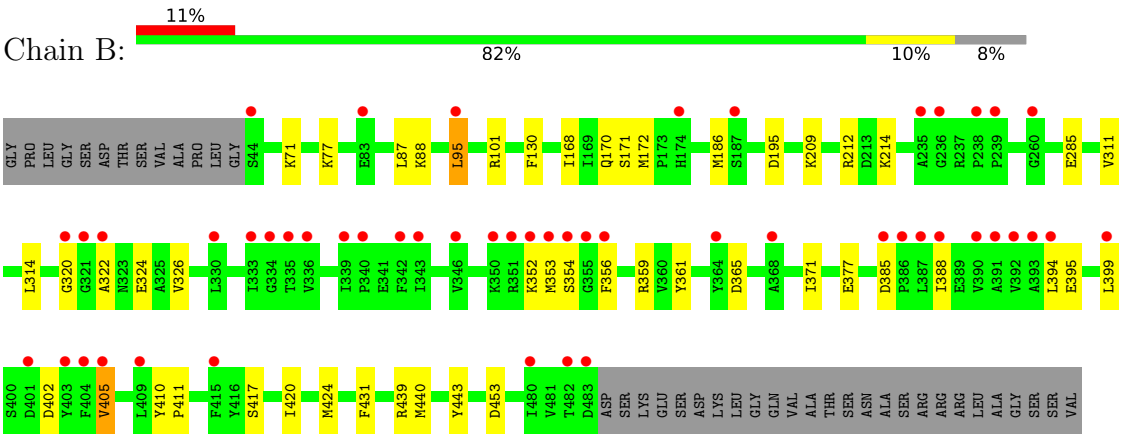
• Molecule 1: Citrate synthase 3, peroxisomal

Chain A:



• Molecule 1: Citrate synthase 3, peroxisomal

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α, β, γ	193.86Å 60.60Å 76.86Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.32 – 1.70 38.32 – 1.70	Depositor EDS
% Data completeness (in resolution range)	98.6 (38.32-1.70) 98.6 (38.32-1.70)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.98 (at 1.70Å)	Xtriage
Refinement program	REFMAC 5.8.0419	Depositor
R, R_{free}	0.166 , 0.197 0.172 , 0.206	Depositor DCC
R_{free} test set	1977 reflections (1.97%)	wwPDB-VP
Wilson B-factor (Å^2)	22.7	Xtriage
Anisotropy	0.063	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 38.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	7902	wwPDB-VP
Average B, all atoms (Å^2)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.63% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: EDO, MG, PEG, COA, OAA, EPE

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	0.77	1/3571 (0.0%)	1.14	7/4844 (0.1%)
1	B	0.74	0/3589	1.12	7/4867 (0.1%)
All	All	0.75	1/7160 (0.0%)	1.13	14/9711 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	243	SER	CA-CB	-5.72	1.45	1.53

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	88	LYS	N-CA-CB	-7.05	99.56	110.85
1	A	88	LYS	N-CA-CB	-7.00	99.65	110.85
1	B	361	TYR	N-CA-CB	6.92	120.36	109.71
1	B	365	ASP	CA-CB-CG	6.80	119.40	112.60
1	A	435	PHE	CA-CB-CG	6.32	120.12	113.80
1	A	365	ASP	CA-CB-CG	6.10	118.70	112.60
1	B	195	ASP	CA-CB-CG	6.00	118.60	112.60
1	A	84	ASP	CA-CB-CG	5.52	118.12	112.60
1	A	265	LYS	CB-CA-C	-5.51	102.74	110.13
1	A	373	ASN	CA-CB-CG	-5.35	107.25	112.60
1	A	66	ASP	CA-CB-CG	5.14	117.74	112.60
1	B	324	GLU	N-CA-CB	5.08	117.44	110.07
1	B	130	PHE	CA-CB-CG	-5.07	108.73	113.80
1	B	431	PHE	CA-CB-CG	5.04	118.84	113.80

There are no chirality outliers.

There are no planarity outliers.

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	3475	0	3503	14	0
1	B	3485	0	3523	29	0
2	A	9	0	2	0	0
2	B	9	0	2	0	0
3	A	48	0	32	0	0
3	B	48	0	32	1	0
4	A	14	0	20	1	0
5	A	3	0	0	0	0
5	B	2	0	0	0	0
6	B	4	0	6	2	0
7	B	15	0	18	1	0
8	A	446	0	0	4	3
8	B	344	0	0	10	2
All	All	7902	0	7138	44	3

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 3.

All (44) 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:A:182:LEU:HD11	1:A:186[B]:MET:HE3	1.74	0.69
1:A:387:LEU:HD13	8:A:795:HOH:O	1.94	0.67
1:B:209:LYS:HZ1	6:B:603:EDO:H11	1.61	0.66
1:B:95:LEU:HD22	1:B:359:ARG:NH1	2.13	0.64
1:B:353:MET:HE3	1:B:394:LEU:HD21	1.87	0.55
1:A:386:PRO:O	1:A:389:GLU:OE1	2.24	0.55
1:B:186[B]:MET:HE1	8:B:927:HOH:O	2.08	0.53
1:B:212[B]:ARG:HG3	8:B:739:HOH:O	2.11	0.51
1:B:171:SER:O	8:B:701:HOH:O	2.20	0.50
1:B:322:ALA:O	1:B:326:VAL:HG23	2.10	0.50
1:A:244:GLY:N	8:A:706:HOH:O	2.36	0.48
1:B:71:LYS:NZ	8:B:711:HOH:O	2.46	0.48
1:A:385:ASP:C	1:A:385:ASP:OD1	2.57	0.47
1:B:424:MET:O	7:B:606:EPE:H52	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:371:ILE:HD13	1:B:417:SER:HB3	1.96	0.47
1:B:371:ILE:HG23	1:B:420:ILE:HD12	1.97	0.47
1:B:168:ILE:HG22	1:B:172[B]:MET:HE3	1.97	0.47
1:A:353:MET:HE2	1:A:353:MET:HB2	1.63	0.46
1:A:168:ILE:HG22	1:A:172[B]:MET:HE3	1.98	0.45
1:B:402:ASP:HA	1:B:405:VAL:HG22	1.98	0.45
1:B:356:PHE:HA	1:B:410:TYR:O	2.17	0.44
1:B:399:LEU:HD21	1:B:411:PRO:HD3	1.98	0.44
1:B:186[B]:MET:HE3	8:B:773:HOH:O	2.18	0.43
1:B:352:LYS:HE3	8:B:962:HOH:O	2.19	0.43
1:B:77:LYS:NZ	8:B:717:HOH:O	2.50	0.43
1:B:209:LYS:NZ	6:B:603:EDO:H11	2.30	0.43
1:B:377:GLU:OE2	8:B:702:HOH:O	2.21	0.43
1:B:101[A]:ARG:NH2	1:B:453:ASP:OD1	2.48	0.42
1:A:191:ILE:HD13	1:B:172[B]:MET:SD	2.59	0.42
1:B:314:LEU:O	1:B:320:GLY:HA3	2.19	0.42
1:B:395:GLU:O	1:B:399:LEU:HG	2.19	0.42
1:B:439:ARG:HG3	1:B:443:TYR:CZ	2.55	0.42
1:A:293:ALA:HB2	1:A:310:ALA:HB2	2.00	0.42
1:A:385:ASP:O	1:A:388:ILE:HG22	2.19	0.42
1:B:311:VAL:CG1	1:B:440:MET:HE1	2.49	0.42
1:B:95:LEU:HD22	1:B:359:ARG:CZ	2.49	0.42
3:B:602:COA:S1P	8:B:892:HOH:O	2.26	0.41
1:B:87[A]:LEU:HD23	8:B:908:HOH:O	2.20	0.41
1:A:387:LEU:CD1	8:A:795:HOH:O	2.60	0.41
1:A:379:PHE:HB3	1:A:384:LYS:HA	2.02	0.41
1:A:223:ALA:HB3	1:A:224:PRO:HD3	2.02	0.41
1:A:95:LEU:HD23	1:A:359:ARG:NH1	2.36	0.40
4:A:604:PEG:H12	8:A:1012:HOH:O	2.21	0.40
1:B:385:ASP:O	1:B:388:ILE:HG22	2.20	0.40

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:A:926:HOH:O	8:B:909:HOH:O[3_359]	2.13	0.07
8:A:880:HOH:O	8:B:891:HOH:O[3_349]	2.15	0.05
8:A:943:HOH:O	8:A:943:HOH:O[2_355]	2.16	0.04

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	444/479 (93%)	440 (99%)	4 (1%)	0	100	100
1	B	445/479 (93%)	437 (98%)	8 (2%)	0	100	100
All	All	889/958 (93%)	877 (99%)	12 (1%)	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 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	373/399 (94%)	370 (99%)	3 (1%)	73	65
1	B	376/399 (94%)	370 (98%)	6 (2%)	55	41
All	All	749/798 (94%)	740 (99%)	9 (1%)	63	51

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	82	LYS
1	A	284	HIS
1	A	353	MET
1	B	95	LEU
1	B	170	GLN
1	B	214	LYS
1	B	285	GLU
1	B	354	SER

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Mol	Chain	Res	Type
1	B	405	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	174	HIS
1	A	210	GLN
1	B	170	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 13 ligands modelled in this entry, 5 are monoatomic - leaving 8 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	$\#\|Z\| > 2$
4	PEG	A	603	-	6,6,6	0.22	0	5,5,5	0.25	0
3	COA	B	602	-	47,50,50	0.57	0	69,75,75	0.73	1 (1%)
2	OAA	A	601	-	8,8,8	4.69	5 (62%)	8,10,10	1.02	0
3	COA	A	602[A]	-	47,50,50	0.60	1 (2%)	69,75,75	0.91	2 (2%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
7	EPE	B	606	-	15,15,15	0.92	1 (6%)	19,20,20	0.98	1 (5%)
6	EDO	B	603	-	3,3,3	0.22	0	2,2,2	0.43	0
4	PEG	A	604	-	6,6,6	0.24	0	5,5,5	0.29	0
2	OAA	B	601	-	8,8,8	4.59	1 (12%)	8,10,10	2.05	3 (37%)

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
4	PEG	A	603	-	-	1/4/4/4	-
3	COA	B	602	-	-	6/48/64/64	0/3/3/3
2	OAA	A	601	-	-	1/8/8/8	-
3	COA	A	602[A]	-	-	0/48/64/64	0/3/3/3
7	EPE	B	606	-	-	4/9/19/19	0/1/1/1
6	EDO	B	603	-	-	1/1/1/1	-
4	PEG	A	604	-	-	0/4/4/4	-
2	OAA	B	601	-	-	0/8/8/8	-

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	601	OAA	C3-C4	-12.57	1.34	1.53
2	A	601	OAA	C3-C4	-12.42	1.34	1.53
7	B	606	EPE	O3S-S	3.04	1.58	1.47
3	A	602[A]	COA	P3B-O3B	2.58	1.64	1.59
2	A	601	OAA	O2-C1	-2.21	1.23	1.30
2	A	601	OAA	O4-C4	2.20	1.28	1.22
2	A	601	OAA	C2-C1	2.19	1.54	1.51
2	A	601	OAA	O5-C4	-2.07	1.24	1.30

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	601	OAA	O4-C4-C3	-3.10	117.96	121.81
2	B	601	OAA	O5-C4-C3	2.86	121.52	113.59
2	B	601	OAA	O3-C3-C4	2.79	123.66	119.67
3	B	602	COA	P3B-O3B-C3B	-2.68	116.28	123.43
7	B	606	EPE	O3S-S-C10	-2.51	101.09	106.00
3	A	602[A]	COA	O3B-P3B-O7A	-2.38	100.85	109.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	602[A]	COA	O5A-P2A-O4A	2.18	122.60	112.44

There are no chirality outliers.

All (13) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	602	COA	C5B-O5B-P1A-O2A
3	B	602	COA	C5B-O5B-P1A-O3A
3	B	602	COA	CDP-CBP-CCP-O6A
3	B	602	COA	CEP-CBP-CCP-O6A
7	B	606	EPE	C8-C7-N4-C5
4	A	603	PEG	O2-C3-C4-O4
7	B	606	EPE	C10-C9-N1-C2
7	B	606	EPE	C10-C9-N1-C6
3	B	602	COA	P2A-O3A-P1A-O5B
7	B	606	EPE	C9-C10-S-O2S
3	B	602	COA	CAP-CBP-CCP-O6A
6	B	603	EDO	O1-C1-C2-O2
2	A	601	OAA	C1-C2-C3-O3

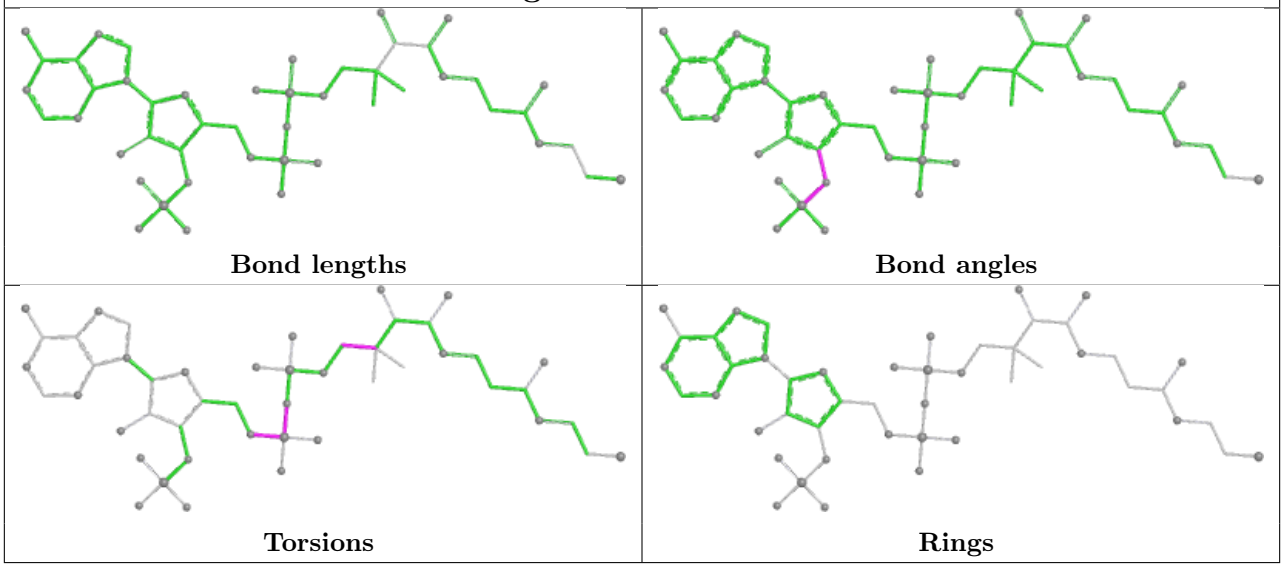
There are no ring outliers.

4 monomers are involved in 5 short contacts:

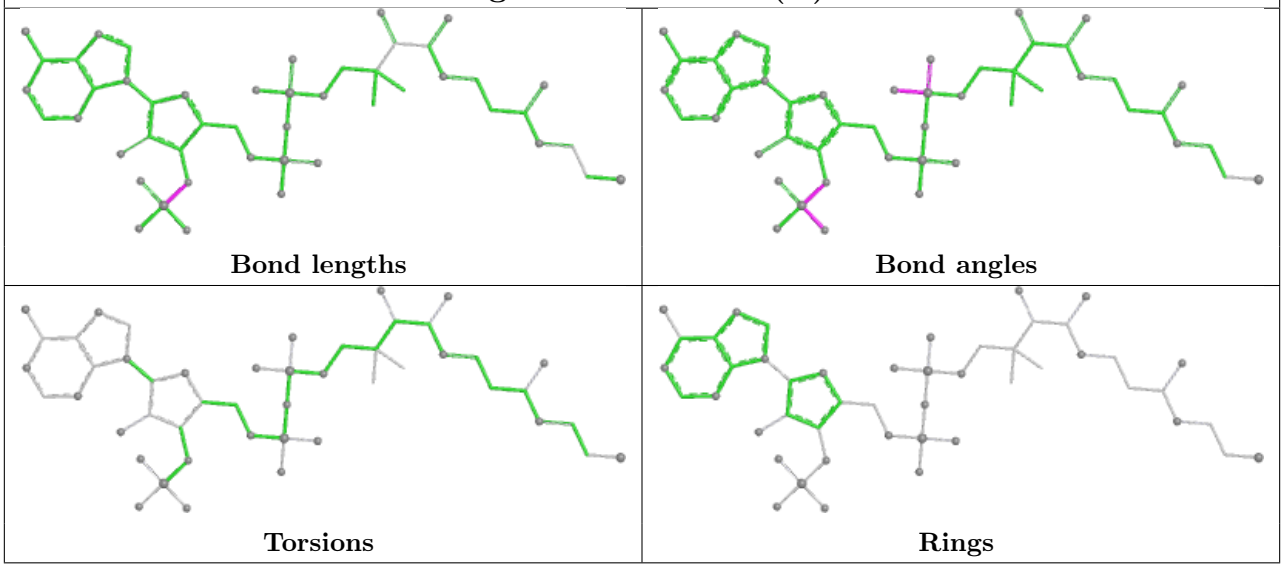
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	602	COA	1	0
7	B	606	EPE	1	0
6	B	603	EDO	2	0
4	A	604	PEG	1	0

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 COA B 602



Ligand COA A 602 (A)



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

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, 95^{th} 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	441/479 (92%)	-0.11	11 (2%) 58 62	11, 22, 43, 80	5 (1%)
1	B	440/479 (91%)	0.40	51 (11%) 9 9	11, 26, 78, 115	7 (1%)
All	All	881/958 (91%)	0.14	62 (7%) 22 24	11, 23, 63, 115	12 (1%)

All (62) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	339	ILE	5.4
1	A	40	ALA	5.1
1	A	480	ILE	4.9
1	B	321	GLY	4.8
1	B	336	VAL	4.4
1	B	392	VAL	4.4
1	A	42	LEU	4.4
1	B	404	PHE	4.4
1	B	343	ILE	4.3
1	B	342	PHE	4.3
1	B	330	LEU	4.1
1	B	391	ALA	3.6
1	B	386	PRO	3.5
1	B	409	LEU	3.4
1	B	335	THR	3.3
1	B	405	VAL	3.3
1	B	385	ASP	3.3
1	B	393	ALA	3.2
1	B	351	ARG	3.1
1	B	174	HIS	3.1
1	A	41	PRO	3.1
1	B	399	LEU	3.1
1	B	346	VAL	3.0
1	B	387	LEU	3.0

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Mol	Chain	Res	Type	RSRZ
1	B	390	VAL	3.0
1	B	322	ALA	2.9
1	B	388	ILE	2.9
1	B	480	ILE	2.9
1	B	239	PRO	2.8
1	B	340	PRO	2.8
1	B	353	MET	2.8
1	A	386	PRO	2.8
1	A	244	GLY	2.8
1	B	354	SER	2.8
1	A	321	GLY	2.7
1	B	403	TYR	2.7
1	B	320	GLY	2.7
1	B	394	LEU	2.6
1	A	236	GLY	2.6
1	B	260	GLY	2.6
1	B	368	ALA	2.6
1	B	355	GLY	2.5
1	B	482	THR	2.5
1	B	236	GLY	2.5
1	B	235	ALA	2.5
1	B	350	LYS	2.5
1	B	238	PRO	2.5
1	B	401	ASP	2.4
1	B	334	GLY	2.4
1	B	333	ILE	2.4
1	A	259	LEU	2.4
1	B	95	LEU	2.3
1	B	364	TYR	2.3
1	B	352	LYS	2.1
1	A	402	ASP	2.1
1	B	356	PHE	2.1
1	B	415	PHE	2.1
1	B	44	SER	2.1
1	B	483	ASP	2.0
1	B	83	GLU	2.0
1	A	235	ALA	2.0
1	B	187	SER	2.0

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 (i)

There are no oligosaccharides in this entry.

6.4 Ligands (i)

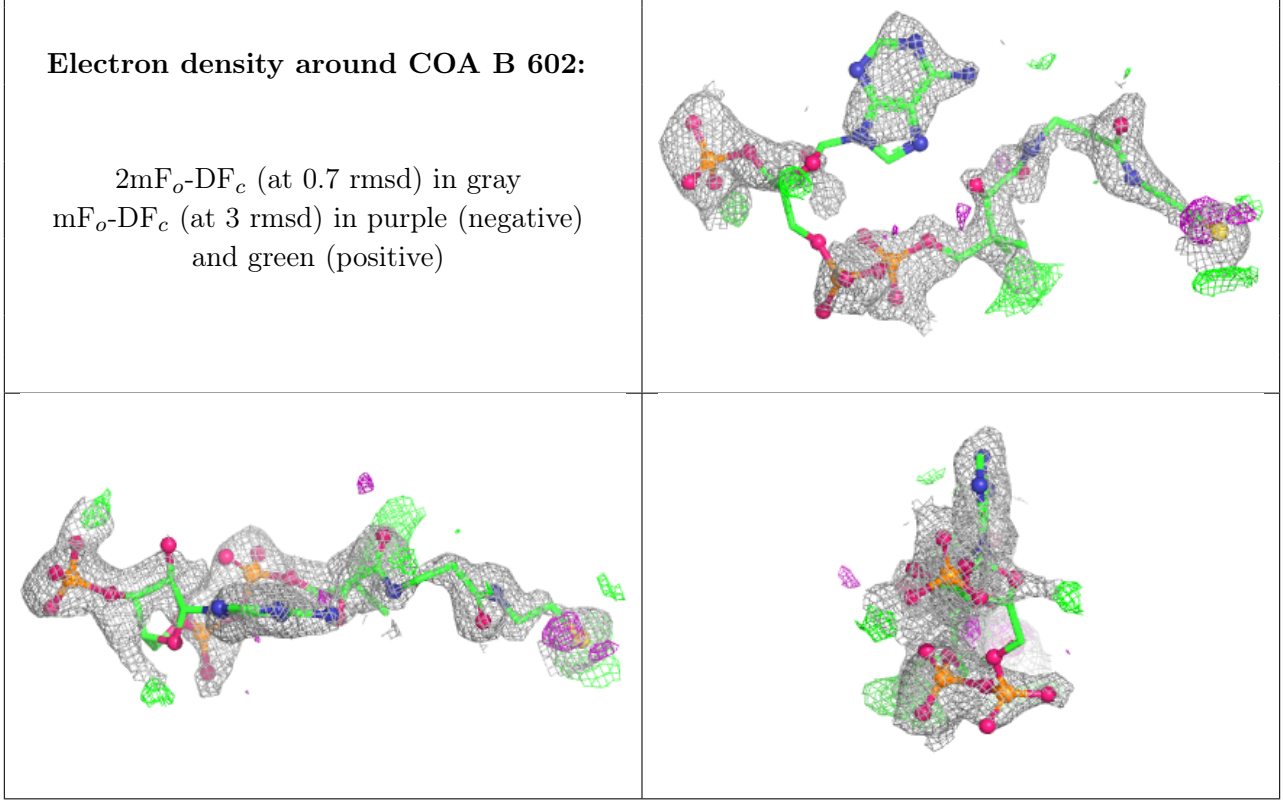
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
7	EPE	B	606	15/15	0.69	0.19	47,64,75,78	0
3	COA	B	602	48/48	0.76	0.14	41,84,113,121	0
5	MG	A	605	1/1	0.77	0.21	56,56,56,56	0
4	PEG	A	603	7/7	0.88	0.11	40,45,47,51	0
3	COA	A	602[A]	48/48	0.89	0.11	22,35,52,64	48
6	EDO	B	603	4/4	0.90	0.13	44,46,50,50	0
4	PEG	A	604	7/7	0.90	0.11	38,41,49,57	0
2	OAA	B	601	9/9	0.92	0.08	25,27,32,33	0
5	MG	B	604	1/1	0.95	0.17	46,46,46,46	0
5	MG	A	607	1/1	0.96	0.25	30,30,30,30	0
2	OAA	A	601	9/9	0.96	0.05	18,19,21,26	0
5	MG	A	606	1/1	0.97	0.23	41,41,41,41	0
5	MG	B	605	1/1	0.97	0.10	29,29,29,29	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.

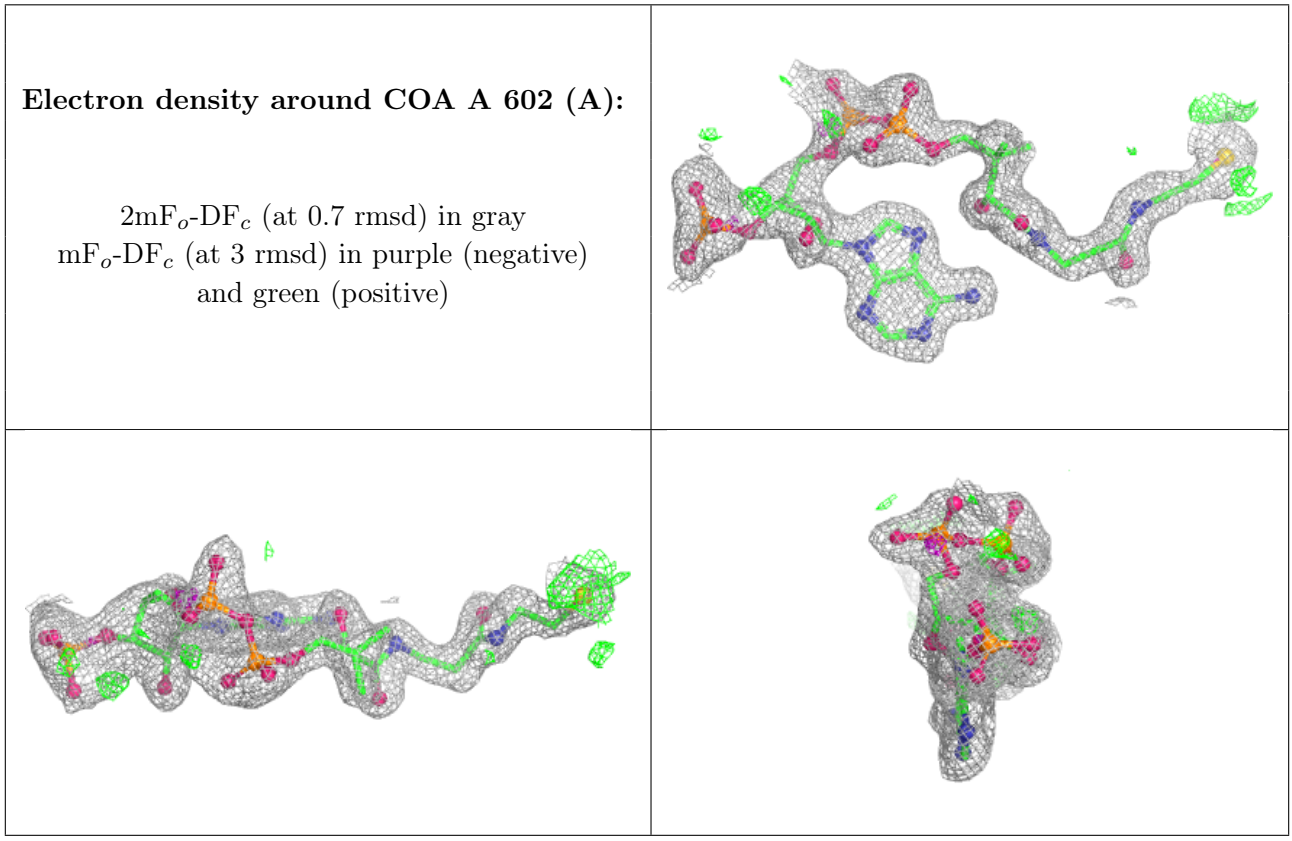
Electron density around COA B 602:

$2mF_o$-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 A 602 (A):

$2mF_o$-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 (i)

There are no such residues in this entry.