



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 13, 2025 – 06:10 PM JST

PDB ID : 8XXE
Title : TtCS-intermediate complex
Authors : Yang, L.; Fang, Y.J.
Deposited on : 2024-01-18
Resolution : 2.08 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.21
EDS : 3.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.004 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.40

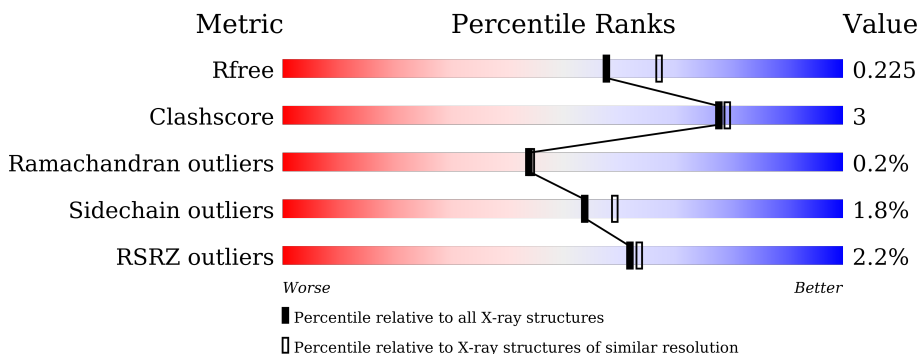
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.08 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}	164625	7574 (2.10-2.06)
Clashscore	180529	8325 (2.10-2.06)
Ramachandran outliers	177936	8271 (2.10-2.06)
Sidechain outliers	177891	8272 (2.10-2.06)
RSRZ outliers	164620	7574 (2.10-2.06)

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 $\leq 5\%$. 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	449	
1	B	449	
1	C	449	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	ACE	C	503	-	-	X	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 11484 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.

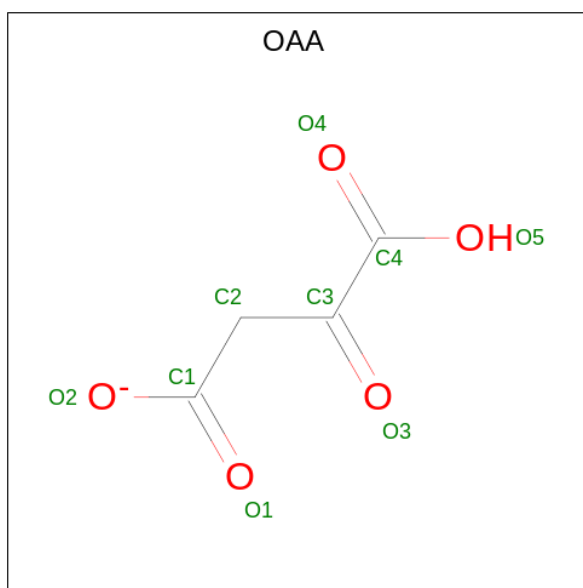
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	448	3573	2295	614	643	21	0	0	0
1	B	449	3578	2298	615	644	21	0	0	0
1	C	442	3561	2287	612	641	21	0	1	0

There are 21 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	443	LYS	-	expression tag	UNP A0A0S3QTD0
A	444	LEU	-	expression tag	UNP A0A0S3QTD0
A	445	ALA	-	expression tag	UNP A0A0S3QTD0
A	446	ALA	-	expression tag	UNP A0A0S3QTD0
A	447	ALA	-	expression tag	UNP A0A0S3QTD0
A	448	LEU	-	expression tag	UNP A0A0S3QTD0
A	449	GLU	-	expression tag	UNP A0A0S3QTD0
B	443	LYS	-	expression tag	UNP A0A0S3QTD0
B	444	LEU	-	expression tag	UNP A0A0S3QTD0
B	445	ALA	-	expression tag	UNP A0A0S3QTD0
B	446	ALA	-	expression tag	UNP A0A0S3QTD0
B	447	ALA	-	expression tag	UNP A0A0S3QTD0
B	448	LEU	-	expression tag	UNP A0A0S3QTD0
B	449	GLU	-	expression tag	UNP A0A0S3QTD0
C	443	LYS	-	expression tag	UNP A0A0S3QTD0
C	444	LEU	-	expression tag	UNP A0A0S3QTD0
C	445	ALA	-	expression tag	UNP A0A0S3QTD0
C	446	ALA	-	expression tag	UNP A0A0S3QTD0
C	447	ALA	-	expression tag	UNP A0A0S3QTD0
C	448	LEU	-	expression tag	UNP A0A0S3QTD0
C	449	GLU	-	expression tag	UNP A0A0S3QTD0

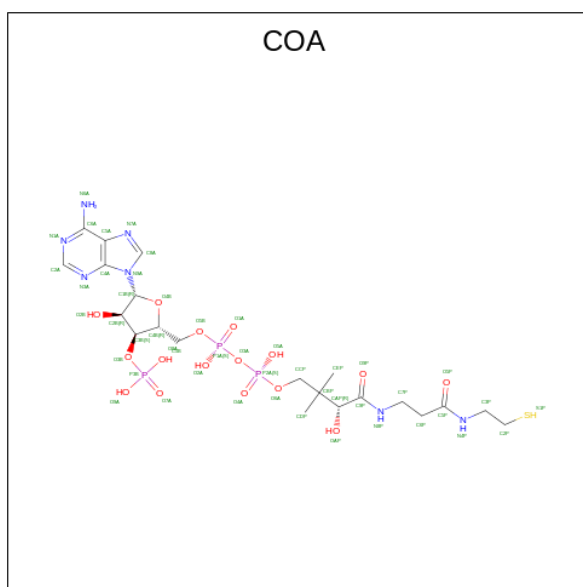
- Molecule 2 is OXALOACETATE ION (three-letter code: OAA) (formula: C₄H₃O₅) (labeled

as "Ligand of Interest" by depositor).



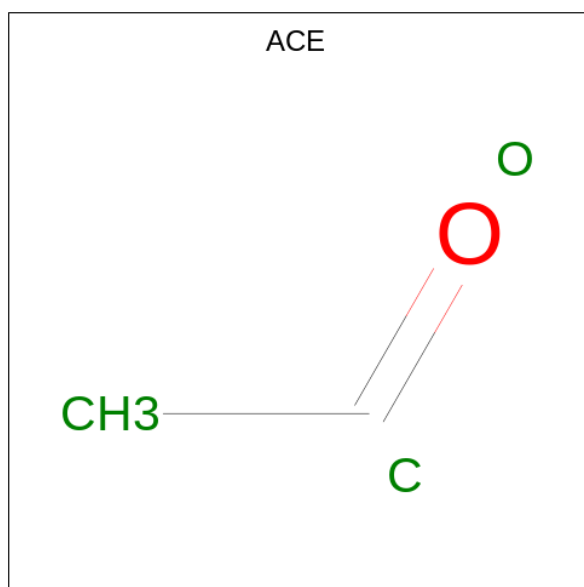
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 9 4 5	0	0
2	B	1	Total C O 9 4 5	0	0
2	C	1	Total C O 9 4 5	0	0

- Molecule 3 is COENZYME A (three-letter code: COA) (formula: $C_{21}H_{36}N_7O_{16}P_3S$) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 4 is ACETYL GROUP (three-letter code: ACE) (formula: C₂H₄O) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	C	1	Total	C	O	0	0
			3	2	1		

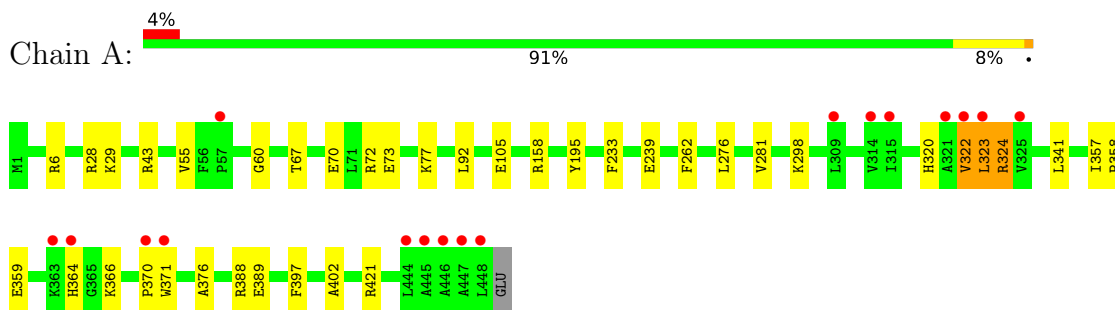
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	187	Total	O	0	0
			187	187		
5	B	198	Total	O	0	0
			198	198		
5	C	213	Total	O	0	0
			213	213		

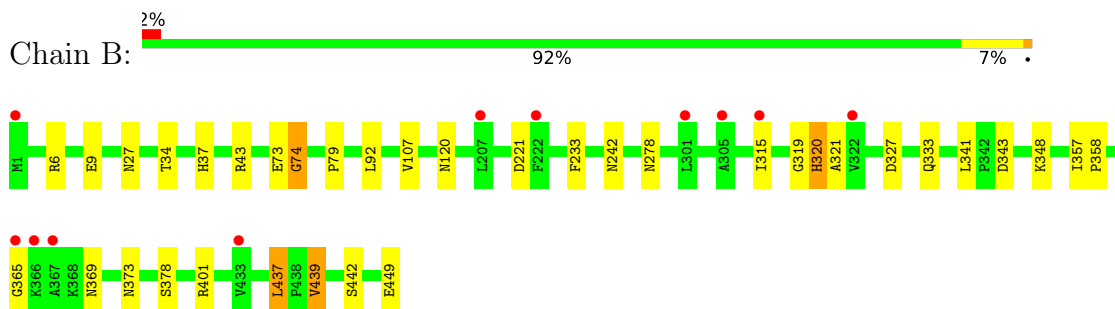
3 Residue-property plots [i](#)

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.

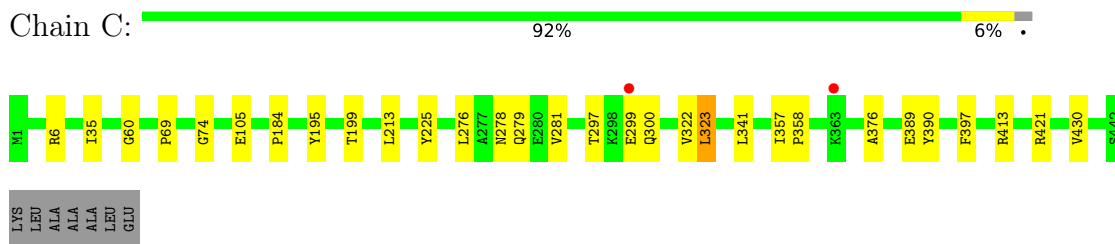
- Molecule 1: Citrate synthase



- Molecule 1: Citrate synthase



- Molecule 1: Citrate synthase



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	109.91Å 109.91Å 265.09Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	34.46 – 2.08 34.46 – 2.08	Depositor EDS
% Data completeness (in resolution range)	100.0 (34.46-2.08) 100.0 (34.46-2.08)	Depositor EDS
R_{merge}	0.18	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.36 (at 2.08Å)	Xtrriage
Refinement program	REFMAC 5.8.0411	Depositor
R, R_{free}	0.171 , 0.217 0.181 , 0.225	Depositor DCC
R_{free} test set	4900 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	34.3	Xtrriage
Anisotropy	0.028	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 43.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	11484	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.82% 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: OAA, COA, ACE

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	0.43	0/3669	0.74	1/4975 (0.0%)
1	B	0.45	0/3674	0.75	0/4982
1	C	0.45	0/3657	0.75	1/4957 (0.0%)
All	All	0.44	0/11000	0.75	2/14914 (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	5
1	B	0	2
1	C	0	1
All	All	0	8

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	388	ARG	CG-CD-NE	-5.19	100.90	111.80
1	C	225	TYR	CB-CG-CD1	5.04	124.03	121.00

There are no chirality outliers.

All (8) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	158	ARG	Sidechain
1	A	324	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	A	43	ARG	Sidechain
1	A	6	ARG	Sidechain
1	A	73	GLU	Peptide
1	B	320	HIS	Peptide
1	B	401	ARG	Sidechain
1	C	6	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	3573	0	3517	17	0
1	B	3578	0	3519	28	0
1	C	3561	0	3511	15	0
2	A	9	0	2	0	0
2	B	9	0	2	2	0
2	C	9	0	2	0	0
3	A	48	0	32	0	0
3	B	48	0	32	7	0
3	C	48	0	32	0	0
4	C	3	0	3	3	0
5	A	187	0	0	1	0
5	B	198	0	0	2	0
5	C	213	0	0	2	0
All	All	11484	0	10652	59	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 3.

All (59) 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:B:449:GLU:C	5:B:604:HOH:O	1.91	1.06
1:B:439:VAL:HG13	1:B:442:SER:HB3	1.68	0.74
1:A:364:HIS:CE1	1:A:366:LYS:HG3	2.27	0.69
1:C:299:GLU:OE2	5:C:601:HOH:O	2.10	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:502:COA:H1B	3:B:502:COA:O9A	1.96	0.65
1:B:6:ARG:NH1	1:B:9:GLU:OE2	2.31	0.63
1:B:365:GLY:HA2	5:B:764:HOH:O	1.99	0.61
1:A:67:THR:OG1	1:A:70:GLU:HG3	2.01	0.61
1:B:333:GLN:HE22	1:B:378:SER:HB3	1.67	0.60
1:B:439:VAL:HG13	1:B:442:SER:CB	2.31	0.59
1:B:320:HIS:ND1	3:B:502:COA:N4P	2.50	0.59
1:B:319:GLY:HA2	1:B:369:ASN:O	2.04	0.57
1:B:34:THR:H	1:B:37:HIS:HD2	1.51	0.57
1:A:60:GLY:HA2	1:A:323:LEU:HD11	1.89	0.54
1:A:55:VAL:HG23	1:A:239:GLU:HG3	1.90	0.54
1:B:315:ILE:HD13	1:B:357:ILE:HD12	1.89	0.54
1:B:73:GLU:O	1:B:74:GLY:O	2.26	0.53
1:C:60:GLY:HA2	1:C:323:LEU:HD11	1.91	0.52
1:C:69:PRO:O	1:C:74:GLY:N	2.34	0.52
1:B:120:ASN:HA	1:C:199:THR:HG21	1.91	0.51
1:C:279[C]:GLN:HG2	1:C:390:TYR:O	2.10	0.51
1:A:359:GLU:HG3	5:A:615:HOH:O	2.12	0.50
1:C:35:ILE:HD13	1:C:430:VAL:HG13	1.94	0.49
1:A:92:LEU:HD22	1:A:233:PHE:CD1	2.49	0.48
1:B:221:ASP:OD1	1:B:221:ASP:C	2.51	0.47
1:A:370:PRO:HG2	1:A:371:TRP:CD1	2.48	0.47
1:A:28:ARG:HD2	1:B:437:LEU:O	2.15	0.47
1:A:421:ARG:HD2	2:B:501:OAA:O4	2.17	0.45
1:B:278:ASN:C	1:B:278:ASN:OD1	2.54	0.45
1:B:320:HIS:ND1	3:B:502:COA:H31	2.31	0.45
1:B:357:ILE:N	1:B:358:PRO:CD	2.80	0.45
1:A:357:ILE:N	1:A:358:PRO:CD	2.80	0.45
1:C:195:TYR:CG	1:C:389:GLU:HG2	2.53	0.44
1:C:357:ILE:N	1:C:358:PRO:CD	2.81	0.44
1:C:278:ASN:H	4:C:503:ACE:CH3	2.30	0.44
1:B:327:ASP:HB2	1:B:373:ASN:HA	2.00	0.43
1:B:321:ALA:HB2	3:B:502:COA:H62	2.00	0.43
1:B:92:LEU:HD22	1:B:233:PHE:CD1	2.53	0.43
1:C:413:ARG:HA	1:C:413:ARG:NE	2.34	0.43
1:B:320:HIS:HB3	3:B:502:COA:HN4	1.83	0.42
1:C:281:VAL:HG11	1:C:376:ALA:HA	2.00	0.42
1:A:320:HIS:CB	1:A:323:LEU:HB2	2.48	0.42
1:A:281:VAL:HG11	1:A:376:ALA:HA	2.02	0.42
1:A:28:ARG:HG2	1:A:28:ARG:HH11	1.85	0.42
1:C:297:THR:OG1	1:C:300:GLN:HG3	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:195:TYR:CG	1:A:389:GLU:HG2	2.55	0.42
1:C:413:ARG:HA	1:C:413:ARG:CZ	2.50	0.41
1:A:262:PHE:CZ	1:A:402:ALA:HB2	2.55	0.41
1:B:333:GLN:NE2	1:B:378:SER:HA	2.35	0.41
1:B:320:HIS:HA	3:B:502:COA:H71	2.03	0.41
1:C:184:PRO:HB3	1:C:213:LEU:HB2	2.02	0.41
1:B:79:PRO:HG2	1:B:107:VAL:HG21	2.03	0.41
1:B:320:HIS:ND1	3:B:502:COA:C3P	2.84	0.41
1:A:29:LYS:O	1:B:437:LEU:HG	2.21	0.41
1:A:72:ARG:O	1:A:77:LYS:NZ	2.49	0.41
1:B:343:ASP:HA	1:B:348:LYS:HE3	2.03	0.41
1:B:242:ASN:HB3	2:B:501:OAA:C3	2.51	0.40
1:C:278:ASN:H	4:C:503:ACE:H3	1.87	0.40
4:C:503:ACE:H2	5:C:787:HOH:O	2.21	0.40

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	446/449 (99%)	438 (98%)	7 (2%)	1 (0%)	44	44
1	B	447/449 (100%)	438 (98%)	8 (2%)	1 (0%)	44	44
1	C	442/449 (98%)	436 (99%)	6 (1%)	0	100	100
All	All	1335/1347 (99%)	1312 (98%)	21 (2%)	2 (0%)	44	50

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	74	GLY
1	A	322	VAL

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	371/376 (99%)	363 (98%)	8 (2%)	47	51
1	B	371/376 (99%)	366 (99%)	5 (1%)	65	71
1	C	373/376 (99%)	366 (98%)	7 (2%)	52	57
All	All	1115/1128 (99%)	1095 (98%)	20 (2%)	54	59

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	105	GLU
1	A	276	LEU
1	A	298	LYS
1	A	322	VAL
1	A	323	LEU
1	A	324	ARG
1	A	341	LEU
1	A	397	PHE
1	B	27	ASN
1	B	43	ARG
1	B	341	LEU
1	B	437	LEU
1	B	439	VAL
1	C	105	GLU
1	C	276	LEU
1	C	322	VAL
1	C	323	LEU
1	C	341	LEU
1	C	397	PHE
1	C	421	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	120	ASN

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Mol	Chain	Res	Type
1	A	248	ASN
1	A	313	GLN
1	A	364	HIS
1	B	27	ASN
1	B	37	HIS
1	B	248	ASN
1	B	286	GLN
1	B	333	GLN
1	B	408	GLN
1	C	120	ASN
1	C	248	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

7 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	COA	A	502	-	41,50,50	0.69	1 (2%)	52,75,75	0.70	0
3	COA	B	502	-	41,50,50	0.72	1 (2%)	52,75,75	0.93	3 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	OAA	A	501	-	8,8,8	4.74	1 (12%)	9,10,10	1.54	2 (22%)
4	ACE	C	503	-	1,2,2	0.64	0	1,1,1	0.01	0
3	COA	C	502	-	41,50,50	0.67	0	52,75,75	0.92	1 (1%)
2	OAA	C	501	-	8,8,8	4.64	3 (37%)	9,10,10	1.17	0
2	OAA	B	501	-	8,8,8	4.83	3 (37%)	9,10,10	2.68	5 (55%)

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	COA	A	502	-	-	1/44/64/64	0/3/3/3
3	COA	B	502	-	-	15/44/64/64	0/3/3/3
2	OAA	A	501	-	-	0/8/8/8	-
3	COA	C	502	-	-	1/44/64/64	0/3/3/3
2	OAA	C	501	-	-	1/8/8/8	-
2	OAA	B	501	-	-	2/8/8/8	-

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	OAA	C3-C4	-13.05	1.36	1.53
2	A	501	OAA	C3-C4	-12.96	1.36	1.53
2	C	501	OAA	C3-C4	-12.58	1.36	1.53
3	B	502	COA	P3B-O3B	2.94	1.64	1.59
2	B	501	OAA	C2-C1	2.48	1.54	1.51
2	C	501	OAA	O4-C4	2.34	1.28	1.22
2	B	501	OAA	O5-C4	-2.20	1.24	1.30
2	C	501	OAA	O2-C1	-2.11	1.23	1.30
3	A	502	COA	P3B-O3B	2.02	1.63	1.59

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	OAA	C2-C3-C4	5.41	127.00	117.85
2	B	501	OAA	O5-C4-C3	3.05	122.32	113.97
2	B	501	OAA	O4-C4-C3	-3.04	117.66	121.72
3	B	502	COA	O4B-C1B-C2B	-2.92	102.65	106.93
3	C	502	COA	O5A-P2A-O4A	2.80	126.08	112.24
2	B	501	OAA	O3-C3-C4	-2.77	115.42	119.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	OAA	O3-C3-C2	-2.55	116.88	120.58
2	A	501	OAA	C2-C3-C4	2.34	121.80	117.85
3	B	502	COA	O3B-C3B-C4B	2.23	118.15	110.08
3	B	502	COA	C5A-C6A-N6A	2.20	123.70	120.35
2	B	501	OAA	O3-C3-C2	-2.09	117.55	120.58

There are no chirality outliers.

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	501	OAA	O2-C1-C2-C3
3	A	502	COA	C5B-O5B-P1A-O1A
3	B	502	COA	C4B-C3B-O3B-P3B
3	B	502	COA	C3B-C4B-C5B-O5B
3	B	502	COA	CCP-O6A-P2A-O4A
3	B	502	COA	CCP-O6A-P2A-O5A
3	B	502	COA	CAP-CBP-CCP-O6A
3	B	502	COA	C5P-C6P-C7P-N8P
3	C	502	COA	C5B-O5B-P1A-O1A
3	B	502	COA	O4B-C4B-C5B-O5B
3	B	502	COA	CDP-CBP-CCP-O6A
3	B	502	COA	CEP-CBP-CCP-O6A
2	B	501	OAA	O1-C1-C2-C3
3	B	502	COA	P2A-O3A-P1A-O5B
3	B	502	COA	C3B-O3B-P3B-O8A
2	C	501	OAA	O1-C1-C2-C3
3	B	502	COA	O5P-C5P-C6P-C7P
3	B	502	COA	CCP-O6A-P2A-O3A
3	B	502	COA	P2A-O3A-P1A-O1A
3	B	502	COA	N4P-C5P-C6P-C7P

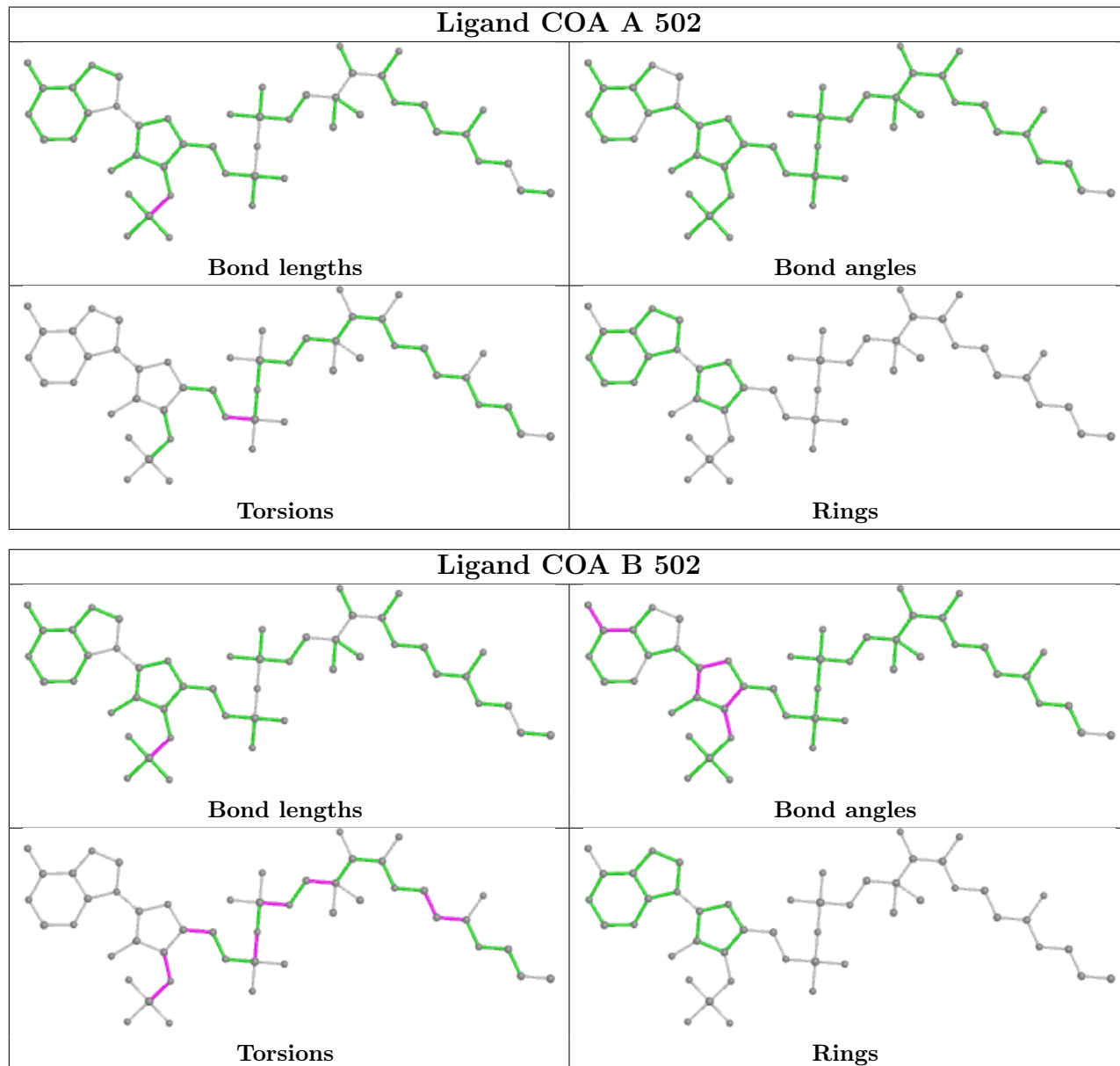
There are no ring outliers.

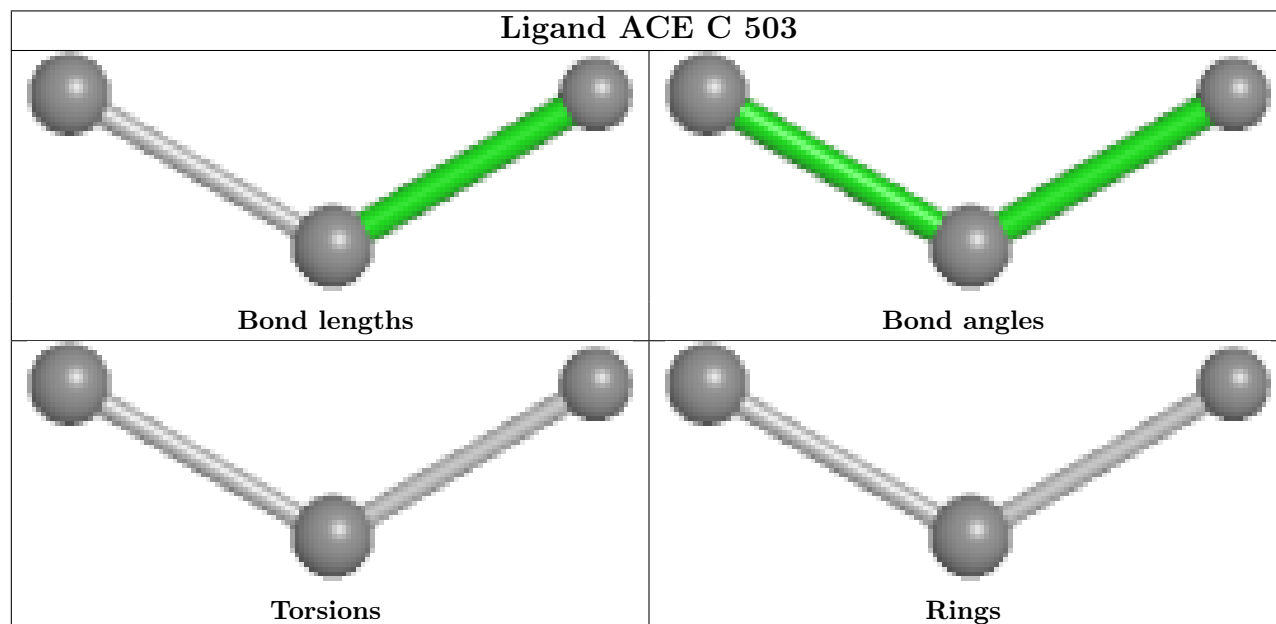
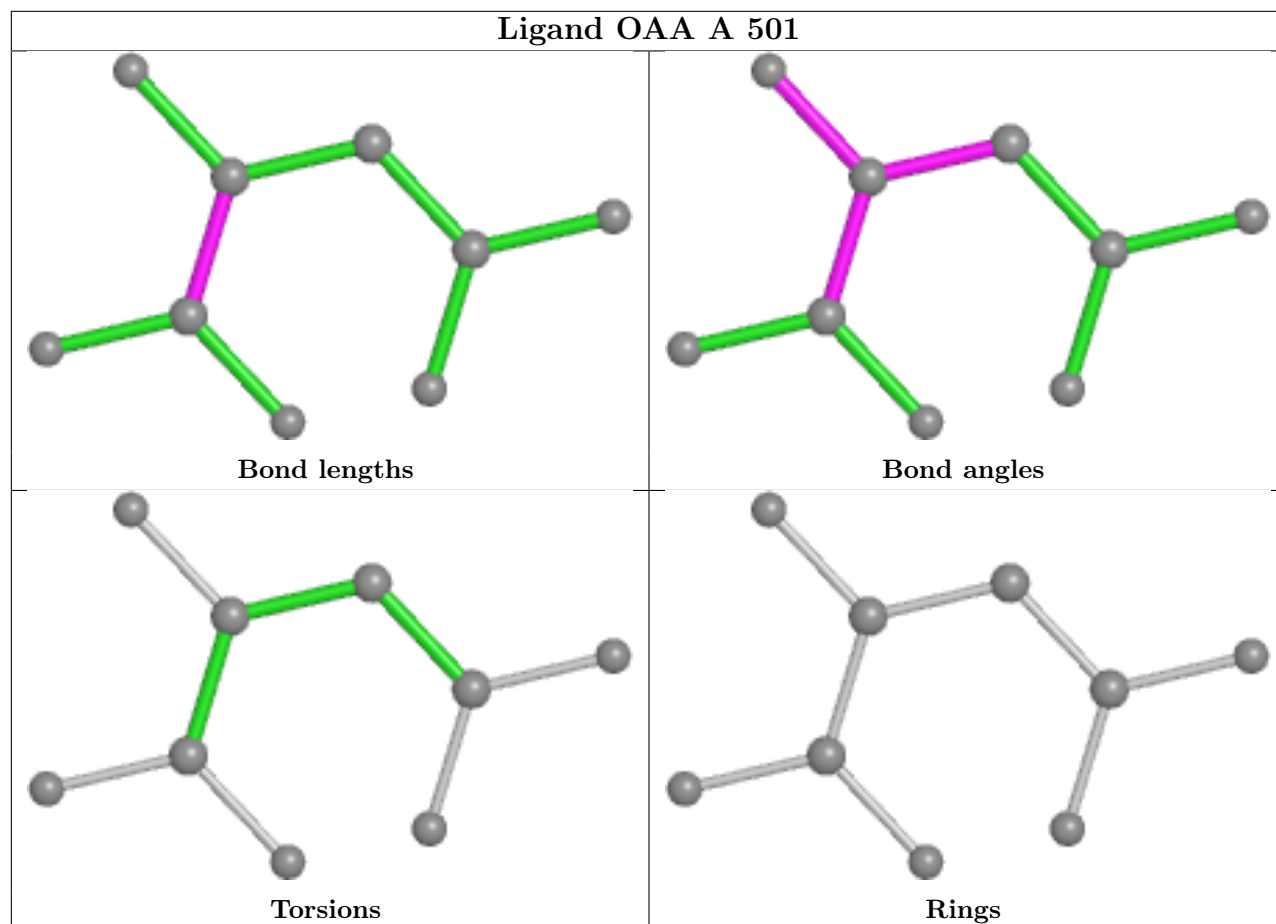
3 monomers are involved in 12 short contacts:

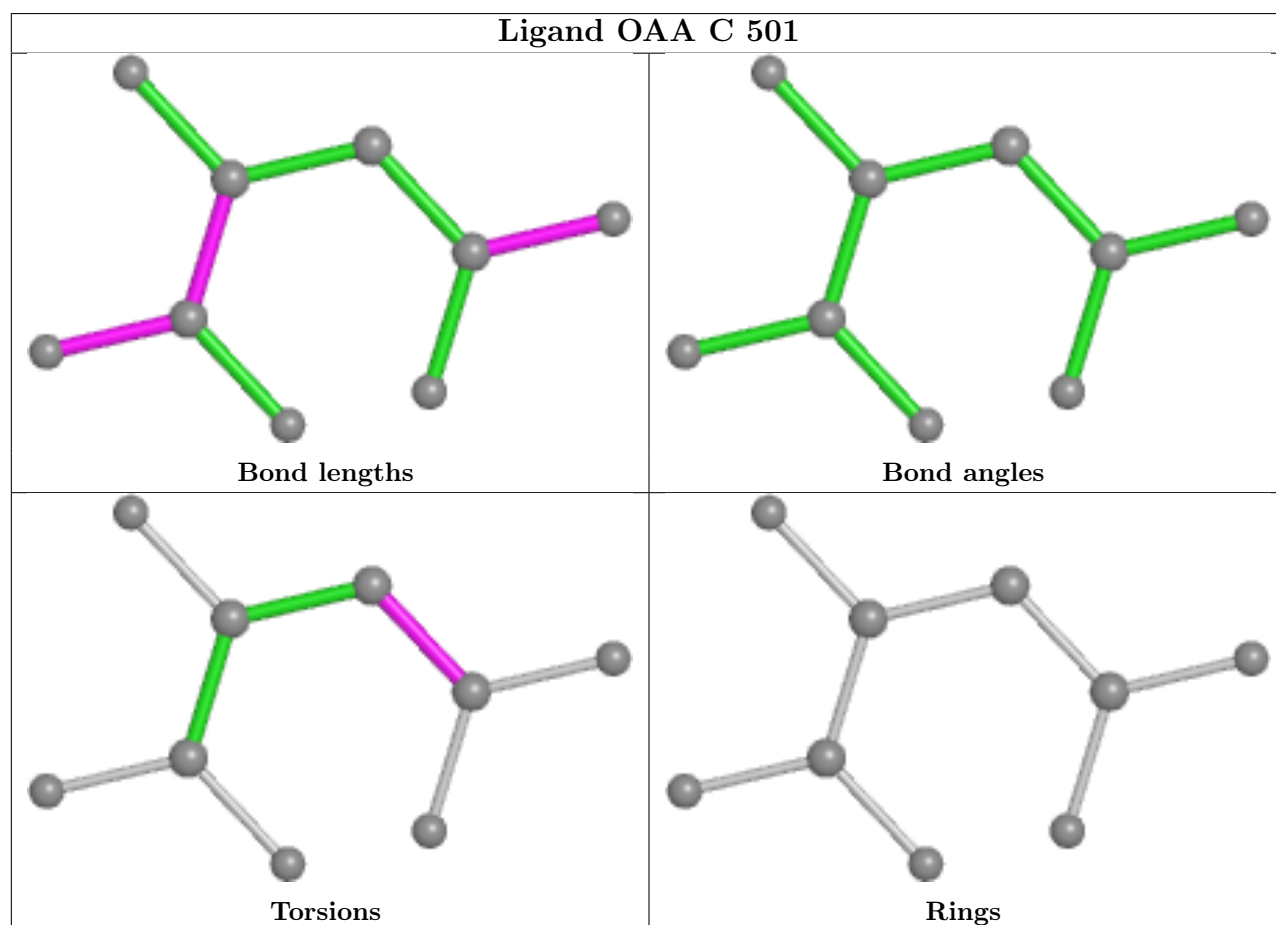
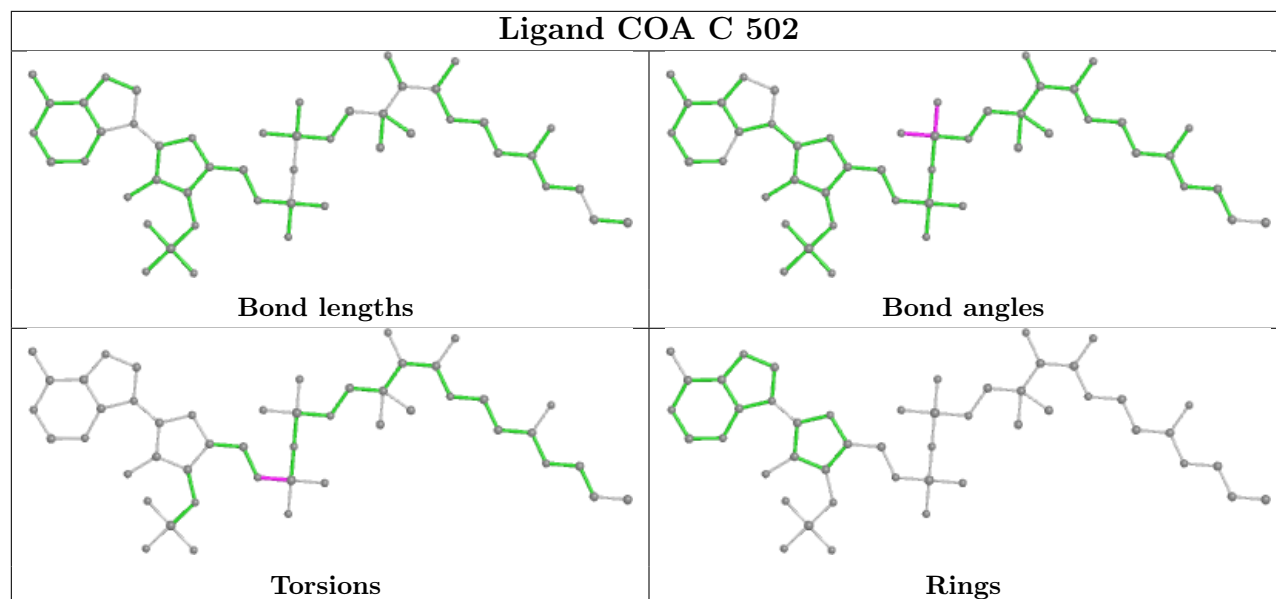
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	502	COA	7	0
4	C	503	ACE	3	0
2	B	501	OAA	2	0

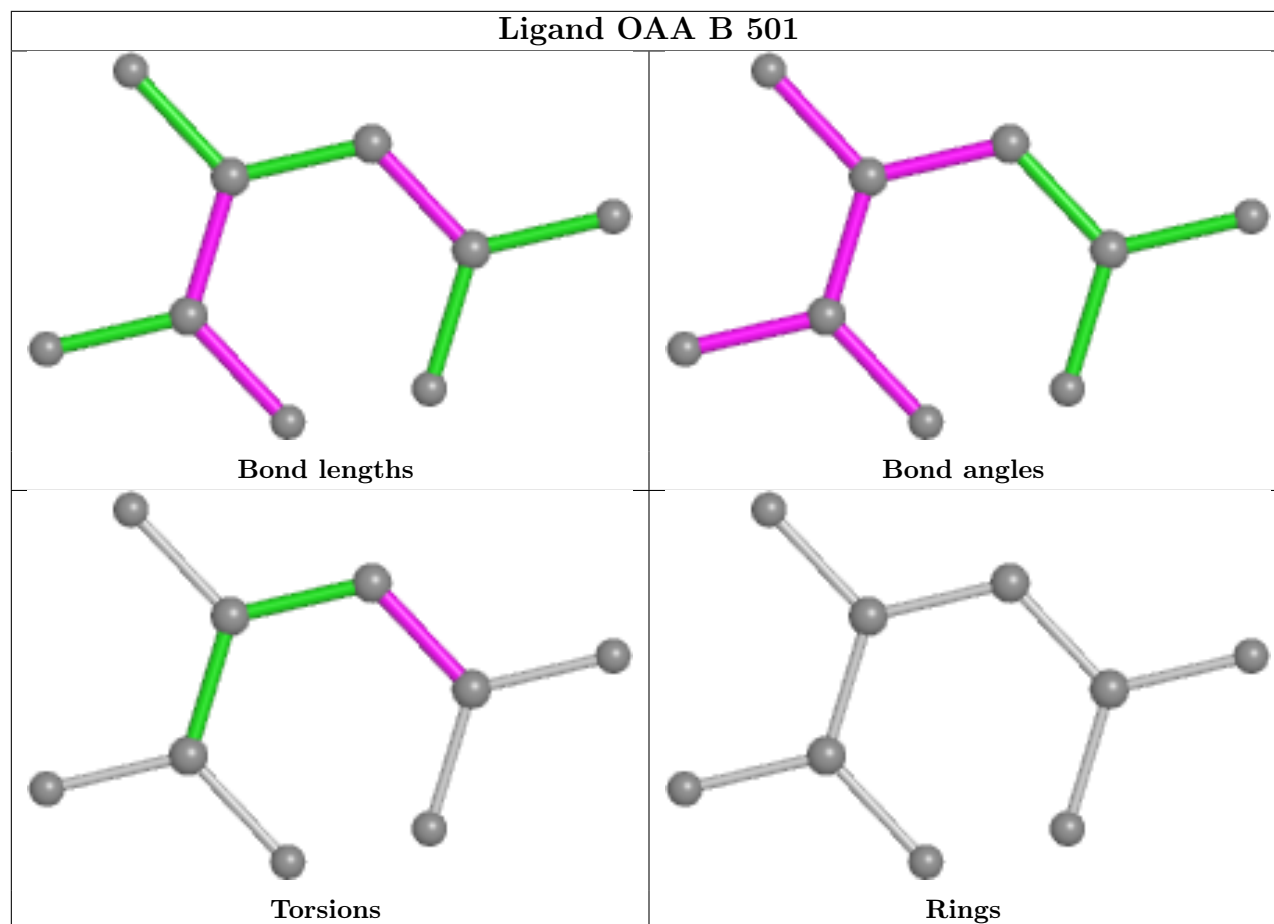
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In

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

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	448/449 (99%)	0.04	17 (3%) 44 46	23, 39, 69, 86	0
1	B	449/449 (100%)	0.19	11 (2%) 59 61	24, 40, 65, 112	0
1	C	442/449 (98%)	-0.20	2 (0%) 87 88	9, 36, 59, 85	1 (0%)
All	All	1339/1347 (99%)	0.01	30 (2%) 62 63	9, 38, 66, 112	1 (0%)

All (30) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	325	VAL	3.9
1	A	446	ALA	3.4
1	B	367	ALA	3.4
1	A	321	ALA	3.4
1	A	309	LEU	3.2
1	A	445	ALA	3.1
1	B	222	PHE	3.0
1	B	366	LYS	2.9
1	B	322	VAL	2.8
1	A	314	VAL	2.8
1	B	305	ALA	2.8
1	C	363	LYS	2.7
1	B	315	ILE	2.7
1	B	301	LEU	2.7
1	A	363	LYS	2.6
1	A	444	LEU	2.5
1	A	364	HIS	2.4
1	A	322	VAL	2.3
1	A	57	PRO	2.2
1	A	323	LEU	2.1
1	A	371	TRP	2.1
1	B	365	GLY	2.1
1	B	433	VAL	2.1

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Mol	Chain	Res	Type	RSRZ
1	C	299	GLU	2.1
1	B	207	LEU	2.1
1	B	1	MET	2.1
1	A	448	LEU	2.1
1	A	315	ILE	2.0
1	A	370	PRO	2.0
1	A	447	ALA	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](#)

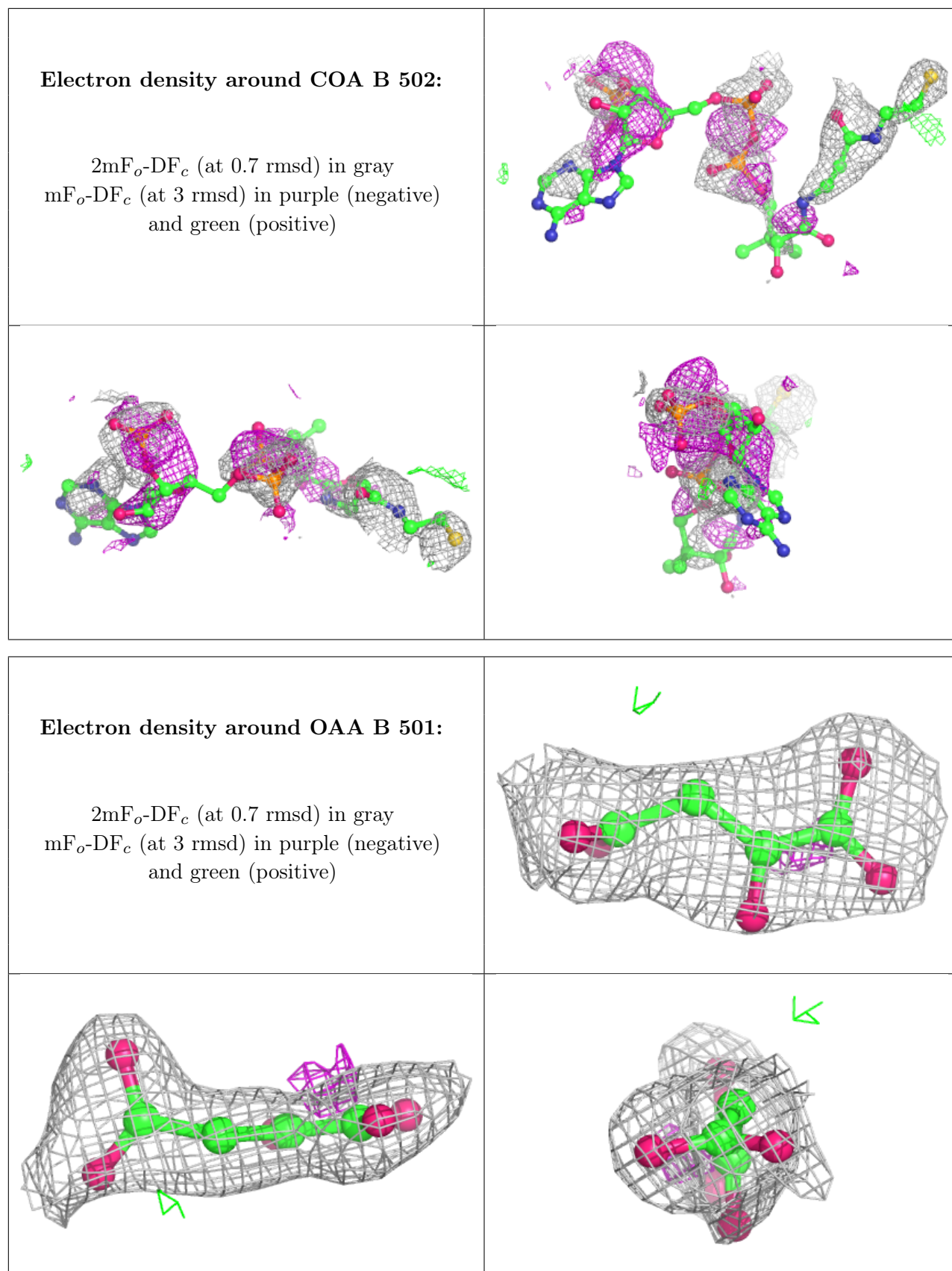
There are no monosaccharides in this entry.

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, 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.

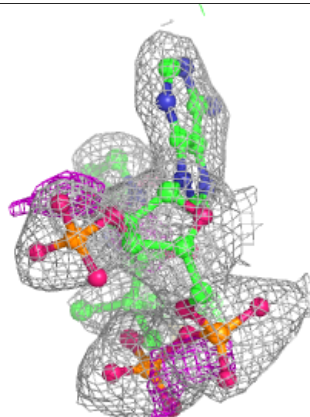
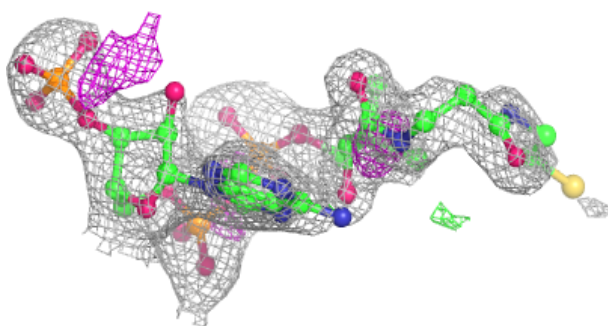
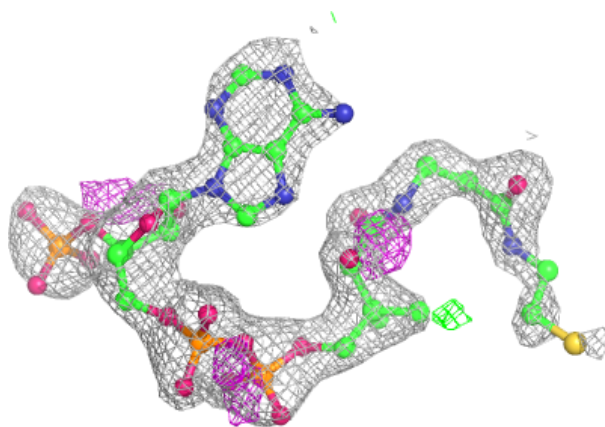
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	COA	B	502	48/48	0.56	0.18	74,112,152,160	0
2	OAA	B	501	9/9	0.78	0.14	55,74,76,82	0
3	COA	A	502	48/48	0.84	0.11	45,70,91,110	0
2	OAA	A	501	9/9	0.85	0.11	42,55,58,59	0
2	OAA	C	501	9/9	0.85	0.12	44,48,61,66	0
4	ACE	C	503	3/3	0.85	0.18	35,35,39,45	0
3	COA	C	502	48/48	0.92	0.08	37,47,67,75	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.



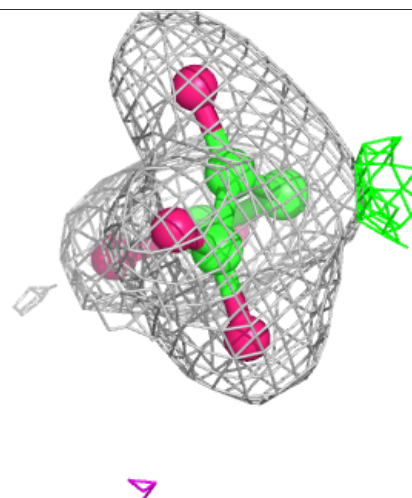
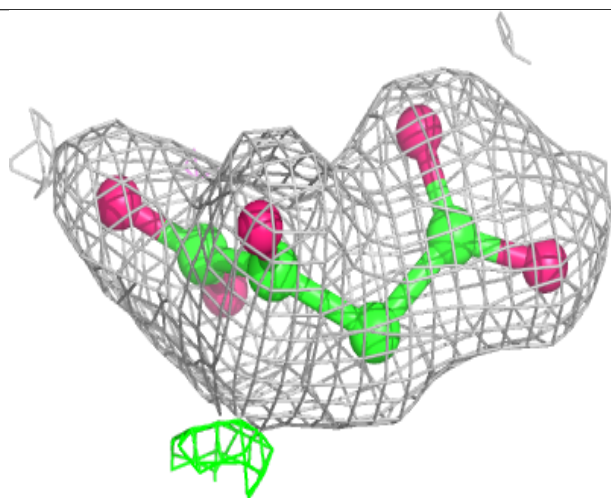
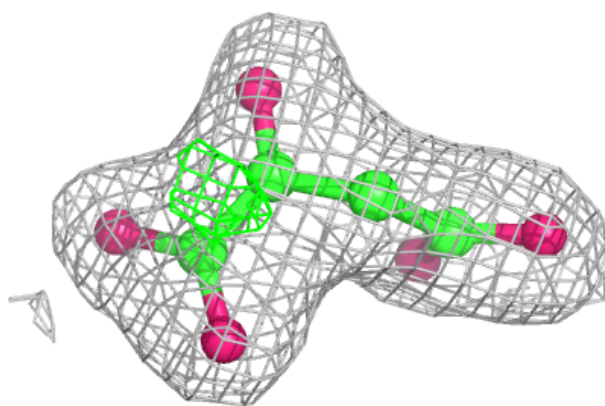
Electron density around COA A 502:

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



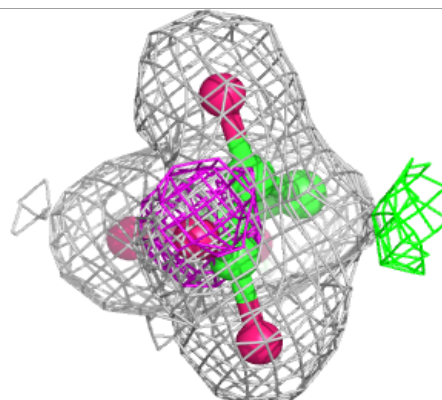
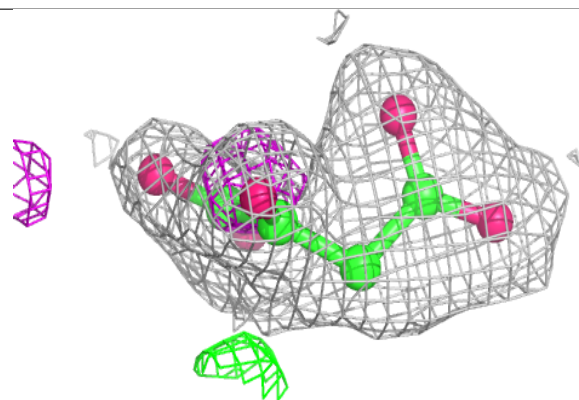
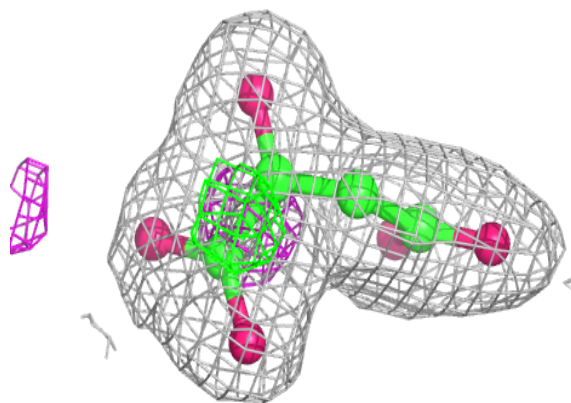
Electron density around OAA A 501:

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

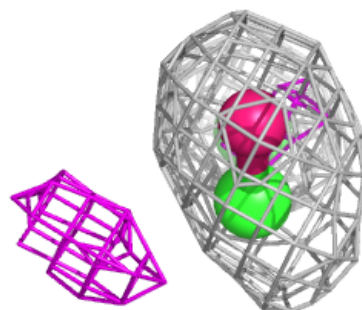
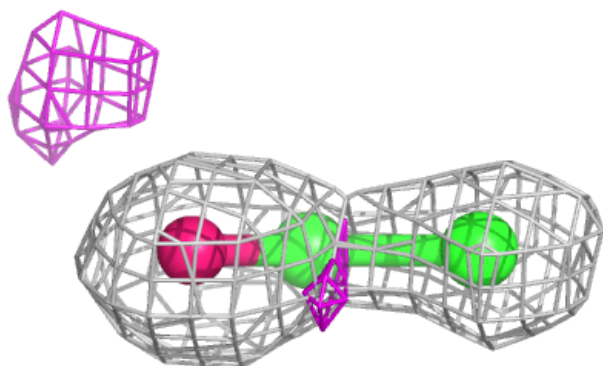
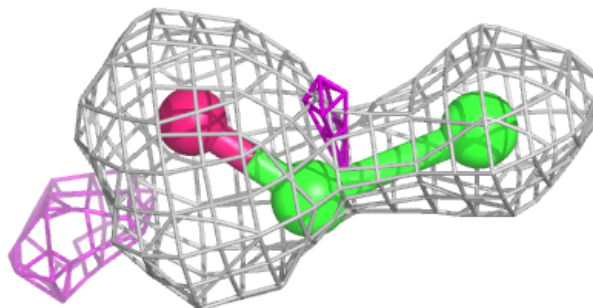


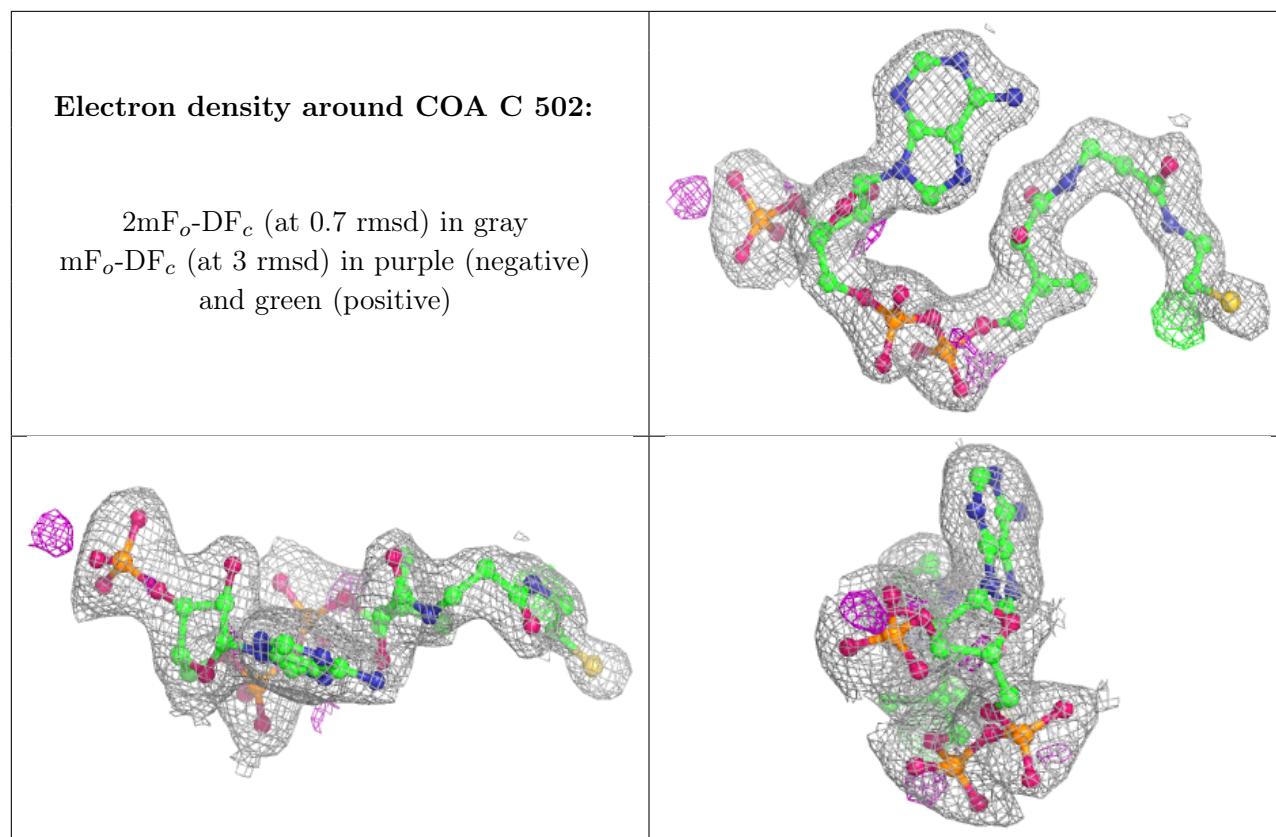
Electron density around OAA C 501:

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

**Electron density around ACE C 503:**

$2mF_o-DF_c$ (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.