



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 19, 2023 – 04:24 pm BST

PDB ID : 8AJI
Title : Crystal structure of DltE from *L. plantarum*, TCEP form
Authors : Ravaud, S.; Nikolopoulos, N.; Grangeasse, C.
Deposited on : 2022-07-28
Resolution : 1.94 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 : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.32.2
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) : 2.32.2

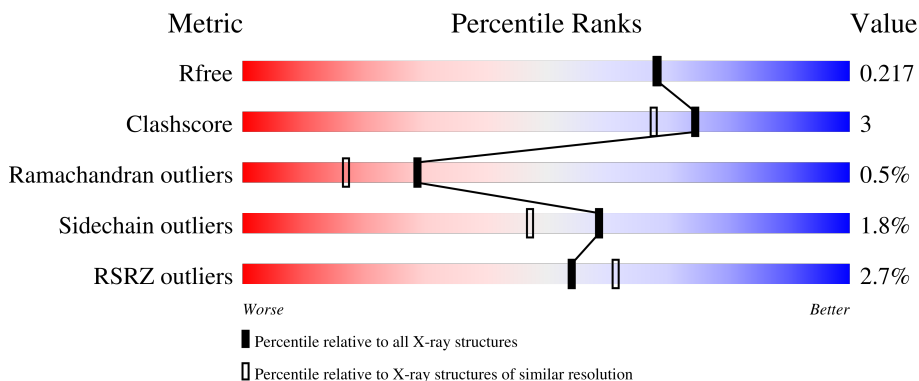
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.94 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	4310 (1.96-1.92)
Clashscore	141614	1023 (1.94-1.94)
Ramachandran outliers	138981	1007 (1.94-1.94)
Sidechain outliers	138945	1007 (1.94-1.94)
RSRZ outliers	127900	4250 (1.96-1.92)

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	374	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 89%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 7%; height: 10px; background-color: grey; margin-right: 2px;"></div> </div> <p style="margin-left: 20px;">2% 89% • 7%</p>
1	B	374	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 80%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 6%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 13%; height: 10px; background-color: grey; margin-right: 2px;"></div> </div> <p style="margin-left: 20px;">2% 80% 6% 13%</p>
1	C	374	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 82%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 6%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 11%; height: 10px; background-color: grey; margin-right: 2px;"></div> </div> <p style="margin-left: 20px;">2% 82% 6% • 11%</p>
1	D	374	<div style="display: flex; align-items: center;"> <div style="width: 4%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 87%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 8%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 8%; height: 10px; background-color: grey; margin-right: 2px;"></div> </div> <p style="margin-left: 20px;">4% 87% • • 8%</p>

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
2	TCE	B	501	-	-	X	-
3	TLA	A	503	-	-	-	X
3	TLA	C	502	-	X	X	-

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 11962 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 Beta-lactamase family protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	348	Total 2738	C 1735	N 478	O 514	S 11	0	4	0
1	B	324	Total 2566	C 1634	N 440	O 481	S 11	5	6	0
1	C	331	Total 2612	C 1659	N 453	O 490	S 10	0	5	0
1	D	344	Total 2694	C 1708	N 465	O 511	S 10	0	4	0

There are 40 discrepancies between the modelled and reference sequences:

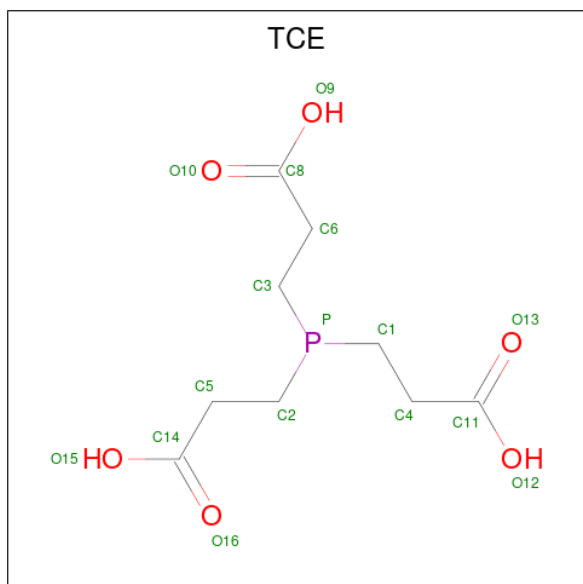
Chain	Residue	Modelled	Actual	Comment	Reference
A	32	MET	-	initiating methionine	UNP A0A0P7JVD2
A	33	ALA	-	expression tag	UNP A0A0P7JVD2
A	398	LEU	-	expression tag	UNP A0A0P7JVD2
A	399	GLU	-	expression tag	UNP A0A0P7JVD2
A	400	HIS	-	expression tag	UNP A0A0P7JVD2
A	401	HIS	-	expression tag	UNP A0A0P7JVD2
A	402	HIS	-	expression tag	UNP A0A0P7JVD2
A	403	HIS	-	expression tag	UNP A0A0P7JVD2
A	404	HIS	-	expression tag	UNP A0A0P7JVD2
A	405	HIS	-	expression tag	UNP A0A0P7JVD2
B	32	MET	-	initiating methionine	UNP A0A0P7JVD2
B	33	ALA	-	expression tag	UNP A0A0P7JVD2
B	398	LEU	-	expression tag	UNP A0A0P7JVD2
B	399	GLU	-	expression tag	UNP A0A0P7JVD2
B	400	HIS	-	expression tag	UNP A0A0P7JVD2
B	401	HIS	-	expression tag	UNP A0A0P7JVD2
B	402	HIS	-	expression tag	UNP A0A0P7JVD2
B	403	HIS	-	expression tag	UNP A0A0P7JVD2
B	404	HIS	-	expression tag	UNP A0A0P7JVD2
B	405	HIS	-	expression tag	UNP A0A0P7JVD2
C	32	MET	-	initiating methionine	UNP A0A0P7JVD2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	33	ALA	-	expression tag	UNP A0A0P7JVD2
C	398	LEU	-	expression tag	UNP A0A0P7JVD2
C	399	GLU	-	expression tag	UNP A0A0P7JVD2
C	400	HIS	-	expression tag	UNP A0A0P7JVD2
C	401	HIS	-	expression tag	UNP A0A0P7JVD2
C	402	HIS	-	expression tag	UNP A0A0P7JVD2
C	403	HIS	-	expression tag	UNP A0A0P7JVD2
C	404	HIS	-	expression tag	UNP A0A0P7JVD2
C	405	HIS	-	expression tag	UNP A0A0P7JVD2
D	32	MET	-	initiating methionine	UNP A0A0P7JVD2
D	33	ALA	-	expression tag	UNP A0A0P7JVD2
D	398	LEU	-	expression tag	UNP A0A0P7JVD2
D	399	GLU	-	expression tag	UNP A0A0P7JVD2
D	400	HIS	-	expression tag	UNP A0A0P7JVD2
D	401	HIS	-	expression tag	UNP A0A0P7JVD2
D	402	HIS	-	expression tag	UNP A0A0P7JVD2
D	403	HIS	-	expression tag	UNP A0A0P7JVD2
D	404	HIS	-	expression tag	UNP A0A0P7JVD2
D	405	HIS	-	expression tag	UNP A0A0P7JVD2

- Molecule 2 is 3,3',3''-phosphanetriyltripropanoic acid (three-letter code: TCE) (formula: C₉H₁₅O₆P) (labeled as "Ligand of Interest" by depositor).



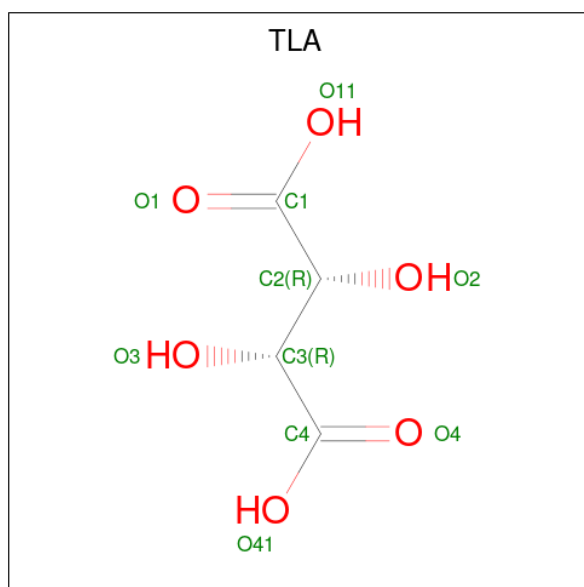
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
2	A	1	Total	C	O	P	0	0
			16	9	6	1		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	B	1	Total	C	O	P	0	0
			16	9	6	1		
2	C	1	Total	C	O	P	0	1
			32	18	12	2		
2	D	1	Total	C	O	P	0	0
			16	9	6	1		

- Molecule 3 is L(+)-TARTARIC ACID (three-letter code: TLA) (formula: C₄H₆O₆).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			10	4	6		
3	A	1	Total	C	O	0	0
			10	4	6		
3	B	1	Total	C	O	0	0
			10	4	6		
3	C	1	Total	C	O	0	0
			10	4	6		
3	D	1	Total	C	O	0	0
			10	4	6		

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 6 3 3	0	0
4	D	1	Total C O 6 3 3	0	0

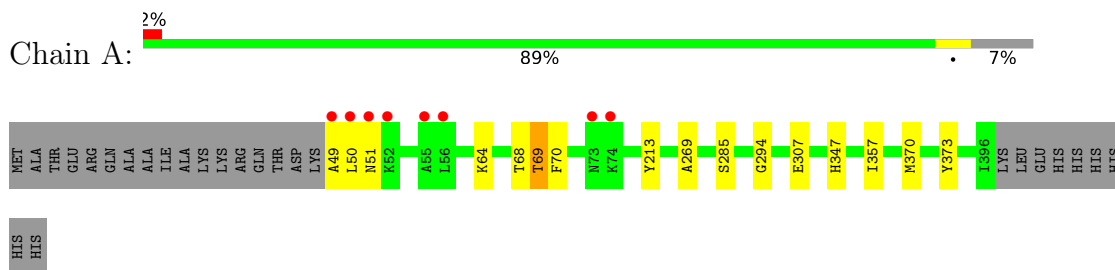
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	317	Total O 317 317	0	0
5	B	292	Total O 292 292	0	0
5	C	289	Total O 289 289	0	0
5	D	312	Total O 312 312	0	0

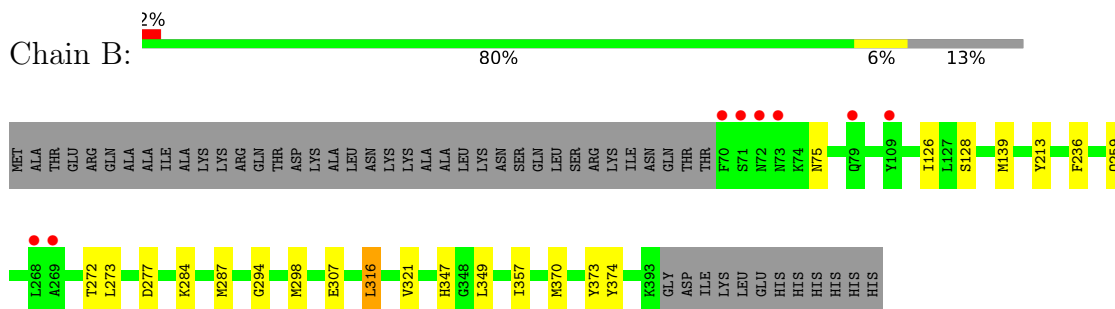
3 Residue-property plots [i](#)

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.

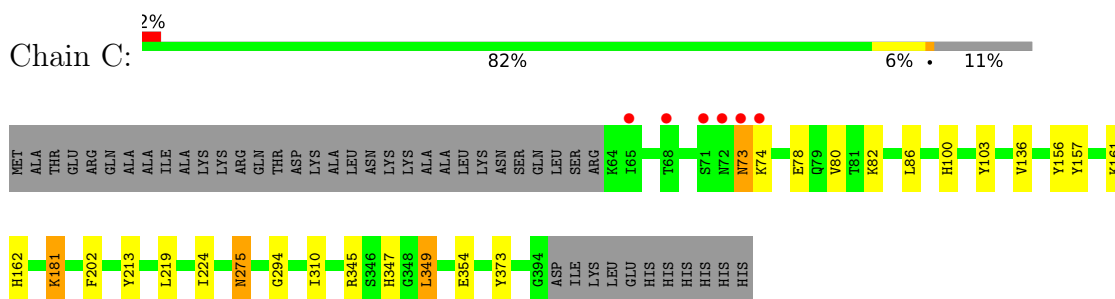
- Molecule 1: Beta-lactamase family protein



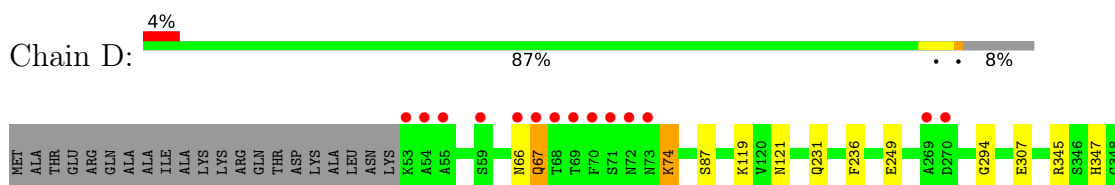
- Molecule 1: Beta-lactamase family protein



- Molecule 1: Beta-lactamase family protein



- Molecule 1: Beta-lactamase family protein



L349	
E354	
I357	
Y373	
I396	
LYS	
LEU	
GLU	
HIS	
HIS	
HIS	
HIS	
HIS	
HIS	

4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	76.24Å 98.64Å 135.93Å 90.00° 105.80° 90.00°	Depositor
Resolution (Å)	49.50 – 1.94 49.45 – 1.94	Depositor EDS
% Data completeness (in resolution range)	97.6 (49.50-1.94) 97.6 (49.45-1.94)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.32 (at 1.94Å)	Xtrriage
Refinement program	REFMAC 5.8.0352	Depositor
R, R_{free}	0.183 , 0.212 0.192 , 0.217	Depositor DCC
R_{free} test set	1994 reflections (1.43%)	wwPDB-VP
Wilson B-factor (Å ²)	21.7	Xtrriage
Anisotropy	0.097	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 42.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.018 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	11962	wwPDB-VP
Average B, all atoms (Å ²)	28.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.19% 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: TLA, TCE, GOL

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	0.46	0/2799	0.66	1/3773 (0.0%)
1	B	0.45	0/2633	0.64	1/3552 (0.0%)
1	C	0.46	0/2673	0.65	0/3605
1	D	0.46	0/2755	0.67	0/3719
All	All	0.46	0/10860	0.66	2/14649 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	370	MET	CG-SD-CE	-5.18	91.91	100.20
1	A	370	MET	CG-SD-CE	-5.16	91.94	100.20

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	2738	0	2760	8	0
1	B	2566	0	2588	22	0
1	C	2612	0	2627	24	0
1	D	2694	0	2694	9	0
2	A	16	0	12	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	16	0	12	8	0
2	C	32	0	24	6	0
2	D	16	0	12	2	0
3	A	20	0	8	0	0
3	B	10	0	4	0	0
3	C	10	0	4	4	0
3	D	10	0	4	0	0
4	A	6	0	8	0	0
4	D	6	0	8	0	0
5	A	317	0	0	0	0
5	B	292	0	0	1	0
5	C	289	0	0	1	0
5	D	312	0	0	2	0
All	All	11962	0	10765	68	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 (68) 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:275:ASN:O	1:C:275:ASN:ND2	2.04	0.90
2:C:501[B]:TCE:H4	2:C:501[B]:TCE:H6	1.57	0.86
1:C:347:HIS:ND1	2:C:501[B]:TCE:H6A	1.98	0.79
1:B:213:TYR:CE2	2:B:501:TCE:H6A	2.23	0.73
1:C:82:LYS:O	1:C:86:LEU:HD23	1.90	0.70
1:B:284:LYS:HA	1:B:287:MET:HE3	1.75	0.69
1:D:66:ASN:O	1:D:67:GLN:HG2	1.93	0.68
1:B:139:MET:HB3	1:B:316[A]:LEU:HD11	1.76	0.68
1:D:345:ARG:NH1	2:D:501:TCE:O9	2.29	0.66
1:D:347:HIS:ND1	2:D:501:TCE:H6	2.11	0.66
1:B:349:LEU:HD21	1:B:374:TYR:CE1	2.32	0.65
1:C:157:TYR:CE2	1:C:224[A]:ILE:HD11	2.31	0.65
1:A:49:ALA:N	1:A:51:ASN:OD1	2.34	0.60
2:C:501[A]:TCE:O10	2:C:501[A]:TCE:H2A	2.01	0.60
1:B:273:LEU:HD13	1:C:181:LYS:HE2	1.85	0.59
1:A:69:THR:O	1:A:70:PHE:HB2	2.03	0.58
1:C:157:TYR:HE2	1:C:224[A]:ILE:HD11	1.66	0.57
1:B:347:HIS:HB3	2:B:501:TCE:H4A	1.87	0.56
2:A:501:TCE:H6A	2:A:501:TCE:C4	2.34	0.56
1:C:80[A]:VAL:CG2	1:C:103:TYR:CE1	2.90	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:181:LYS:HD2	1:C:202:PHE:CD2	2.42	0.55
1:B:349:LEU:HB2	2:B:501:TCE:H5A	1.87	0.54
1:C:275:ASN:HB3	5:C:631:HOH:O	2.08	0.54
1:B:277:ASP:OD2	3:C:502:TLA:H3	2.08	0.53
1:A:64:LYS:O	1:A:68:THR:HG23	2.09	0.53
1:B:349:LEU:HD21	1:B:374:TYR:CD1	2.44	0.52
1:C:80[A]:VAL:HG22	1:C:103:TYR:CE1	2.44	0.52
1:C:347:HIS:O	2:C:501[A]:TCE:H1A	2.11	0.51
1:B:347:HIS:O	2:B:501:TCE:H3A	2.11	0.50
1:D:349:LEU:HD23	1:D:354:GLU:HG3	1.95	0.49
1:C:213:TYR:CE1	2:C:501[B]:TCE:H4A	2.46	0.49
1:B:349:LEU:HD21	1:B:374:TYR:CZ	2.47	0.48
1:C:156:TYR:CB	1:C:224[A]:ILE:HD12	2.43	0.48
1:D:74:LYS:HA	1:D:74:LYS:CE	2.43	0.48
1:C:181:LYS:H	1:C:181:LYS:CE	2.27	0.48
2:A:501:TCE:H6A	2:A:501:TCE:H4	1.95	0.48
1:B:284:LYS:HA	1:B:287:MET:CE	2.43	0.47
1:C:181:LYS:HE3	1:C:202:PHE:CZ	2.49	0.47
1:A:347:HIS:O	2:A:501:TCE:H6A	2.16	0.46
1:C:136:VAL:HG21	1:C:310:ILE:HD13	1.96	0.46
2:B:501:TCE:H4	2:B:501:TCE:H6	1.97	0.46
1:D:121:ASN:HB2	1:D:249:GLU:OE2	2.15	0.46
1:D:231:GLN:HB2	5:D:747:HOH:O	2.14	0.46
1:B:213:TYR:HE2	2:B:501:TCE:H6A	1.75	0.45
1:B:277:ASP:O	1:C:161:LYS:HE2	2.17	0.45
1:B:277:ASP:OD1	3:C:502:TLA:H3	2.16	0.45
1:C:162:HIS:N	3:C:502:TLA:O3	2.40	0.45
1:C:181:LYS:N	1:C:181:LYS:HD3	2.32	0.44
1:B:128:SER:OG	2:B:501:TCE:C14	2.65	0.44
1:B:277:ASP:CG	3:C:502:TLA:H3	2.38	0.44
1:B:347:HIS:ND1	2:B:501:TCE:H4A	2.33	0.44
1:C:181:LYS:HE2	1:C:181:LYS:H	1.83	0.43
1:A:213:TYR:CE2	2:A:501:TCE:H6	2.53	0.43
2:A:501:TCE:H6A	2:A:501:TCE:H4A	2.00	0.42
1:C:219:LEU:C	1:C:219:LEU:HD23	2.40	0.42
1:B:316[B]:LEU:HD23	1:B:321:VAL:HG22	2.02	0.42
1:D:119:LYS:NZ	5:D:612:HOH:O	2.50	0.41
1:D:307:GLU:HG3	1:D:357:ILE:HD13	2.02	0.41
1:C:181:LYS:N	1:C:181:LYS:CD	2.83	0.41
1:B:126:ILE:HG21	1:B:298[A]:MET:SD	2.61	0.41
1:B:259:GLN:HG2	5:B:629:HOH:O	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:307:GLU:HG3	1:B:357:ILE:HD13	2.01	0.41
1:A:50:LEU:HB2	1:A:269:ALA:HB1	2.02	0.41
1:A:347:HIS:N	2:A:501:TCE:O10	2.52	0.41
1:C:156:TYR:CG	1:C:224[A]:ILE:HD12	2.55	0.41
1:A:307:GLU:HG3	1:A:357:ILE:HD13	2.02	0.41
2:C:501[B]:TCE:H6	2:C:501[B]:TCE:C4	2.33	0.40
1:C:349:LEU:CD1	1:C:354:GLU:HG3	2.52	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	350/374 (94%)	337 (96%)	11 (3%)	2 (1%)	25 13
1	B	328/374 (88%)	319 (97%)	8 (2%)	1 (0%)	41 32
1	C	334/374 (89%)	319 (96%)	13 (4%)	2 (1%)	25 13
1	D	346/374 (92%)	336 (97%)	8 (2%)	2 (1%)	25 13
All	All	1358/1496 (91%)	1311 (96%)	40 (3%)	7 (0%)	29 17

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	67	GLN
1	A	294	GLY
1	C	73	ASN
1	A	69	THR
1	B	294	GLY
1	C	294	GLY
1	D	294	GLY

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	296/316 (94%)	294 (99%)	2 (1%)	84	81
1	B	280/316 (89%)	273 (98%)	7 (2%)	47	35
1	C	283/316 (90%)	273 (96%)	10 (4%)	36	21
1	D	291/316 (92%)	287 (99%)	4 (1%)	67	58
All	All	1150/1264 (91%)	1127 (98%)	23 (2%)	59	42

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	285	SER
1	A	373	TYR
1	B	75	ASN
1	B	236	PHE
1	B	272[A]	THR
1	B	272[B]	THR
1	B	316[A]	LEU
1	B	316[B]	LEU
1	B	373	TYR
1	C	73	ASN
1	C	74	LYS
1	C	78	GLU
1	C	100	HIS
1	C	181	LYS
1	C	275	ASN
1	C	345[A]	ARG
1	C	345[B]	ARG
1	C	349	LEU
1	C	373	TYR
1	D	74	LYS
1	D	87	SER
1	D	236	PHE
1	D	373	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	200	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

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
3	TLA	C	502	-	9,9,9	0.91	0	12,12,12	1.34	2 (16%)
3	TLA	D	502	-	9,9,9	1.15	0	12,12,12	1.08	0
2	TCE	C	501[B]	-	12,15,15	1.76	3 (25%)	12,18,18	1.63	2 (16%)
2	TCE	A	501	-	12,15,15	3.33	2 (16%)	12,18,18	2.64	4 (33%)
4	GOL	A	504	-	5,5,5	0.23	0	5,5,5	0.31	0
3	TLA	A	503	-	9,9,9	1.37	1 (11%)	12,12,12	0.88	0
3	TLA	B	502	-	9,9,9	0.99	0	12,12,12	1.23	2 (16%)
4	GOL	D	503	-	5,5,5	0.14	0	5,5,5	0.39	0
2	TCE	D	501	-	12,15,15	1.58	2 (16%)	12,18,18	2.29	3 (25%)
2	TCE	C	501[A]	-	12,15,15	1.63	3 (25%)	12,18,18	1.53	1 (8%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	TLA	A	502	-	9,9,9	1.12	0	12,12,12	1.02	0
2	TCE	B	501	-	12,15,15	1.83	3 (25%)	12,18,18	1.97	3 (25%)

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	TLA	C	502	-	-	12/12/12/12	-
3	TLA	D	502	-	-	4/12/12/12	-
2	TCE	C	501[B]	-	-	11/15/15/15	-
2	TCE	A	501	-	-	9/15/15/15	-
4	GOL	A	504	-	-	1/4/4/4	-
3	TLA	A	503	-	-	8/12/12/12	-
3	TLA	B	502	-	-	0/12/12/12	-
4	GOL	D	503	-	-	2/4/4/4	-
2	TCE	D	501	-	-	11/15/15/15	-
2	TCE	C	501[A]	-	-	8/15/15/15	-
3	TLA	A	502	-	-	0/12/12/12	-
2	TCE	B	501	-	-	11/15/15/15	-

All (14) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	TCE	P-C2	10.48	1.99	1.84
2	D	501	TCE	P-C1	3.70	1.89	1.84
2	B	501	TCE	P-C3	3.46	1.89	1.84
2	A	501	TCE	P-C3	3.44	1.89	1.84
2	B	501	TCE	P-C1	3.24	1.89	1.84
2	C	501[B]	TCE	P-C2	3.06	1.88	1.84
2	C	501[A]	TCE	P-C2	2.74	1.88	1.84
2	C	501[B]	TCE	P-C1	2.67	1.88	1.84
2	D	501	TCE	P-C3	2.57	1.88	1.84
2	C	501[B]	TCE	O16-C14	2.34	1.29	1.22
2	B	501	TCE	P-C2	2.28	1.87	1.84
3	A	503	TLA	C2-C1	2.23	1.55	1.52
2	C	501[A]	TCE	O9-C8	-2.20	1.23	1.30
2	C	501[A]	TCE	O16-C14	2.06	1.29	1.22

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	TCE	C3-P-C2	5.50	118.48	100.95
2	D	501	TCE	C1-P-C2	5.36	118.04	100.95
2	A	501	TCE	C1-P-C3	5.03	116.99	100.95
2	B	501	TCE	C1-P-C3	4.52	115.36	100.95
2	A	501	TCE	C1-P-C2	3.72	112.81	100.95
2	C	501[A]	TCE	C3-P-C2	3.45	111.94	100.95
2	C	501[B]	TCE	C1-P-C3	3.22	111.22	100.95
2	D	501	TCE	C1-P-C3	3.14	110.96	100.95
2	D	501	TCE	C3-P-C2	3.01	110.54	100.95
2	C	501[B]	TCE	C3-P-C2	2.95	110.36	100.95
3	C	502	TLA	O11-C1-C2	2.52	120.10	113.27
2	B	501	TCE	O16-C14-C5	-2.44	115.23	123.08
2	B	501	TCE	C1-P-C2	2.44	108.71	100.95
3	C	502	TLA	O1-C1-C2	-2.15	115.99	121.63
2	A	501	TCE	O13-C11-C4	-2.15	116.18	123.08
3	B	502	TLA	O4-C4-C3	-2.04	116.28	121.63
3	B	502	TLA	O11-C1-C2	2.03	118.75	113.27

There are no chirality outliers.

All (77) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	TCE	C5-C2-P-C3
2	A	501	TCE	C6-C3-P-C2
2	A	501	TCE	C6-C3-P-C1
2	A	501	TCE	C4-C1-P-C2
2	B	501	TCE	P-C2-C5-C14
2	B	501	TCE	C5-C2-P-C3
2	B	501	TCE	C5-C2-P-C1
2	B	501	TCE	C4-C1-P-C2
2	B	501	TCE	C4-C1-P-C3
2	B	501	TCE	P-C1-C4-C11
2	C	501[A]	TCE	C5-C2-P-C3
2	C	501[A]	TCE	C5-C2-P-C1
2	C	501[A]	TCE	P-C3-C6-C8
2	C	501[B]	TCE	C5-C2-P-C3
2	C	501[B]	TCE	C5-C2-P-C1
2	C	501[B]	TCE	C6-C3-P-C2
2	C	501[B]	TCE	C6-C3-P-C1
2	C	501[B]	TCE	O13-C11-C4-C1
2	D	501	TCE	C5-C2-P-C3

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Mol	Chain	Res	Type	Atoms
2	D	501	TCE	C5-C2-P-C1
2	D	501	TCE	C4-C1-P-C2
2	D	501	TCE	C4-C1-P-C3
3	A	503	TLA	O1-C1-C2-O2
3	A	503	TLA	O1-C1-C2-C3
3	A	503	TLA	O11-C1-C2-C3
3	C	502	TLA	C1-C2-C3-O3
3	C	502	TLA	O2-C2-C3-C4
3	C	502	TLA	C1-C2-C3-C4
3	A	503	TLA	O11-C1-C2-O2
3	A	503	TLA	O3-C3-C4-O4
3	A	503	TLA	O3-C3-C4-O41
3	C	502	TLA	O1-C1-C2-O2
3	C	502	TLA	O11-C1-C2-O2
3	C	502	TLA	O2-C2-C3-O3
3	C	502	TLA	O11-C1-C2-C3
4	D	503	GOL	C1-C2-C3-O3
2	A	501	TCE	O12-C11-C4-C1
2	C	501[A]	TCE	C3-C6-C8-O10
2	C	501[A]	TCE	O13-C11-C4-C1
2	D	501	TCE	C3-C6-C8-O10
3	C	502	TLA	O1-C1-C2-C3
3	C	502	TLA	C2-C3-C4-O4
3	A	503	TLA	C2-C3-C4-O4
3	A	503	TLA	C2-C3-C4-O41
3	C	502	TLA	C2-C3-C4-O41
2	A	501	TCE	O13-C11-C4-C1
2	B	501	TCE	C3-C6-C8-O9
2	C	501[A]	TCE	C3-C6-C8-O9
2	D	501	TCE	C3-C6-C8-O9
2	A	501	TCE	C4-C1-P-C3
2	A	501	TCE	P-C2-C5-C14
2	A	501	TCE	P-C1-C4-C11
2	B	501	TCE	P-C3-C6-C8
2	C	501[B]	TCE	P-C2-C5-C14
2	C	501[B]	TCE	P-C3-C6-C8
2	D	501	TCE	P-C2-C5-C14
2	D	501	TCE	P-C3-C6-C8
2	D	501	TCE	P-C1-C4-C11
2	B	501	TCE	C3-C6-C8-O10
3	C	502	TLA	O3-C3-C4-O4
3	D	502	TLA	O1-C1-C2-C3

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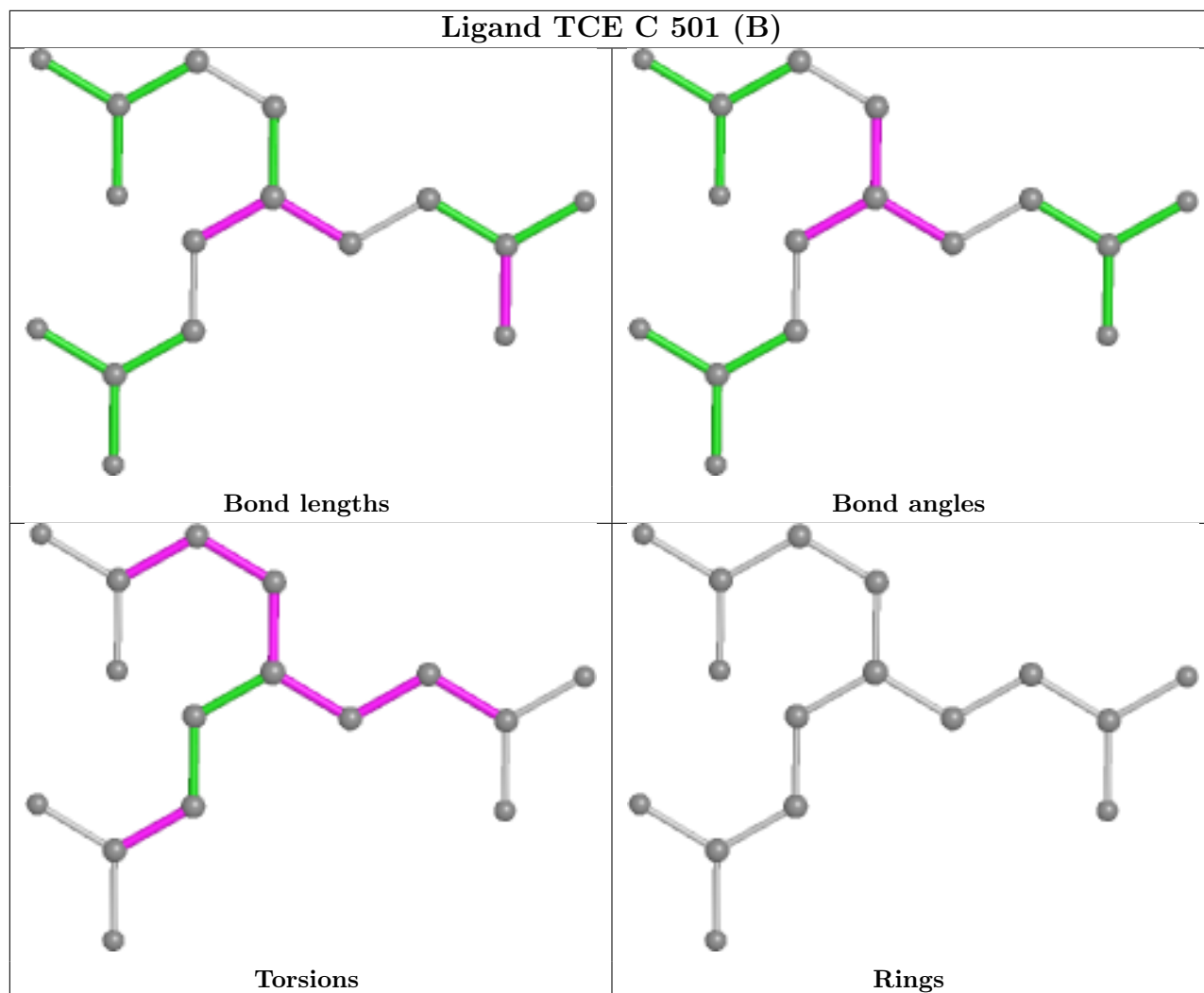
Mol	Chain	Res	Type	Atoms
3	C	502	TLA	O3-C3-C4-O41
3	D	502	TLA	O11-C1-C2-C3
2	B	501	TCE	O12-C11-C4-C1
2	C	501[A]	TCE	O12-C11-C4-C1
2	C	501[B]	TCE	C3-C6-C8-O10
2	C	501[B]	TCE	C3-C6-C8-O9
2	C	501[B]	TCE	O12-C11-C4-C1
2	D	501	TCE	O15-C14-C5-C2
4	D	503	GOL	O2-C2-C3-O3
3	D	502	TLA	O11-C1-C2-O2
3	D	502	TLA	O1-C1-C2-O2
2	B	501	TCE	O13-C11-C4-C1
2	D	501	TCE	O16-C14-C5-C2
4	A	504	GOL	O2-C2-C3-O3
2	C	501[A]	TCE	O15-C14-C5-C2
2	C	501[B]	TCE	O15-C14-C5-C2

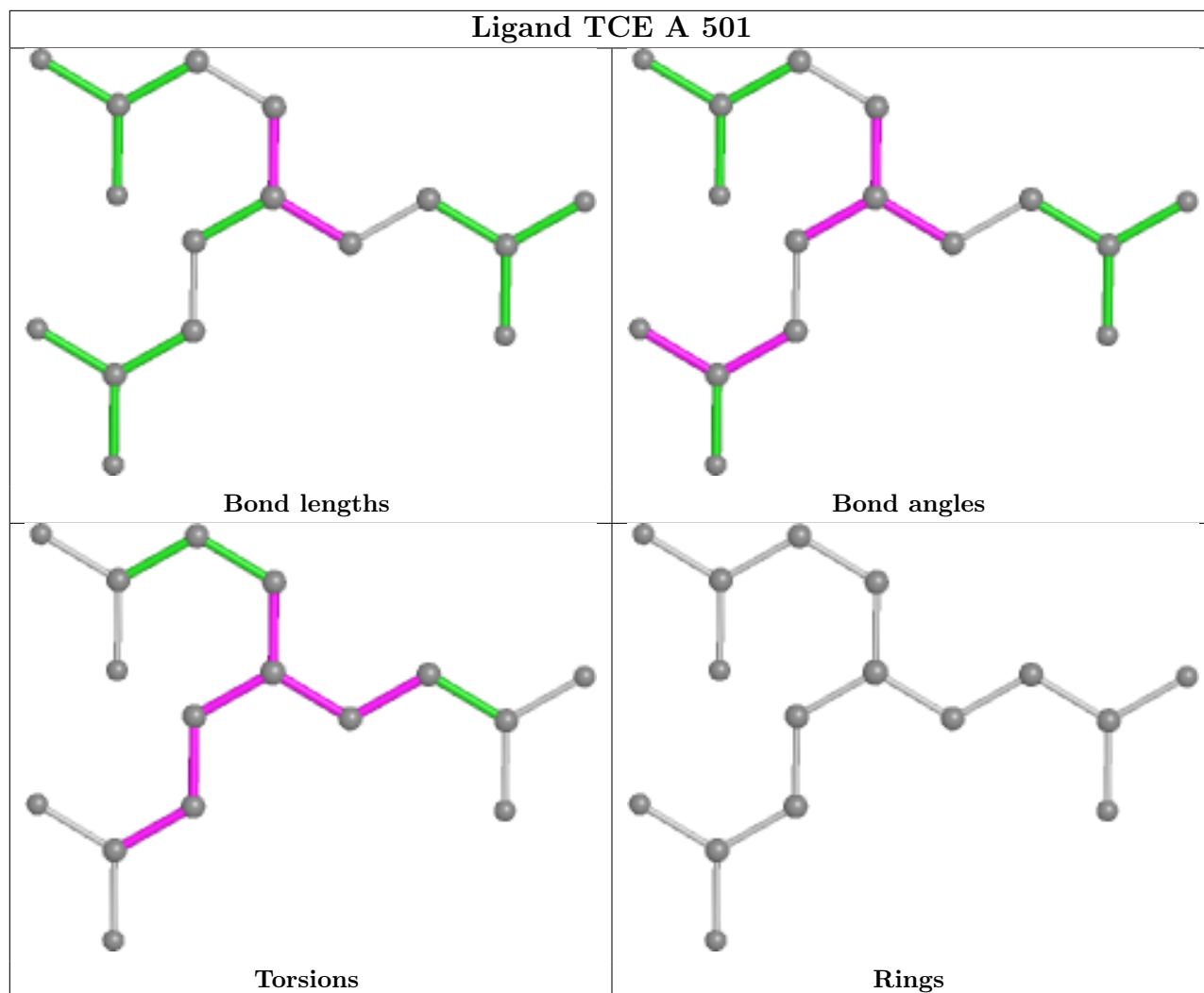
There are no ring outliers.

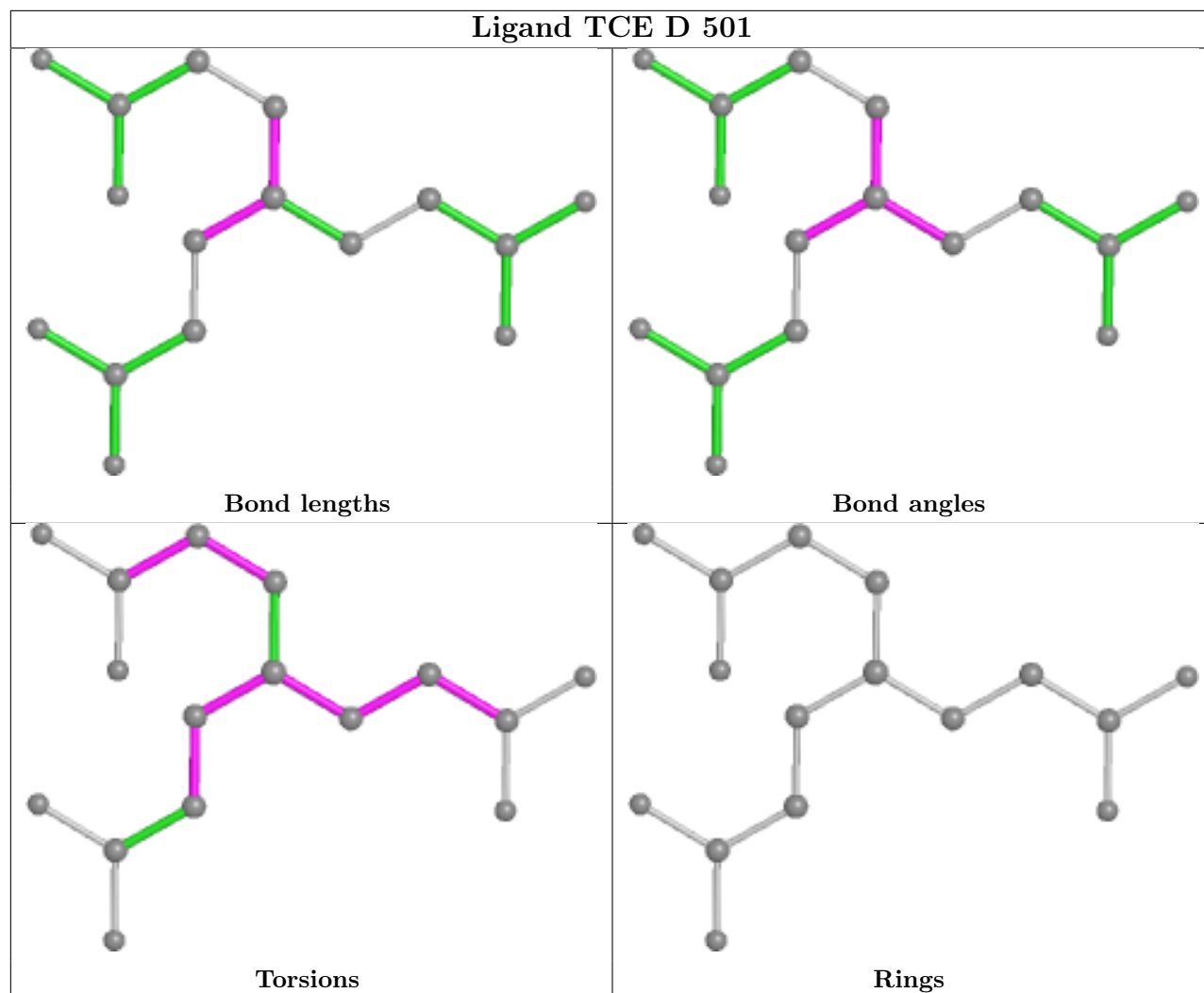
6 monomers are involved in 26 short contacts:

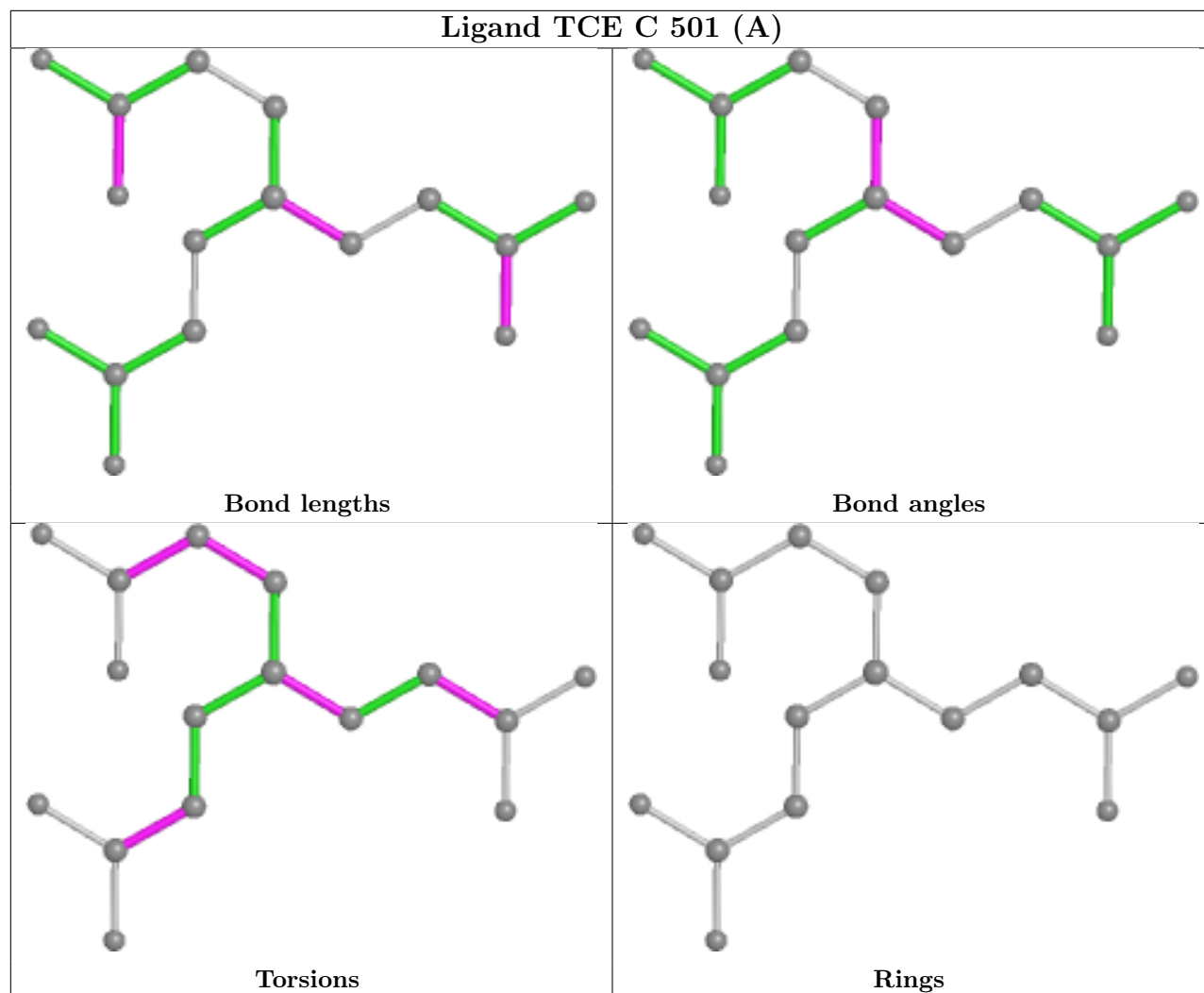
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	502	TLA	4	0
2	C	501[B]	TCE	4	0
2	A	501	TCE	6	0
2	D	501	TCE	2	0
2	C	501[A]	TCE	2	0
2	B	501	TCE	8	0

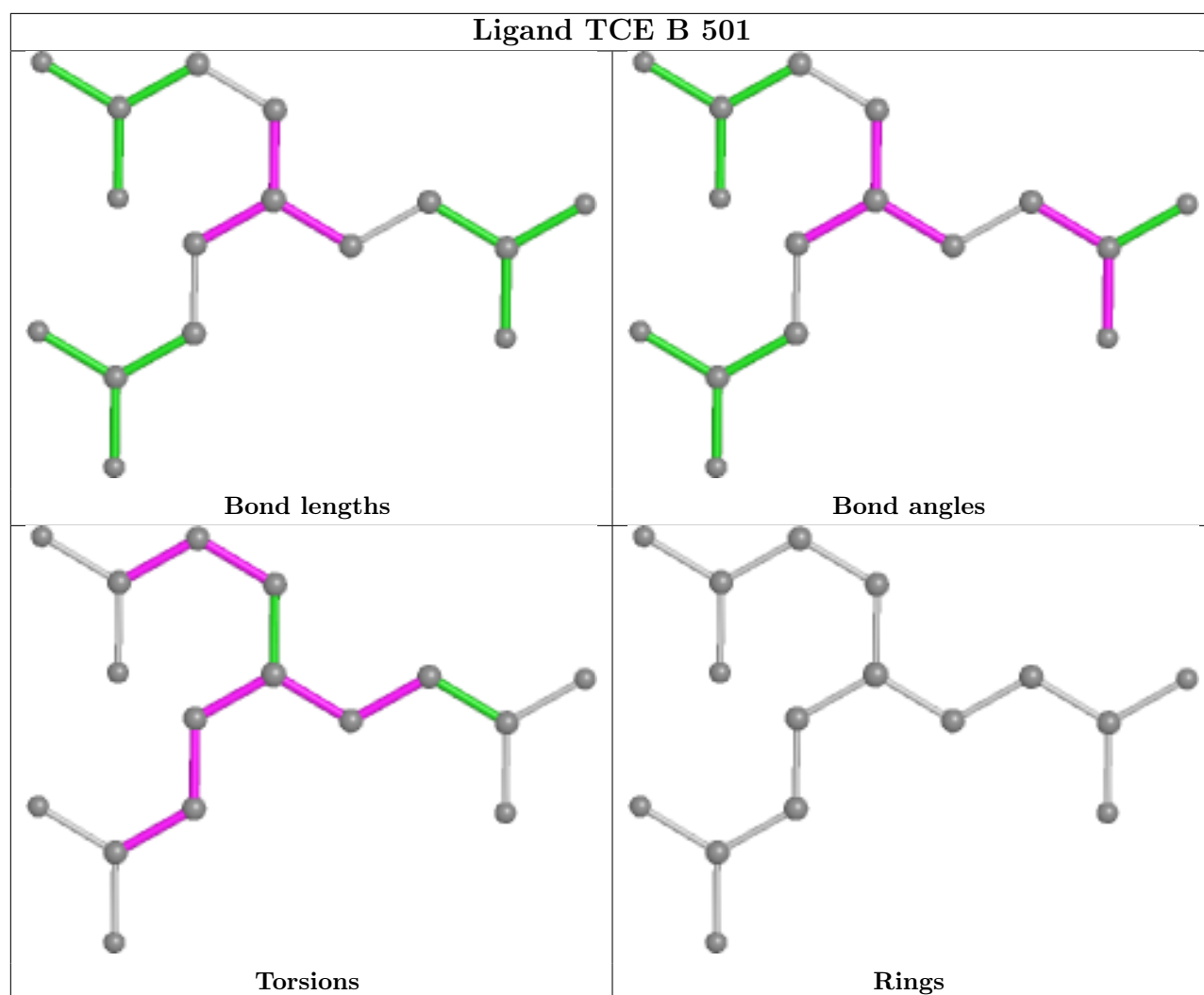
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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	348/374 (93%)	-0.00	8 (2%) 60 67	14, 23, 51, 85	0
1	B	324/374 (86%)	-0.14	8 (2%) 57 64	13, 23, 47, 83	0
1	C	331/374 (88%)	-0.12	6 (1%) 68 74	14, 24, 47, 93	0
1	D	344/374 (91%)	-0.01	14 (4%) 37 44	14, 22, 56, 83	0
All	All	1347/1496 (90%)	-0.07	36 (2%) 54 61	13, 23, 52, 93	0

All (36) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	73	ASN	6.3
1	D	69	THR	5.5
1	A	50	LEU	5.2
1	A	73	ASN	5.0
1	B	71	SER	4.5
1	B	72	ASN	4.0
1	C	68	THR	4.0
1	A	56	LEU	4.0
1	D	68	THR	3.9
1	D	67	GLN	3.6
1	D	54	ALA	3.4
1	B	70	PHE	3.4
1	A	52	LYS	3.3
1	A	74	LYS	3.3
1	D	55	ALA	3.2
1	A	49	ALA	3.0
1	D	269	ALA	3.0
1	B	269	ALA	2.8
1	B	268	LEU	2.8
1	D	53	LYS	2.7
1	D	59	SER	2.7

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Mol	Chain	Res	Type	RSRZ
1	C	65	ILE	2.6
1	B	73	ASN	2.6
1	C	71	SER	2.5
1	D	270	ASP	2.5
1	A	55	ALA	2.4
1	C	73	ASN	2.4
1	D	70	PHE	2.3
1	D	71	SER	2.3
1	C	72	ASN	2.3
1	B	109	TYR	2.2
1	D	72	ASN	2.2
1	D	66	ASN	2.1
1	B	79	GLN	2.1
1	C	74	LYS	2.1
1	A	51	ASN	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.

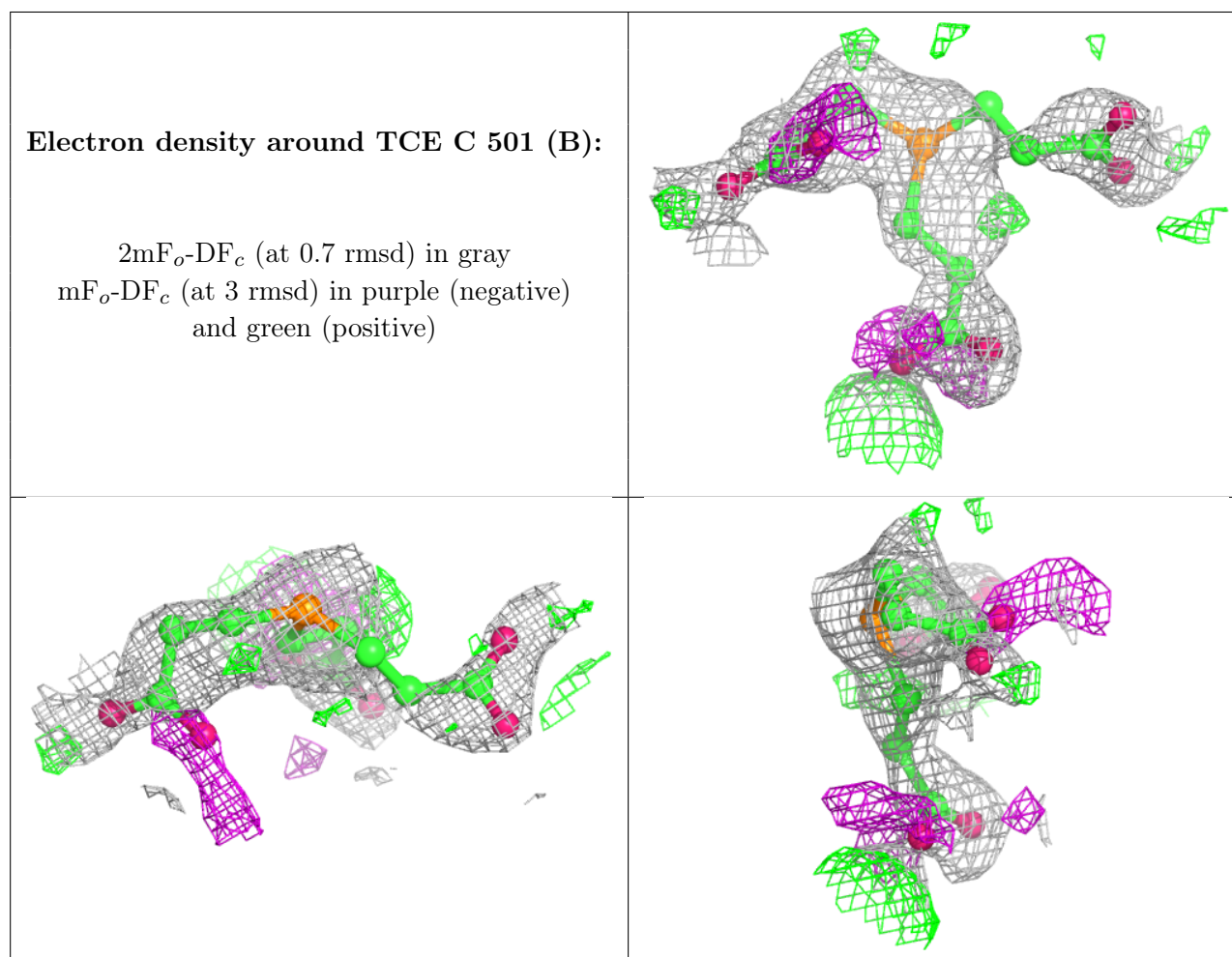
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q < 0.9
3	TLA	A	503	10/10	0.65	0.46	72,94,117,120	0
2	TCE	C	501[B]	16/16	0.71	0.31	38,46,54,60	16
2	TCE	C	501[A]	16/16	0.71	0.31	38,46,55,62	16
2	TCE	D	501	16/16	0.75	0.21	39,58,71,73	0
2	TCE	A	501	16/16	0.77	0.23	39,53,60,63	0
2	TCE	B	501	16/16	0.81	0.25	48,55,60,61	0
4	GOL	A	504	6/6	0.83	0.21	41,53,63,75	0
3	TLA	C	502	10/10	0.87	0.45	57,60,64,69	0

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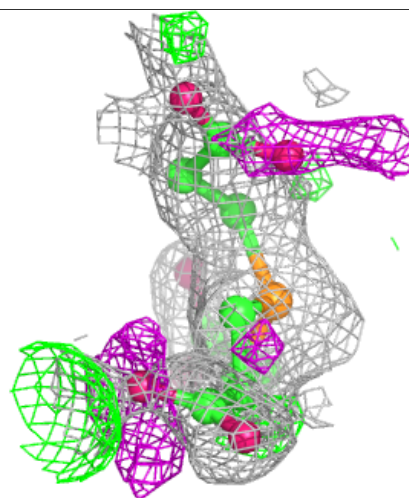
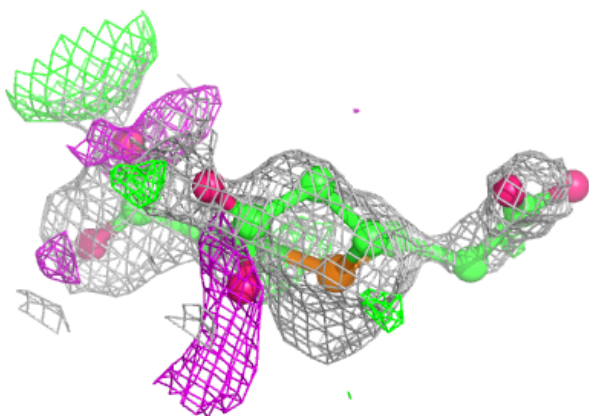
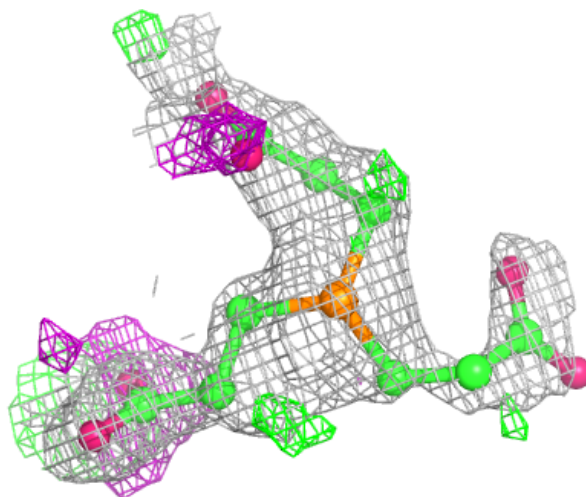
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	TLA	A	502	10/10	0.90	0.12	44,54,56,56	0
3	TLA	B	502	10/10	0.91	0.16	28,43,48,49	0
3	TLA	D	502	10/10	0.93	0.12	32,41,50,52	0
4	GOL	D	503	6/6	0.94	0.17	31,34,35,37	0

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.



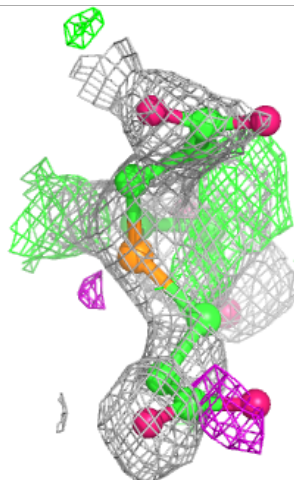
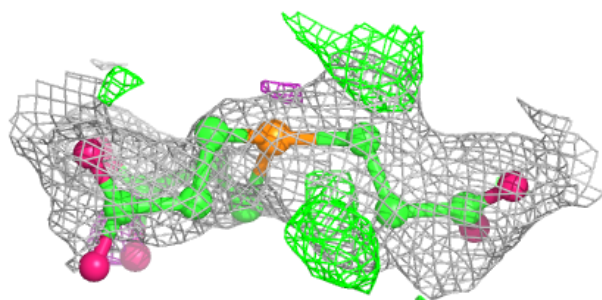
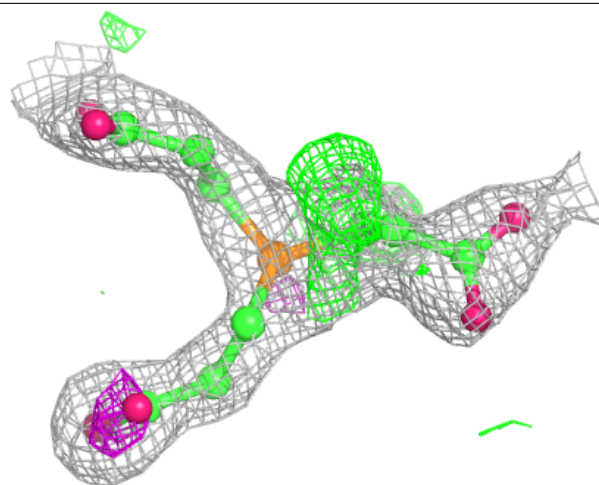
Electron density around TCE C 501 (A):

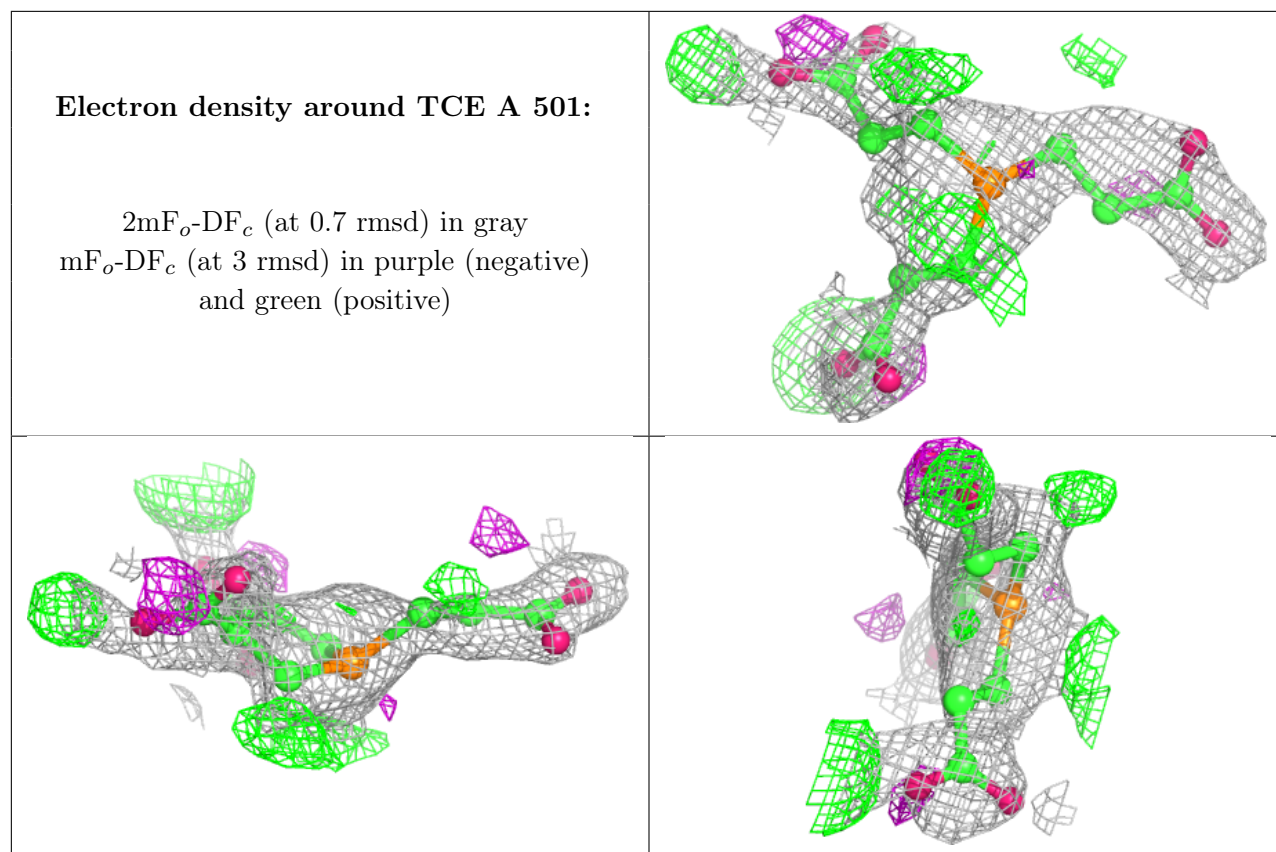
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

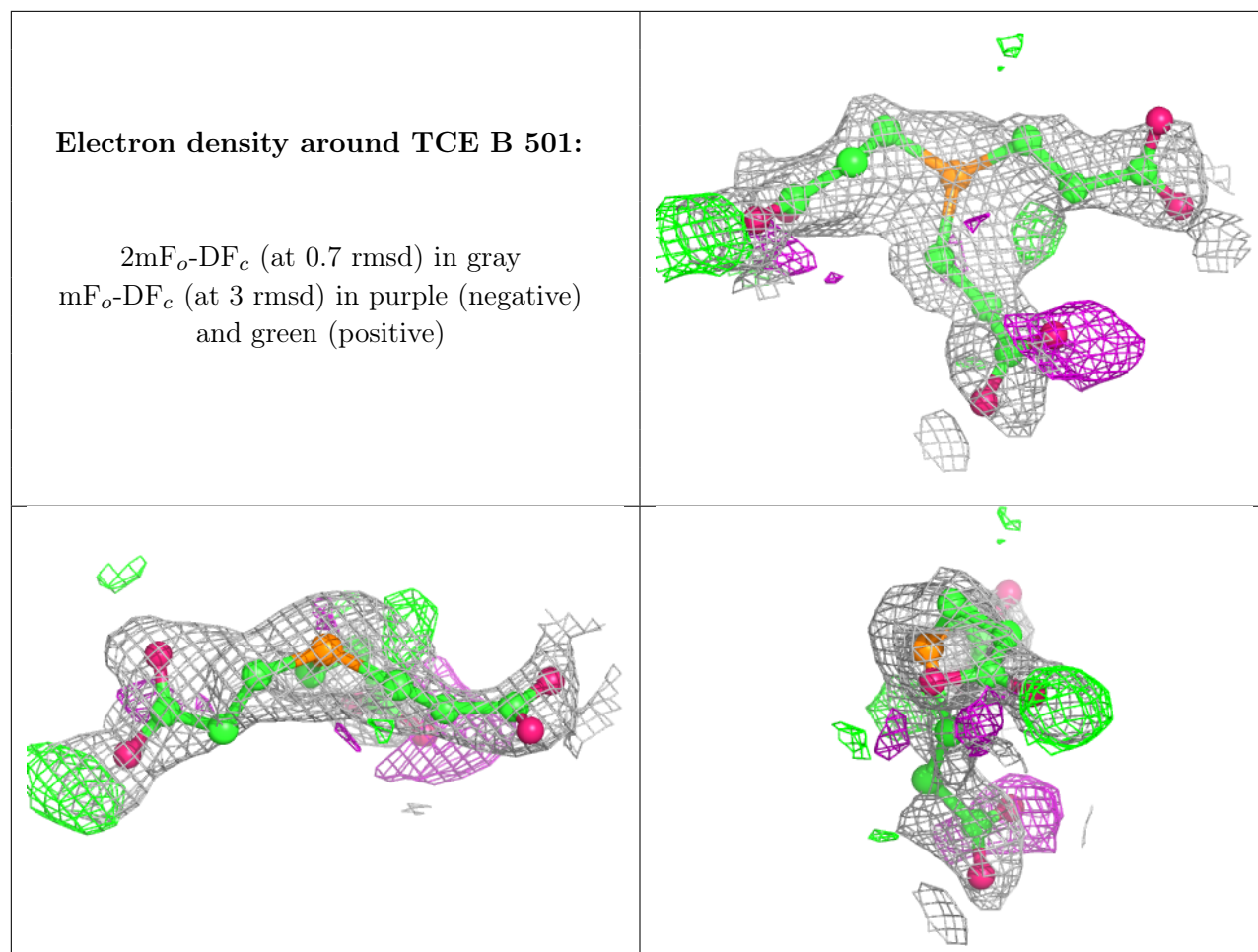


Electron density around TCE D 501:

$2mF_o-DF_c$ (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.