



# Full wwPDB X-ray Structure Validation Report ⓘ

May 3, 2025 – 11:05 AM EDT

PDB ID : 3OID / pdb\_00003oid  
Title : Crystal Structure of Enoyl-ACP Reductases III (FabL) from *B. subtilis* (complex with NADP and TCL)  
Authors : Kim, K.-H.; Ha, B.H.; Kim, S.J.; Hong, S.K.; Hwang, K.Y.; Kim, E.E.  
Deposited on : 2010-08-19  
Resolution : 1.80 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](mailto: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>.

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

MolProbity : 4-5-2 with Phenix2.0rc1  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtrriage (Phenix) : 2.0rc1  
EDS : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.006 (Gargrove)  
Density-Fitness : 1.0.12  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.43.1

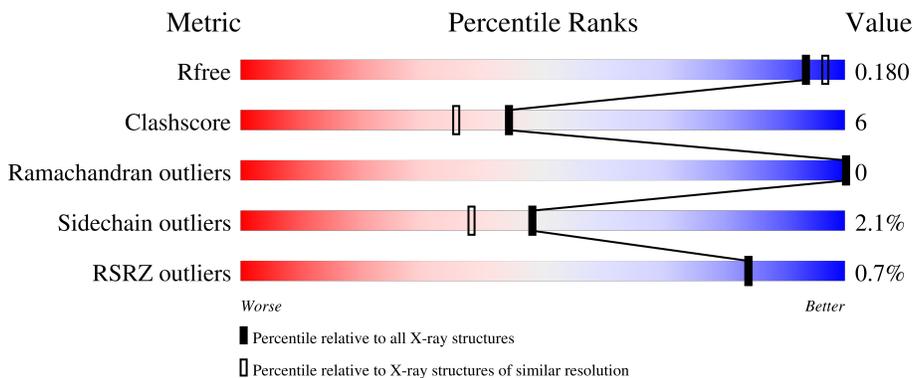
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 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	7108 (1.80-1.80)
Clashscore	180529	8162 (1.80-1.80)
Ramachandran outliers	177936	8077 (1.80-1.80)
Sidechain outliers	177891	8076 (1.80-1.80)
RSRZ outliers	164620	7108 (1.80-1.80)

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  $\geq 3$ , 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	258	 85% 9% . . .
1	B	258	 84% 12% . . .
1	C	258	 87% 7% . . .
1	D	258	 87% 7% . . .

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 8384 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 Enoyl-[acyl-carrier-protein] reductase [NADPH].

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	249	Total	C	N	O	S	0	0	0
			1895	1192	332	362	9			
1	B	251	Total	C	N	O	S	0	0	0
			1912	1202	334	366	10			
1	C	248	Total	C	N	O	S	0	0	0
			1886	1187	330	360	9			
1	D	248	Total	C	N	O	S	0	0	0
			1886	1187	330	360	9			

There are 32 discrepancies between the modelled and reference sequences:

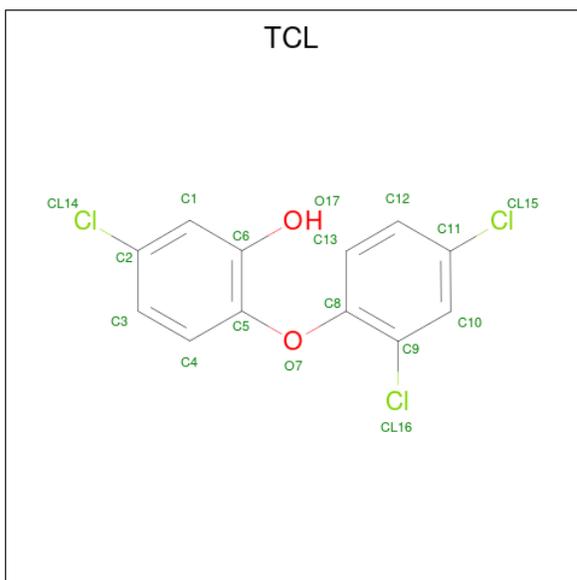
Chain	Residue	Modelled	Actual	Comment	Reference
A	251	LEU	-	expression tag	UNP P71079
A	252	GLU	-	expression tag	UNP P71079
A	253	HIS	-	expression tag	UNP P71079
A	254	HIS	-	expression tag	UNP P71079
A	255	HIS	-	expression tag	UNP P71079
A	256	HIS	-	expression tag	UNP P71079
A	257	HIS	-	expression tag	UNP P71079
A	258	HIS	-	expression tag	UNP P71079
B	251	LEU	-	expression tag	UNP P71079
B	252	GLU	-	expression tag	UNP P71079
B	253	HIS	-	expression tag	UNP P71079
B	254	HIS	-	expression tag	UNP P71079
B	255	HIS	-	expression tag	UNP P71079
B	256	HIS	-	expression tag	UNP P71079
B	257	HIS	-	expression tag	UNP P71079
B	258	HIS	-	expression tag	UNP P71079
C	251	LEU	-	expression tag	UNP P71079
C	252	GLU	-	expression tag	UNP P71079
C	253	HIS	-	expression tag	UNP P71079
C	254	HIS	-	expression tag	UNP P71079
C	255	HIS	-	expression tag	UNP P71079

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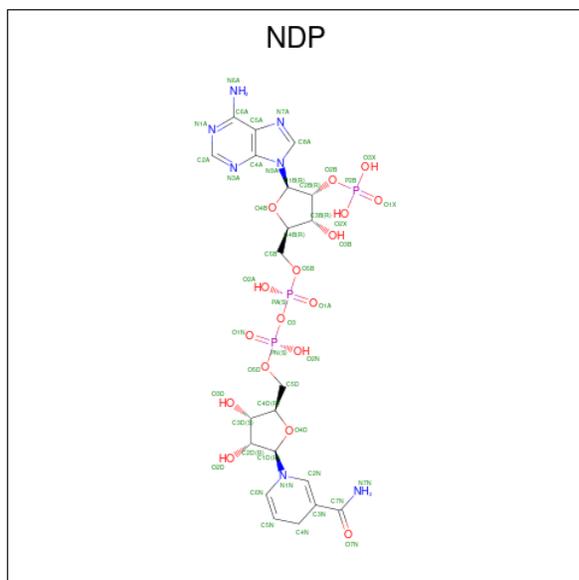
Chain	Residue	Modelled	Actual	Comment	Reference
C	256	HIS	-	expression tag	UNP P71079
C	257	HIS	-	expression tag	UNP P71079
C	258	HIS	-	expression tag	UNP P71079
D	251	LEU	-	expression tag	UNP P71079
D	252	GLU	-	expression tag	UNP P71079
D	253	HIS	-	expression tag	UNP P71079
D	254	HIS	-	expression tag	UNP P71079
D	255	HIS	-	expression tag	UNP P71079
D	256	HIS	-	expression tag	UNP P71079
D	257	HIS	-	expression tag	UNP P71079
D	258	HIS	-	expression tag	UNP P71079

- Molecule 2 is TRICLOSAN (CCD ID: TCL) (formula:  $C_{12}H_7Cl_3O_2$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	Cl	O		
2	A	1	17	12	3	2	0	0
2	B	1	17	12	3	2	0	0
2	C	1	17	12	3	2	0	0
2	D	1	17	12	3	2	0	0

- Molecule 3 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NDP) (formula:  $C_{21}H_{30}N_7O_{17}P_3$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
3	A	1	48	21	7	17	3	0	0
3	B	1	48	21	7	17	3	0	0
3	C	1	48	21	7	17	3	0	0
3	D	1	48	21	7	17	3	0	0

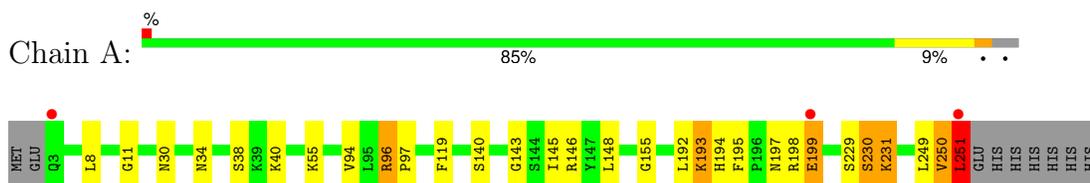
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	138	138	138	0	0
4	B	134	134	134	0	0
4	C	139	139	139	0	0
4	D	134	134	134	0	0

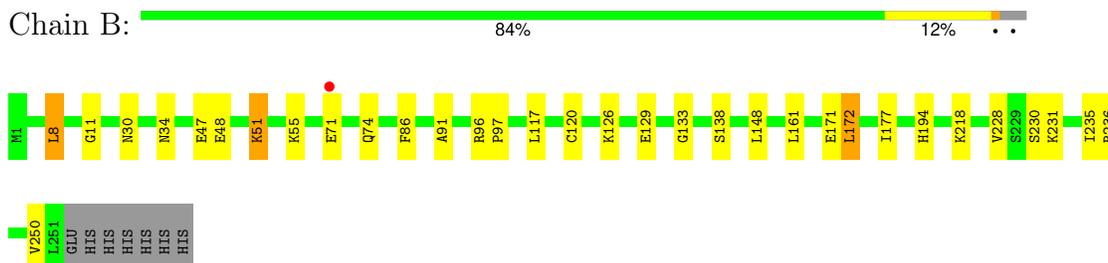
### 3 Residue-property plots [i](#)

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.

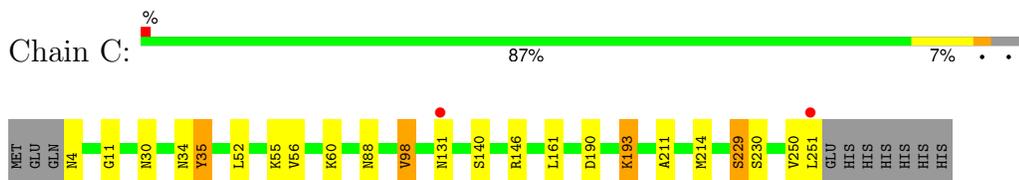
- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADPH]



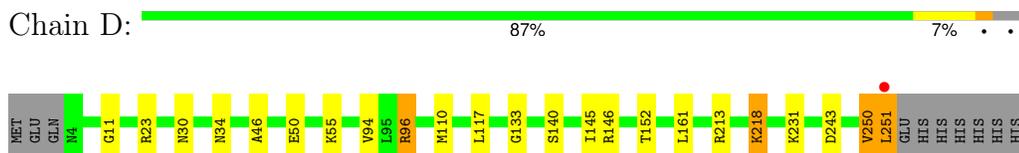
- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADPH]



- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADPH]



- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADPH]



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	58.38Å 110.68Å 85.17Å 90.00° 91.82° 90.00°	Depositor
Resolution (Å)	36.01 – 1.80 36.01 – 1.80	Depositor EDS
% Data completeness (in resolution range)	99.1 (36.01-1.80) 99.1 (36.01-1.80)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	7.48 (at 1.79Å)	Xtrriage
Refinement program	CNS, REFMAC 5.5.0109	Depositor
R, $R_{free}$	0.149 , 0.181 0.149 , 0.180	Depositor DCC
$R_{free}$ test set	4966 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	14.1	Xtrriage
Anisotropy	0.111	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 41.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.026 for h,-k,-l	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	8384	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	14.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.34% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: TCL, NDP

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	1.47	4/1917 (0.2%)	1.21	9/2588 (0.3%)
1	B	1.45	5/1934 (0.3%)	1.20	0/2610
1	C	1.45	5/1908 (0.3%)	1.22	5/2576 (0.2%)
1	D	1.46	4/1908 (0.2%)	1.19	1/2576 (0.0%)
All	All	1.46	18/7667 (0.2%)	1.20	15/10350 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	250	VAL	CA-C	7.25	1.61	1.52
1	A	250	VAL	CA-C	6.86	1.61	1.52
1	D	250	VAL	CA-CB	6.82	1.63	1.54
1	D	243	ASP	N-CA	5.86	1.52	1.46
1	B	91	ALA	CA-CB	5.79	1.64	1.53
1	C	88	ASN	C-O	-5.68	1.16	1.23
1	C	211	ALA	CA-CB	5.65	1.63	1.53
1	C	250	VAL	CA-C	5.62	1.59	1.52
1	A	230	SER	N-CA	5.59	1.52	1.46
1	C	56	VAL	C-O	5.41	1.29	1.24
1	B	228	VAL	CA-CB	5.37	1.61	1.54
1	C	35	TYR	N-CA	5.37	1.52	1.45
1	A	38	SER	N-CA	5.27	1.53	1.46
1	A	155	GLY	N-CA	5.23	1.52	1.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	133	GLY	N-CA	5.23	1.52	1.44
1	B	74	GLN	N-CA	5.23	1.52	1.46
1	B	133	GLY	N-CA	5.06	1.50	1.45
1	D	152	THR	N-CA	5.04	1.52	1.46

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	250	VAL	CA-C-N	8.42	136.85	121.70
1	A	250	VAL	C-N-CA	8.42	136.85	121.70
1	C	250	VAL	CA-C-N	7.26	134.78	121.70
1	C	250	VAL	C-N-CA	7.26	134.78	121.70
1	C	146	ARG	NE-CZ-NH2	-6.89	113.00	119.20
1	A	40	LYS	CD-CE-NZ	-5.93	92.91	111.90
1	A	195	PHE	CA-C-N	-5.81	113.63	119.56
1	A	195	PHE	C-N-CA	-5.81	113.63	119.56
1	C	229	SER	N-CA-C	5.72	120.25	113.28
1	A	119	PHE	CA-CB-CG	-5.60	108.20	113.80
1	A	251	LEU	N-CA-CB	5.41	119.69	110.50
1	D	213	ARG	NE-CZ-NH2	5.37	124.03	119.20
1	C	146	ARG	CG-CD-NE	-5.36	100.21	112.00
1	A	250	VAL	N-CA-C	5.18	120.12	109.34
1	A	229	SER	N-CA-C	5.08	119.46	113.16

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	249	LEU	Peptide

## 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	1895	0	1948	22	0
1	B	1912	0	1966	30	0
1	C	1886	0	1940	17	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	1886	0	1940	26	0
2	A	17	0	6	0	0
2	B	17	0	6	0	0
2	C	17	0	6	0	0
2	D	17	0	6	0	0
3	A	48	0	26	2	0
3	B	48	0	26	1	0
3	C	48	0	26	2	0
3	D	48	0	26	3	0
4	A	138	0	0	5	0
4	B	134	0	0	9	0
4	C	139	0	0	3	0
4	D	134	0	0	1	0
All	All	8384	0	7922	93	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 6.

All (93) 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:218:LYS:HE3	4:B:296:HOH:O	1.40	1.21
1:B:71:GLU:HG3	4:B:364:HOH:O	1.36	1.20
1:D:23:ARG:NH2	1:D:218:LYS:HD2	1.71	1.05
1:D:23:ARG:NH2	1:D:218:LYS:CD	2.29	0.95
4:A:323:HOH:O	1:C:251:LEU:HB3	1.75	0.84
1:D:23:ARG:HH21	1:D:218:LYS:CD	1.91	0.82
1:C:11:GLY:H	1:C:34:ASN:HD22	1.30	0.80
1:C:4:ASN:N	4:C:294:HOH:O	2.15	0.79
1:A:199:GLU:H	1:A:199:GLU:CD	1.88	0.78
1:B:71:GLU:CG	4:B:364:HOH:O	2.08	0.78
1:B:8:LEU:HD12	1:B:86:PHE:CD1	2.23	0.73
1:A:11:GLY:H	1:A:34:ASN:HD22	1.37	0.72
1:B:11:GLY:H	1:B:34:ASN:HD22	1.37	0.70
1:D:11:GLY:H	1:D:34:ASN:HD22	1.40	0.69
1:B:8:LEU:HD12	1:B:86:PHE:HD1	1.56	0.69
1:A:94:VAL:HG12	1:A:96:ARG:HD3	1.75	0.67
1:B:194:HIS:HE1	4:B:446:HOH:O	1.78	0.67
1:D:23:ARG:HH22	1:D:218:LYS:HD2	1.58	0.66
1:B:129:GLU:HB3	4:B:336:HOH:O	1.97	0.65
1:B:8:LEU:C	1:B:8:LEU:HD13	2.21	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:23:ARG:HH21	1:D:218:LYS:HD2	1.51	0.63
1:A:30:ASN:HD22	1:A:55:LYS:H	1.45	0.63
1:B:30:ASN:HD22	1:B:55:LYS:H	1.46	0.61
1:C:251:LEU:N	1:C:251:LEU:HD12	2.14	0.61
1:B:48:GLU:OE2	4:B:312:HOH:O	2.16	0.60
1:C:230:SER:N	4:C:465:HOH:O	2.22	0.60
1:A:230:SER:N	4:A:449:HOH:O	2.31	0.60
1:D:23:ARG:NH2	1:D:218:LYS:HD3	2.17	0.59
1:D:23:ARG:HH22	1:D:218:LYS:CD	2.10	0.58
1:B:138:SER:HB3	1:B:161:LEU:HD11	1.85	0.58
1:A:194:HIS:HE1	4:A:316:HOH:O	1.86	0.58
1:A:231:LYS:HE2	4:B:451:HOH:O	2.04	0.58
1:D:23:ARG:HH21	1:D:218:LYS:CE	2.17	0.57
1:A:94:VAL:CG1	1:A:96:ARG:HD3	2.35	0.56
1:C:161:LEU:C	1:C:161:LEU:HD23	2.30	0.56
1:B:11:GLY:HA2	3:B:503:NDP:H1B	1.88	0.56
1:B:117:LEU:HD22	1:B:161:LEU:HD22	1.88	0.55
1:D:30:ASN:ND2	1:D:55:LYS:H	2.05	0.54
1:B:171:GLU:OE1	1:C:98:VAL:HG23	2.07	0.54
1:C:229:SER:O	1:C:230:SER:CB	2.56	0.54
1:D:117:LEU:HD22	1:D:161:LEU:HD22	1.90	0.53
1:A:96:ARG:HB2	1:A:97:PRO:CD	2.39	0.53
1:B:48:GLU:O	1:B:51:LYS:HG2	2.09	0.52
1:A:192:LEU:HB3	1:A:198:ARG:HG3	1.91	0.52
1:A:30:ASN:ND2	1:A:55:LYS:H	2.08	0.52
1:B:30:ASN:ND2	1:B:55:LYS:H	2.08	0.51
1:C:131:ASN:HB2	4:C:534:HOH:O	2.10	0.51
4:B:463:HOH:O	1:D:251:LEU:HD22	2.12	0.50
1:C:30:ASN:ND2	1:C:55:LYS:H	2.11	0.49
1:C:190:ASP:O	1:C:193:LYS:HG2	2.13	0.49
4:A:348:HOH:O	1:B:231:LYS:HE2	2.12	0.49
1:C:140:SER:O	3:C:504:NDP:H6N	2.12	0.48
1:D:11:GLY:HA2	3:D:502:NDP:H1B	1.93	0.48
1:D:117:LEU:CD2	1:D:161:LEU:HD22	2.43	0.48
1:D:140:SER:O	3:D:502:NDP:H6N	2.12	0.48
1:B:126:LYS:O	1:B:129:GLU:HG2	2.13	0.48
1:A:143:GLY:HA2	1:A:148:LEU:HD13	1.96	0.47
1:A:250:VAL:HG12	1:A:251:LEU:N	2.29	0.47
1:A:197:ASN:OD1	4:A:493:HOH:O	2.21	0.47
1:D:146:ARG:NH2	4:D:315:HOH:O	2.32	0.47
1:B:230:SER:N	4:B:349:HOH:O	2.40	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:11:GLY:H	1:B:34:ASN:ND2	2.10	0.46
1:B:138:SER:CB	1:B:161:LEU:HD11	2.46	0.45
1:B:96:ARG:HB2	1:B:97:PRO:CD	2.47	0.45
1:B:148:LEU:HD13	1:D:250:VAL:HG13	1.97	0.45
1:C:214:MET:HE2	1:C:214:MET:HB3	1.89	0.45
1:C:229:SER:O	1:C:230:SER:HB2	2.16	0.45
1:C:11:GLY:HA2	3:C:504:NDP:H1B	1.98	0.45
1:B:96:ARG:HB2	1:B:97:PRO:HD2	1.99	0.45
1:D:30:ASN:HD22	1:D:55:LYS:H	1.63	0.45
1:A:145:ILE:HG13	1:A:146:ARG:HG2	1.98	0.44
1:B:161:LEU:C	1:B:161:LEU:HD13	2.42	0.44
1:D:110:MET:HE2	1:D:110:MET:HB2	1.86	0.44
1:A:250:VAL:C	1:A:251:LEU:HD23	2.42	0.44
1:D:34:ASN:HD21	3:D:502:NDP:H2A	1.81	0.44
1:A:140:SER:O	3:A:501:NDP:H6N	2.17	0.44
1:B:235:ILE:C	1:B:236:ARG:HG2	2.42	0.44
1:A:96:ARG:HB2	1:A:97:PRO:HD2	1.99	0.43
1:C:35:TYR:CZ	1:C:60:LYS:HB2	2.54	0.42
1:A:11:GLY:HA2	3:A:501:NDP:H1B	2.01	0.42
1:D:161:LEU:C	1:D:161:LEU:HD13	2.44	0.42
1:D:94:VAL:CG1	1:D:96:ARG:HD3	2.50	0.42
1:B:172:LEU:HB3	1:B:177:ILE:HB	2.01	0.42
1:A:193:LYS:HD2	1:A:198:ARG:CD	2.50	0.42
1:D:117:LEU:HD22	1:D:161:LEU:CD2	2.49	0.42
1:D:94:VAL:HG12	1:D:96:ARG:HD3	2.02	0.42
1:B:117:LEU:CD2	1:B:161:LEU:HD22	2.50	0.41
1:B:86:PHE:CZ	1:B:120:CYS:HB3	2.55	0.41
1:C:11:GLY:H	1:C:34:ASN:ND2	2.07	0.41
1:A:193:LYS:HD2	1:A:198:ARG:HD3	2.01	0.41
1:D:46:ALA:O	1:D:50:GLU:HG3	2.21	0.41
1:A:251:LEU:HD22	1:A:251:LEU:HA	1.24	0.40
1:D:145:ILE:HG13	1:D:146:ARG:HG2	2.03	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	247/258 (96%)	240 (97%)	7 (3%)	0	100	100
1	B	249/258 (96%)	245 (98%)	4 (2%)	0	100	100
1	C	246/258 (95%)	242 (98%)	4 (2%)	0	100	100
1	D	246/258 (95%)	241 (98%)	5 (2%)	0	100	100
All	All	988/1032 (96%)	968 (98%)	20 (2%)	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	202/211 (96%)	196 (97%)	6 (3%)	36	24
1	B	204/211 (97%)	200 (98%)	4 (2%)	50	40
1	C	201/211 (95%)	198 (98%)	3 (2%)	60	53
1	D	201/211 (95%)	197 (98%)	4 (2%)	50	40
All	All	808/844 (96%)	791 (98%)	17 (2%)	48	38

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	8	LEU
1	A	96	ARG
1	A	193	LYS
1	A	199	GLU
1	A	231	LYS
1	A	251	LEU
1	B	8	LEU
1	B	47	GLU

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Mol	Chain	Res	Type
1	B	51	LYS
1	B	172	LEU
1	C	52	LEU
1	C	98	VAL
1	C	193	LYS
1	D	96	ARG
1	D	218	LYS
1	D	231	LYS
1	D	251	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	30	ASN
1	A	34	ASN
1	A	194	HIS
1	B	4	ASN
1	B	27	ASN
1	B	30	ASN
1	B	34	ASN
1	B	65	GLN
1	B	74	GLN
1	B	194	HIS
1	C	30	ASN
1	C	34	ASN
1	C	65	GLN
1	C	74	GLN
1	C	75	GLN
1	D	30	ASN
1	D	34	ASN
1	D	65	GLN
1	D	238	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](#)

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
2	TCL	A	601	-	18,18,18	1.66	3 (16%)	25,25,25	2.25	9 (36%)
2	TCL	C	604	-	18,18,18	1.57	2 (11%)	25,25,25	1.54	5 (20%)
3	NDP	D	502	-	47,52,52	1.50	4 (8%)	61,80,80	1.58	9 (14%)
2	TCL	D	602	-	18,18,18	1.60	4 (22%)	25,25,25	1.64	3 (12%)
2	TCL	B	603	-	18,18,18	1.63	2 (11%)	25,25,25	2.13	7 (28%)
3	NDP	C	504	-	47,52,52	1.85	5 (10%)	61,80,80	1.56	12 (19%)
3	NDP	A	501	-	47,52,52	1.43	5 (10%)	61,80,80	1.73	8 (13%)
3	NDP	B	503	-	47,52,52	1.58	8 (17%)	61,80,80	1.60	8 (13%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	TCL	A	601	-	-	0/4/4/4	0/2/2/2
2	TCL	C	604	-	-	0/4/4/4	0/2/2/2
3	NDP	D	502	-	-	5/30/77/77	0/5/5/5
2	TCL	D	602	-	-	0/4/4/4	0/2/2/2
2	TCL	B	603	-	-	0/4/4/4	0/2/2/2
3	NDP	C	504	-	-	6/30/77/77	0/5/5/5
3	NDP	A	501	-	-	4/30/77/77	0/5/5/5
3	NDP	B	503	-	-	6/30/77/77	0/5/5/5

All (33) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	504	NDP	PA-O3	6.66	1.66	1.59
3	C	504	NDP	O7N-C7N	5.70	1.37	1.24
3	D	502	NDP	PA-O3	5.22	1.65	1.59
3	C	504	NDP	C2A-N3A	5.14	1.40	1.32
3	A	501	NDP	O7N-C7N	4.80	1.35	1.24
3	B	503	NDP	O7N-C7N	4.47	1.34	1.24
2	C	604	TCL	C6-C5	4.29	1.47	1.40
3	A	501	NDP	C2A-N3A	4.29	1.38	1.32
3	D	502	NDP	O7N-C7N	4.10	1.34	1.24
2	A	601	TCL	C6-C5	4.05	1.47	1.40
3	B	503	NDP	C2A-N3A	4.04	1.38	1.32
2	B	603	TCL	C6-C5	3.96	1.47	1.40
3	C	504	NDP	O4B-C1B	3.93	1.46	1.40
2	D	602	TCL	C6-C5	3.88	1.47	1.40
2	A	601	TCL	C8-C9	3.81	1.46	1.39
2	D	602	TCL	C8-C9	3.63	1.46	1.39
3	D	502	NDP	C2A-N3A	3.52	1.37	1.32
3	B	503	NDP	O4B-C1B	3.42	1.45	1.40
3	B	503	NDP	P2B-O2B	3.07	1.64	1.59
2	C	604	TCL	C8-C9	3.02	1.44	1.39
3	A	501	NDP	O4B-C1B	2.88	1.44	1.40
3	A	501	NDP	PN-O3	2.80	1.62	1.59
2	B	603	TCL	C8-C9	2.72	1.44	1.39
3	B	503	NDP	PA-O2A	-2.55	1.43	1.55
3	D	502	NDP	P2B-O2B	2.47	1.63	1.59
3	B	503	NDP	PA-O3	2.41	1.62	1.59
2	D	602	TCL	O7-C8	-2.29	1.34	1.39
3	B	503	NDP	C6N-C5N	2.19	1.39	1.33
2	D	602	TCL	C9-CL16	2.17	1.78	1.73
3	C	504	NDP	PN-O3	2.17	1.61	1.59
3	A	501	NDP	C1B-N9A	-2.08	1.44	1.49
2	A	601	TCL	C11-CL15	2.06	1.79	1.74
3	B	503	NDP	P2B-O2X	-2.04	1.47	1.54

All (61) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	501	NDP	N3A-C2A-N1A	-7.60	118.36	128.67
3	D	502	NDP	N3A-C2A-N1A	-6.64	119.65	128.67
2	A	601	TCL	C9-C10-C11	-6.15	111.77	118.72
3	B	503	NDP	O7N-C7N-C3N	-4.92	111.63	120.90
3	D	502	NDP	C3N-C7N-N7N	4.75	126.10	117.67

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	603	TCL	C12-C11-C10	4.71	127.69	121.53
3	A	501	NDP	C5A-C6A-N6A	4.70	127.47	120.31
2	D	602	TCL	C10-C11-CL15	-4.64	113.35	119.17
2	B	603	TCL	C10-C11-CL15	-4.49	113.53	119.17
3	C	504	NDP	O7N-C7N-C3N	-4.35	112.71	120.90
3	C	504	NDP	C6N-N1N-C2N	4.32	123.95	119.32
2	B	603	TCL	C9-C10-C11	-4.24	113.93	118.72
3	B	503	NDP	C3N-C2N-N1N	-4.21	117.03	123.20
3	B	503	NDP	C4B-O4B-C1B	-4.21	106.07	109.92
2	A	601	TCL	C12-C11-C10	4.14	126.94	121.53
3	A	501	NDP	C6N-N1N-C2N	4.12	123.73	119.32
3	B	503	NDP	N3A-C2A-N1A	-4.08	123.14	128.67
3	B	503	NDP	C6N-N1N-C2N	4.04	123.64	119.32
2	D	602	TCL	C12-C11-C10	3.99	126.76	121.53
2	B	603	TCL	C1-C2-CL14	-3.69	114.55	119.17
2	A	601	TCL	C10-C11-CL15	-3.66	114.58	119.17
2	C	604	TCL	C9-C10-C11	-3.64	114.61	118.72
2	A	601	TCL	C1-C2-CL14	-3.50	114.77	119.17
3	B	503	NDP	C3N-C7N-N7N	3.45	123.80	117.67
3	C	504	NDP	C3N-C2N-N1N	-3.42	118.18	123.20
3	D	502	NDP	O7N-C7N-C3N	-3.35	114.58	120.90
3	A	501	NDP	C1D-N1N-C6N	-3.31	113.77	120.77
3	C	504	NDP	C3N-C7N-N7N	3.31	123.55	117.67
3	C	504	NDP	C4B-O4B-C1B	-3.22	106.98	109.92
2	D	602	TCL	C9-C10-C11	-3.21	115.09	118.72
3	A	501	NDP	O7N-C7N-C3N	-3.19	114.89	120.90
3	C	504	NDP	N3A-C2A-N1A	-2.95	124.66	128.67
3	A	501	NDP	C3N-C2N-N1N	-2.92	118.92	123.20
3	D	502	NDP	C6N-N1N-C2N	2.90	122.42	119.32
2	C	604	TCL	C12-C11-C10	2.68	125.03	121.53
2	A	601	TCL	C12-C13-C8	-2.67	114.99	120.06
2	A	601	TCL	C3-C2-C1	2.62	124.96	121.53
3	C	504	NDP	O3D-C3D-C2D	-2.61	103.44	111.82
2	C	604	TCL	C10-C11-CL15	-2.58	115.94	119.17
3	D	502	NDP	O4B-C1B-N9A	2.54	112.11	108.75
2	A	601	TCL	C10-C9-C8	2.53	124.23	121.01
3	D	502	NDP	C5A-C6A-N6A	2.53	124.16	120.31
2	A	601	TCL	C6-C1-C2	-2.49	116.16	118.96
2	B	603	TCL	C6-C1-C2	-2.46	116.19	118.96
3	C	504	NDP	O4B-C1B-C2B	-2.39	102.52	106.61
3	C	504	NDP	O2A-PA-O1A	2.36	123.42	112.44
3	B	503	NDP	C1D-N1N-C6N	-2.32	115.86	120.77

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	603	TCL	C12-C13-C8	-2.31	115.69	120.06
2	A	601	TCL	C8-C9-CL16	-2.28	116.83	119.44
3	D	502	NDP	C1D-N1N-C6N	-2.28	115.95	120.77
2	B	603	TCL	C13-C8-C9	2.27	122.23	118.87
3	C	504	NDP	O4D-C1D-C2D	-2.27	101.75	106.62
2	C	604	TCL	C3-C2-C1	2.23	124.44	121.53
3	D	502	NDP	C5B-C4B-C3B	-2.19	107.32	115.21
3	C	504	NDP	C1D-N1N-C6N	-2.15	116.22	120.77
3	C	504	NDP	C4A-C5A-N7A	-2.15	107.06	109.34
3	B	503	NDP	O4B-C1B-C2B	-2.15	102.94	106.61
3	A	501	NDP	O2N-PN-O1N	2.13	122.37	112.44
3	A	501	NDP	C3B-C2B-C1B	-2.09	98.80	102.81
2	C	604	TCL	C8-C9-CL16	-2.07	117.08	119.44
3	D	502	NDP	O3B-C3B-C2B	-2.05	105.44	111.19

There are no chirality outliers.

All (21) torsion outliers are listed below:

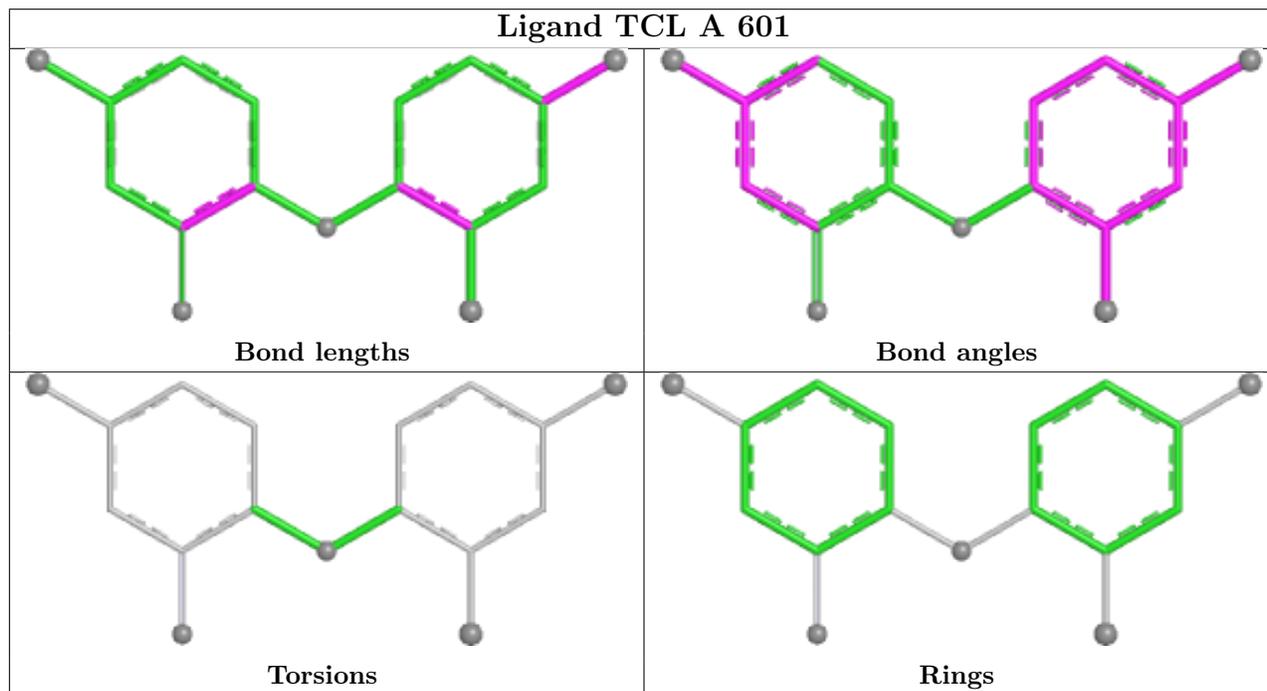
Mol	Chain	Res	Type	Atoms
3	A	501	NDP	C5D-O5D-PN-O3
3	A	501	NDP	C5D-O5D-PN-O1N
3	B	503	NDP	C5D-O5D-PN-O3
3	B	503	NDP	C5D-O5D-PN-O1N
3	C	504	NDP	C5D-O5D-PN-O3
3	C	504	NDP	C5D-O5D-PN-O1N
3	D	502	NDP	C5D-O5D-PN-O3
3	D	502	NDP	C5D-O5D-PN-O1N
3	C	504	NDP	O4D-C1D-N1N-C6N
3	B	503	NDP	O4D-C1D-N1N-C6N
3	D	502	NDP	O4D-C1D-N1N-C6N
3	A	501	NDP	O4D-C1D-N1N-C6N
3	A	501	NDP	C5D-O5D-PN-O2N
3	B	503	NDP	C5D-O5D-PN-O2N
3	C	504	NDP	C5D-O5D-PN-O2N
3	D	502	NDP	C5D-O5D-PN-O2N
3	C	504	NDP	C2B-O2B-P2B-O3X
3	B	503	NDP	C2B-O2B-P2B-O3X
3	D	502	NDP	C2B-O2B-P2B-O3X
3	C	504	NDP	PA-O3-PN-O2N
3	B	503	NDP	O4B-C4B-C5B-O5B

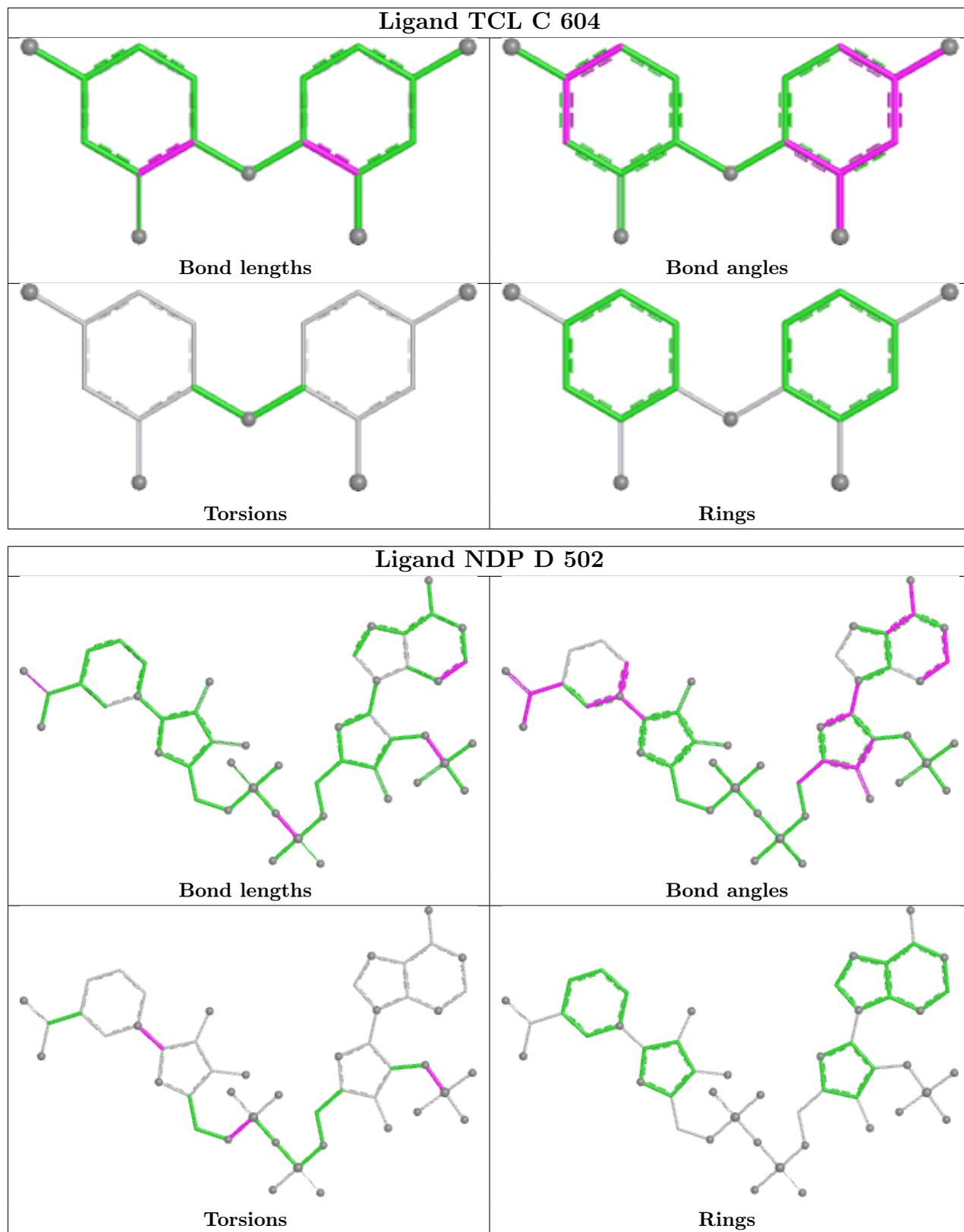
There are no ring outliers.

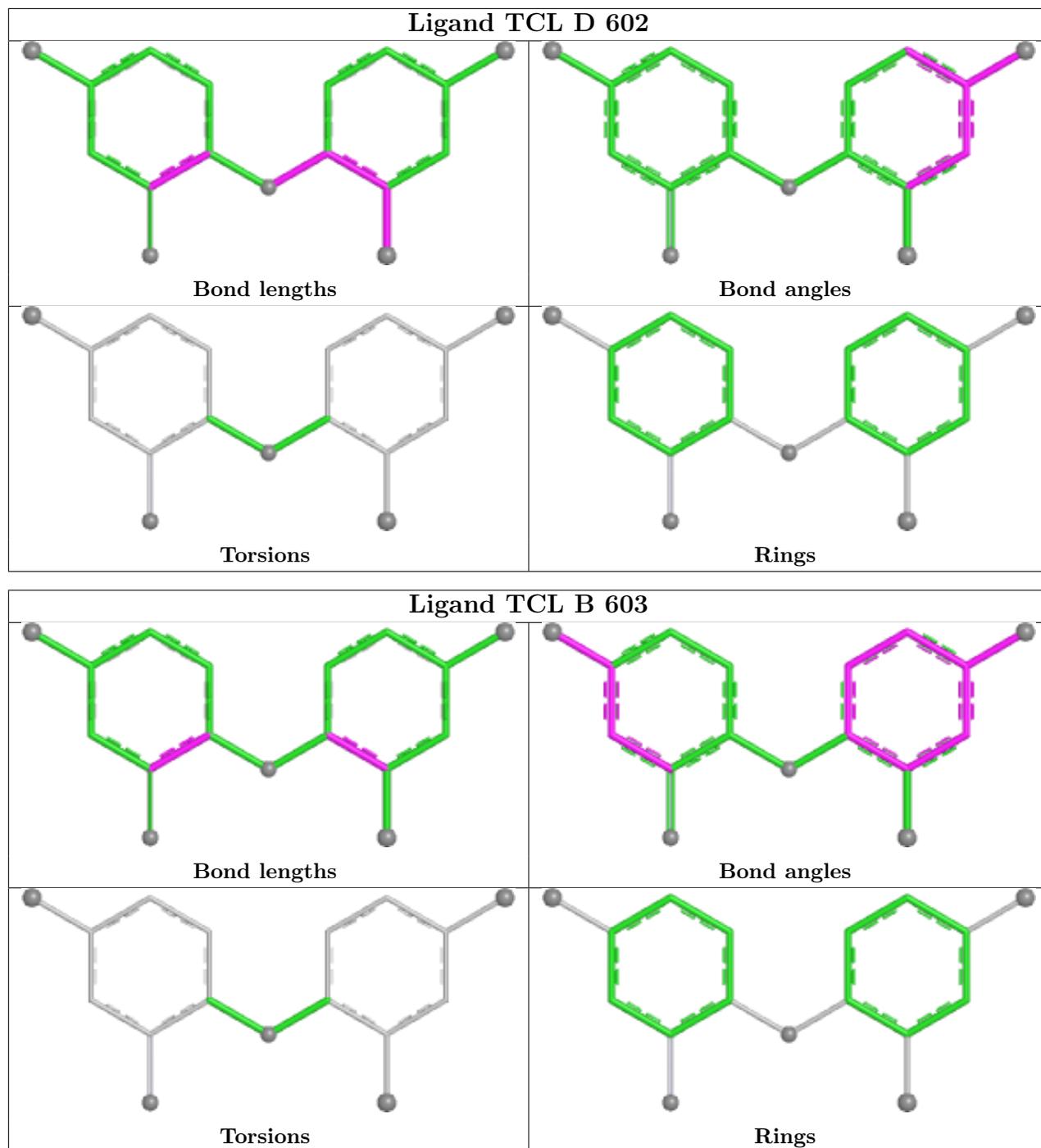
4 monomers are involved in 8 short contacts:

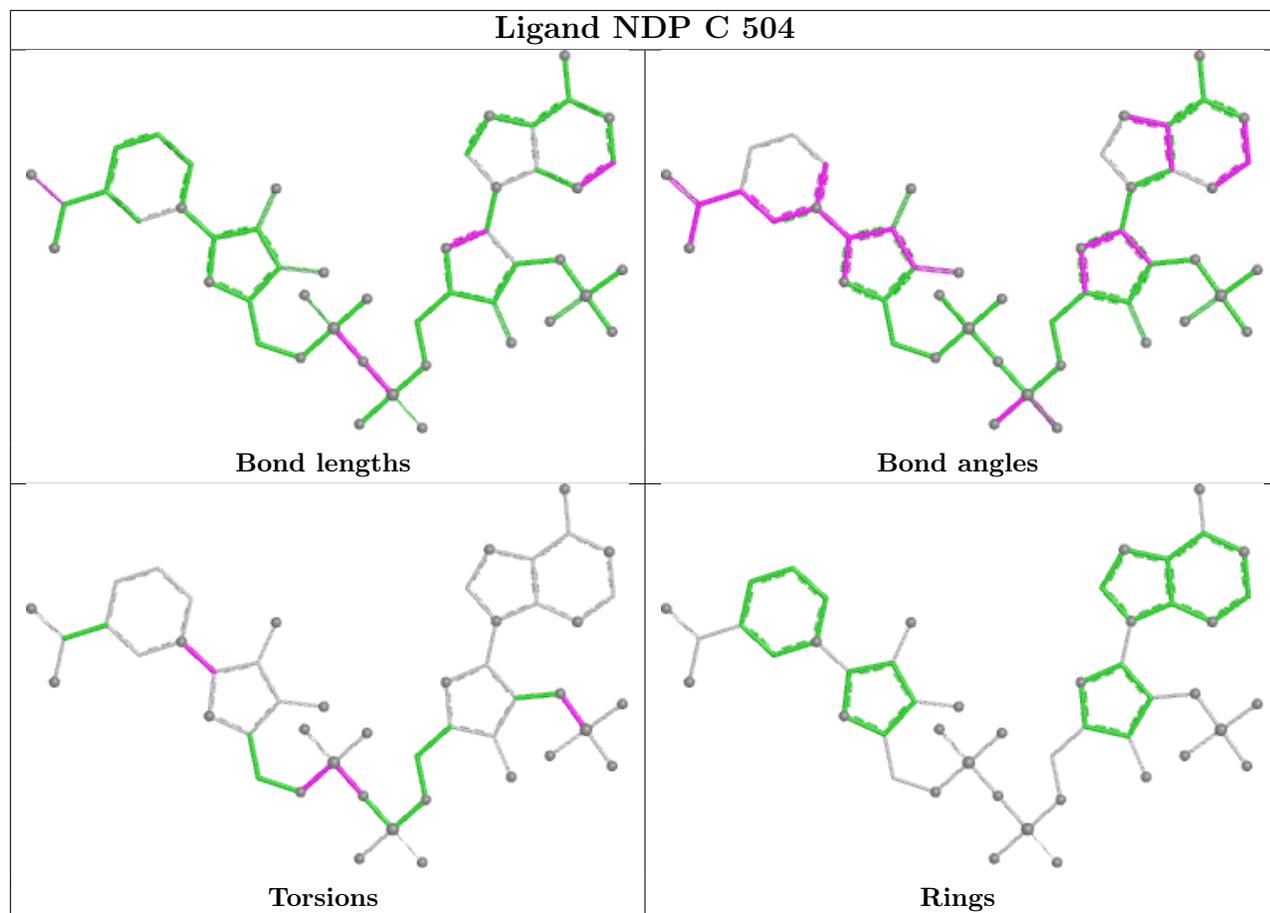
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	502	NDP	3	0
3	C	504	NDP	2	0
3	A	501	NDP	2	0
3	B	503	NDP	1	0

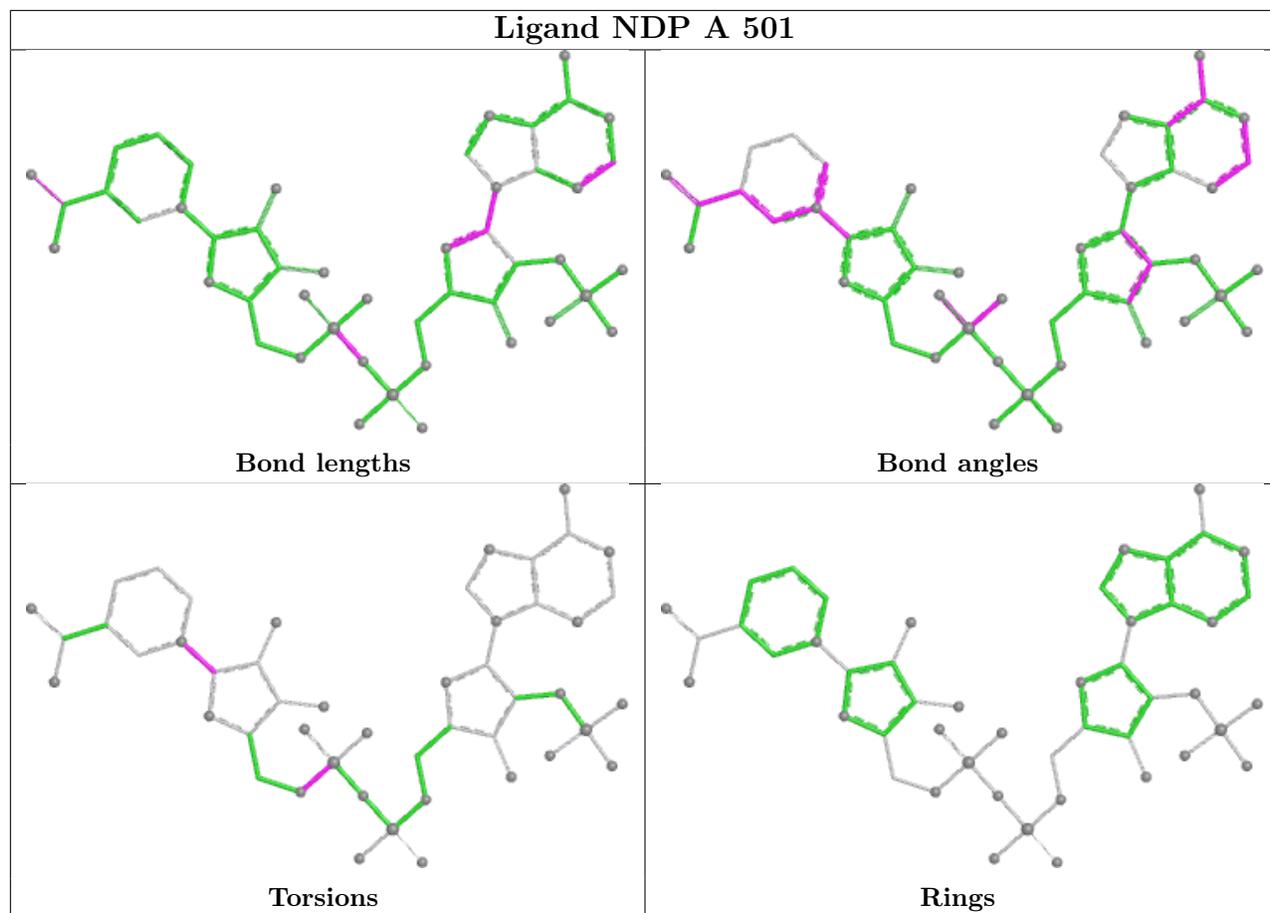
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less 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.

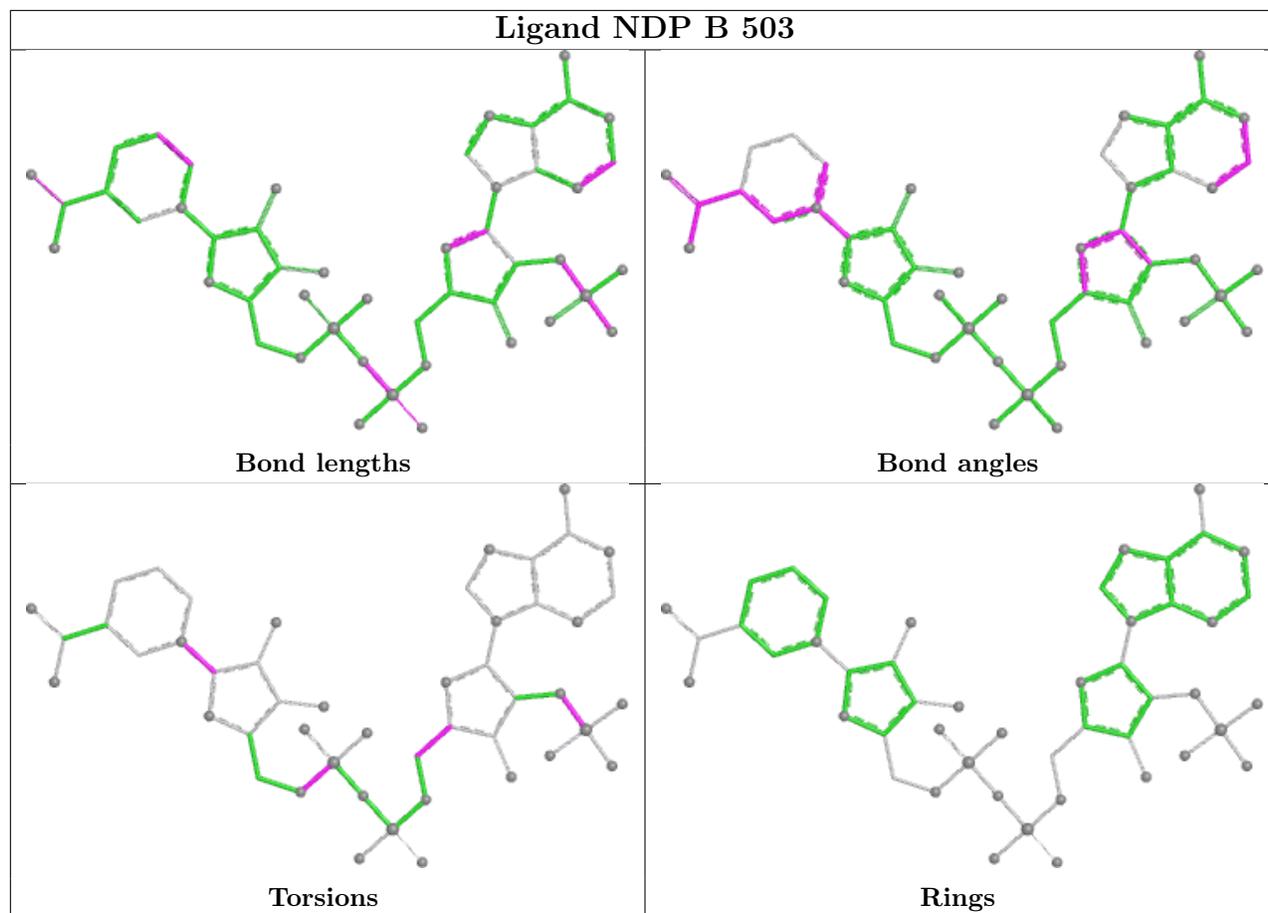












## 5.7 Other polymers [\(i\)](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	249/258 (96%)	-0.78	3 (1%) 76 76	7, 11, 26, 35	0
1	B	251/258 (97%)	-0.78	1 (0%) 89 88	6, 12, 25, 34	0
1	C	248/258 (96%)	-0.74	2 (0%) 82 82	6, 13, 26, 35	0
1	D	248/258 (96%)	-0.70	1 (0%) 89 88	7, 13, 28, 37	0
All	All	996/1032 (96%)	-0.75	7 (0%) 84 84	6, 12, 27, 37	0

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	251	LEU	3.3
1	C	251	LEU	3.2
1	C	131	ASN	2.4
1	A	251	LEU	2.2
1	B	71	GLU	2.1
1	A	199	GLU	2.1
1	A	3	GLN	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](#)

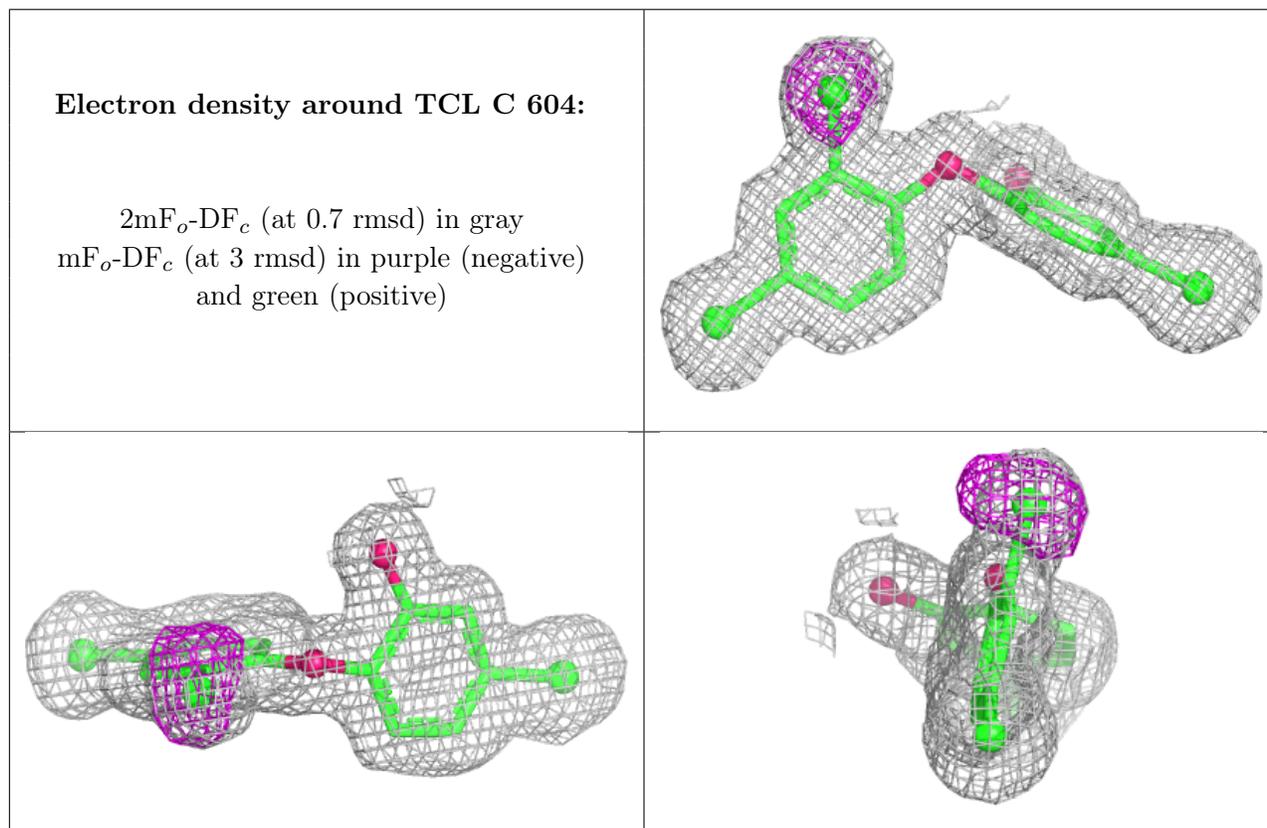
There are no monosaccharides in this entry.

## 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, 95<sup>th</sup> 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.

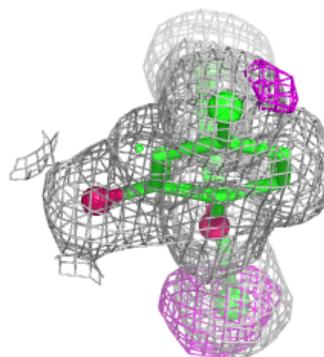
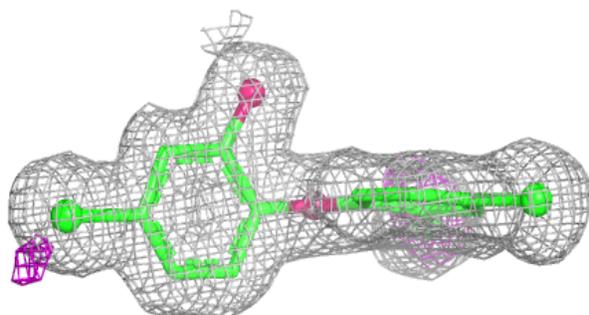
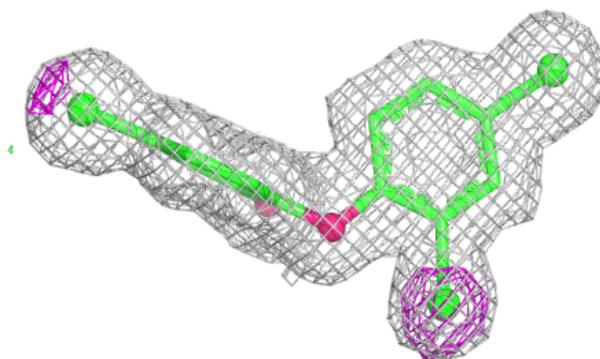
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	TCL	C	604	17/17	0.97	0.05	10,14,23,24	0
2	TCL	B	603	17/17	0.98	0.05	10,12,22,23	0
2	TCL	A	601	17/17	0.98	0.05	10,13,21,23	0
2	TCL	D	602	17/17	0.98	0.05	9,13,23,23	0
3	NDP	A	501	48/48	0.99	0.03	6,9,13,13	0
3	NDP	B	503	48/48	0.99	0.04	6,10,14,17	0
3	NDP	C	504	48/48	0.99	0.04	7,11,14,17	0
3	NDP	D	502	48/48	0.99	0.03	8,11,13,15	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.

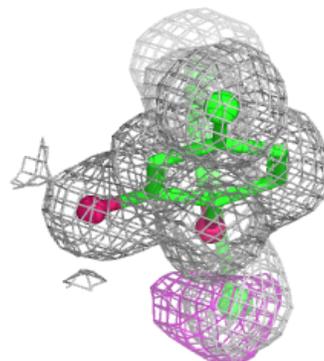
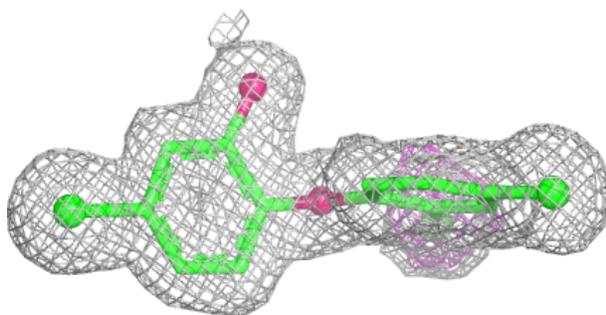
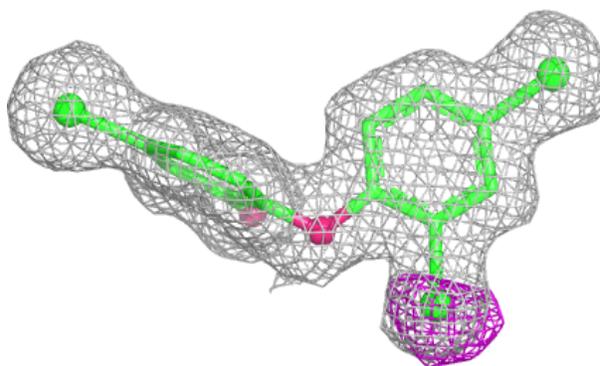


**Electron density around TCL B 603:**

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

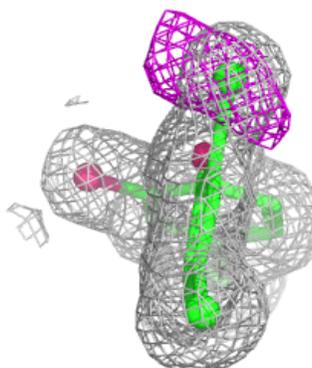
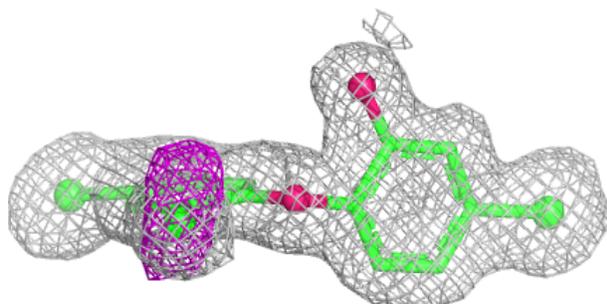
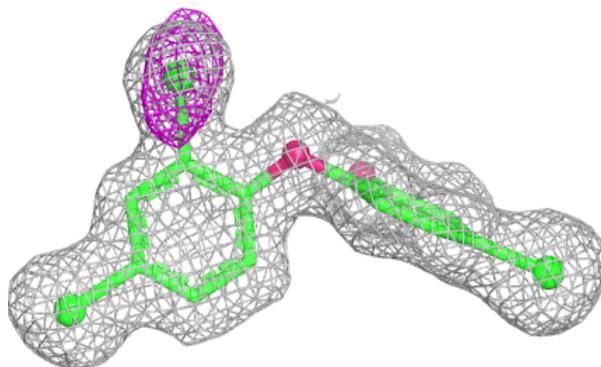
**Electron density around TCL A 601:**

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

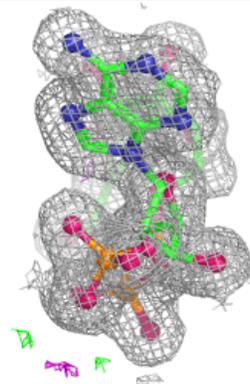
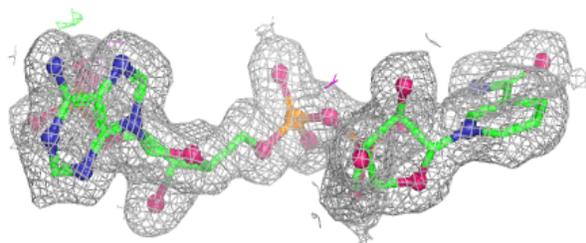
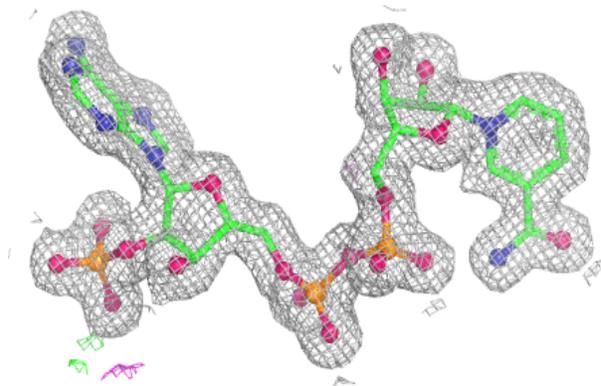


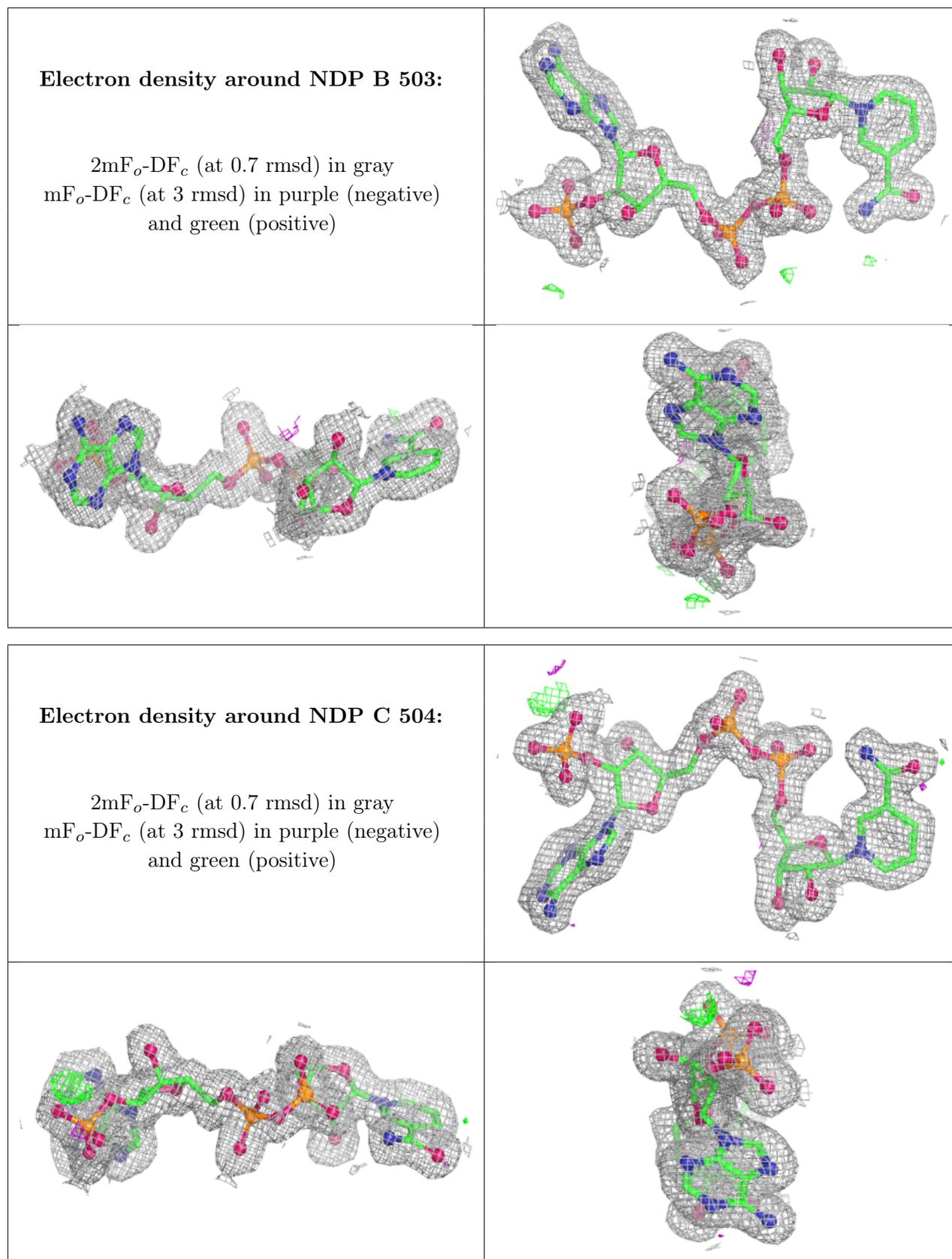
**Electron density around TCL D 602:**

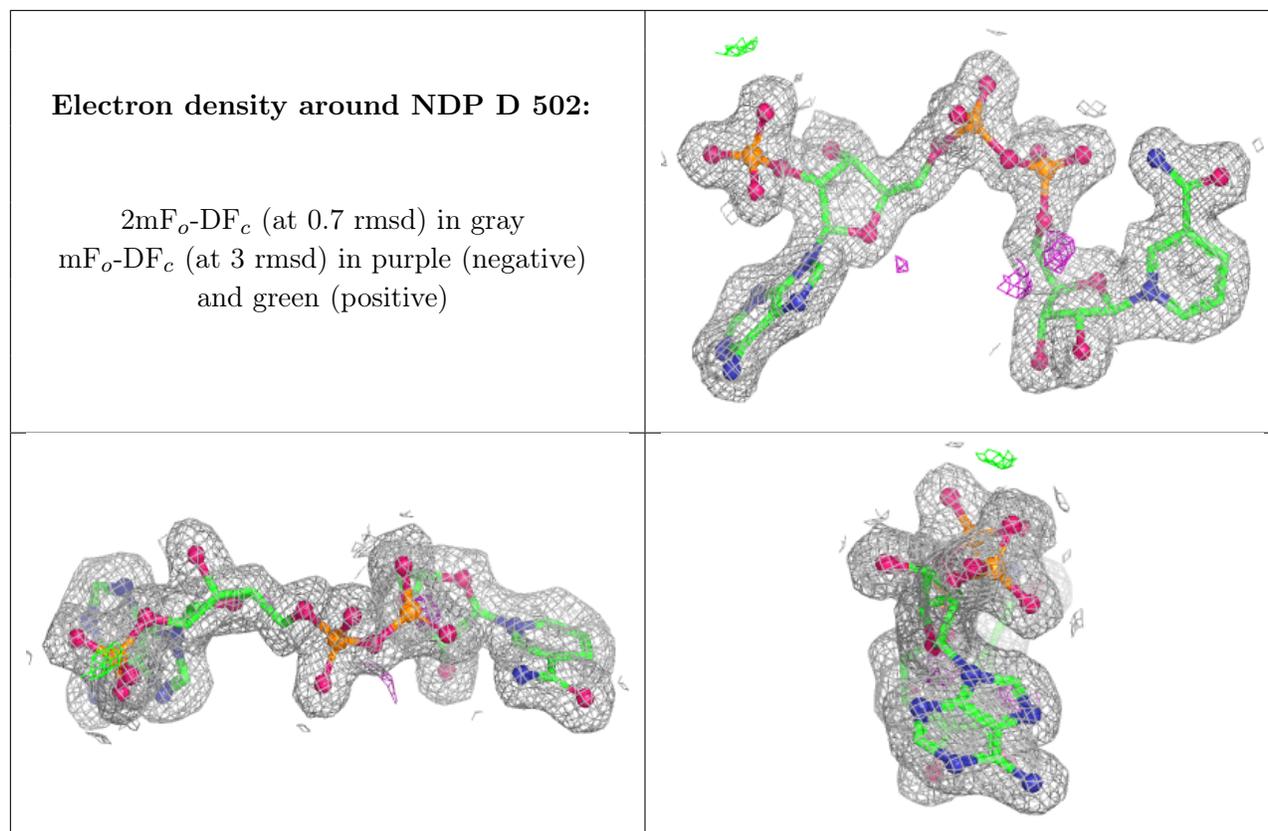
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**Electron density around NDP 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)







## 6.5 Other polymers [i](#)

There are no such residues in this entry.