



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 05:28 AM UTC

PDB ID : 2VK1 / pdb_00002vk1
Title : Crystal structure of the *Saccharomyces cerevisiae* pyruvate decarboxylase variant D28A in complex with its substrate
Authors : Kutter, S.; Weik, M.; Weiss, M.S.; Konig, S.
Deposited on : 2007-12-16
Resolution : 1.71 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

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

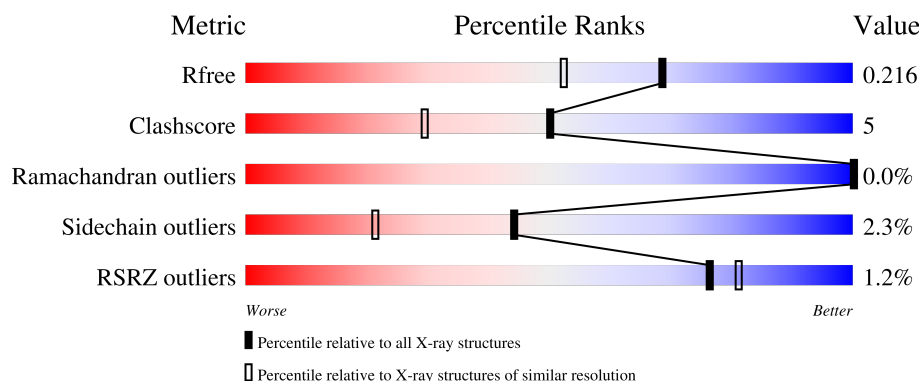
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.71 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1039 (1.72-1.72)
Clashscore	190562	1049 (1.72-1.72)
Ramachandran outliers	187476	1041 (1.72-1.72)
Sidechain outliers	187428	1041 (1.72-1.72)
RSRZ outliers	180081	1039 (1.72-1.72)

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	563	2% 89% 9% .
1	B	563	2% 90% 9% .
1	C	563	2% 90% 8% .
1	D	563	2% 90% 8% .

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	PYR	A	602	-	X	-	-
4	PYR	A	603	-	X	X	-
4	PYR	B	602	-	X	-	-
4	PYR	C	602	-	X	-	-
4	PYR	C	603	-	X	X	-
4	PYR	D	602	-	X	-	-
4	PYR	D	603	-	X	X	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 18994 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.

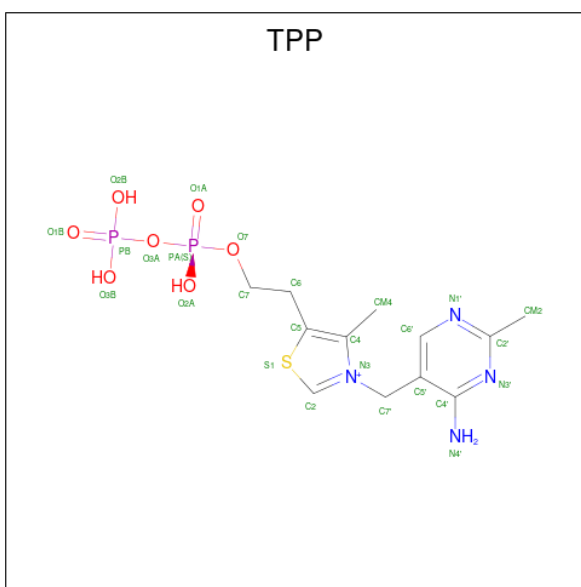
- Molecule 1 is a protein called PYRUVATE DECARBOXYLASE ISOZYME 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	562	Total	C	N	O	S	0	0	0
			4320	2759	724	821	16			
1	B	562	Total	C	N	O	S	0	0	0
			4320	2759	724	821	16			
1	C	562	Total	C	N	O	S	0	0	0
			4320	2759	724	821	16			
1	D	562	Total	C	N	O	S	0	0	0
			4320	2759	724	821	16			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	28	ALA	ASP	engineered mutation	UNP P06169
B	28	ALA	ASP	engineered mutation	UNP P06169
C	28	ALA	ASP	engineered mutation	UNP P06169
D	28	ALA	ASP	engineered mutation	UNP P06169

- Molecule 2 is THIAMINE DIPHOSPHATE (CCD ID: TPP) (formula: C₁₂H₁₉N₄O₇P₂S).

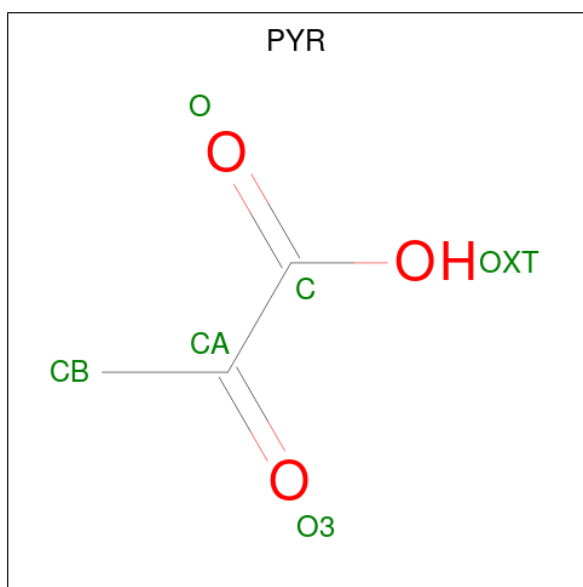


Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total 26	C 12	N 4	O 7	P 2	S 1	0	0
2	B	1	Total 26	C 12	N 4	O 7	P 2	S 1	0	0
2	C	1	Total 26	C 12	N 4	O 7	P 2	S 1	0	0
2	D	1	Total 26	C 12	N 4	O 7	P 2	S 1	0	0

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Mg 1 1	0	0
3	B	1	Total Mg 1 1	0	0
3	C	1	Total Mg 1 1	0	0
3	D	1	Total Mg 1 1	0	0

- Molecule 4 is PYRUVIC ACID (CCD ID: PYR) (formula: $\text{C}_3\text{H}_4\text{O}_3$).



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

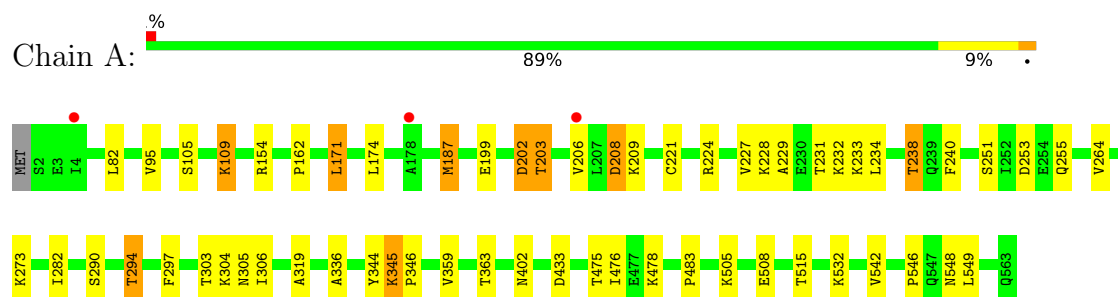
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	436	Total	O	0	0
			436	436		
5	B	377	Total	O	0	0
			377	377		
5	C	408	Total	O	0	0
			408	408		
5	D	337	Total	O	0	0
			337	337		

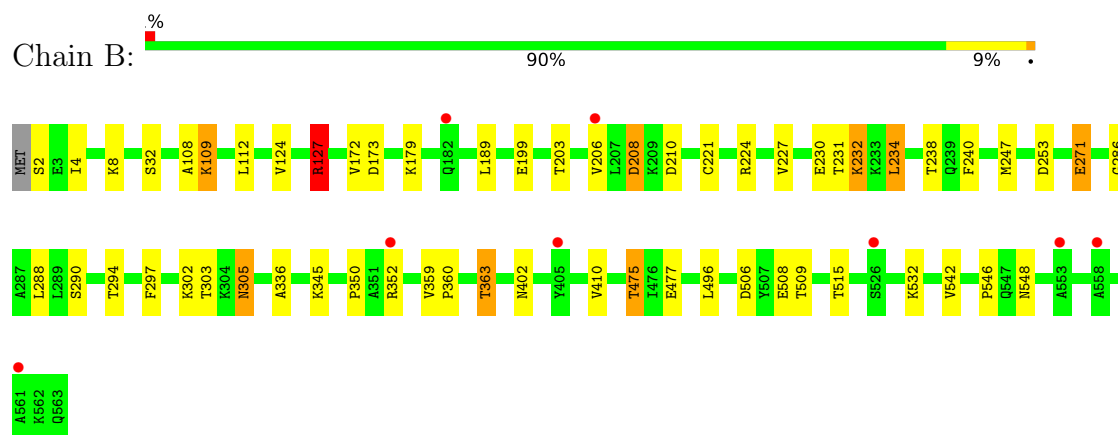
3 Residue-property plots [i](#)

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.

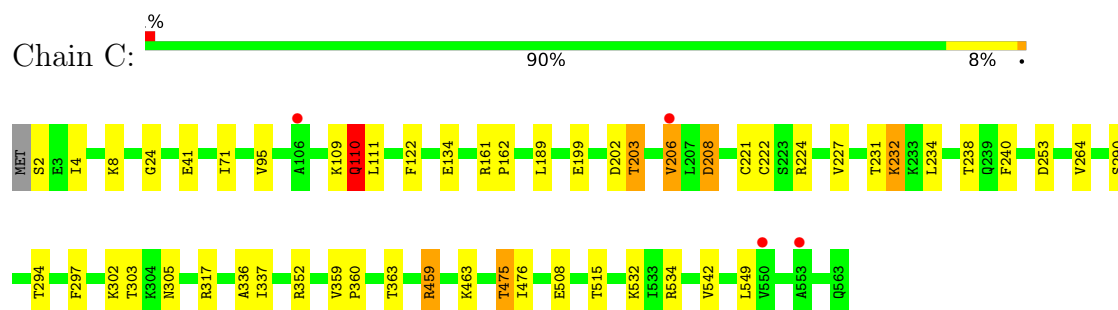
• Molecule 1: PYRUVATE DECARBOXYLASE ISOZYME 1



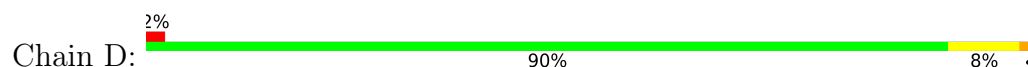
• Molecule 1: PYRUVATE DECARBOXYLASE ISOZYME 1

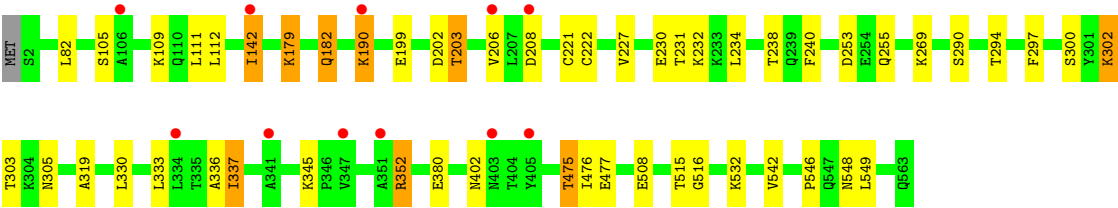


• Molecule 1: PYRUVATE DECARBOXYLASE ISOZYME 1



• Molecule 1: PYRUVATE DECARBOXYLASE ISOZYME 1





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	80.88Å 141.31Å 114.41Å 90.00° 107.19° 90.00°	Depositor
Resolution (Å)	109.11 – 1.71 109.11 – 1.71	Depositor EDS
% Data completeness (in resolution range)	99.1 (109.11-1.71) 99.1 (109.11-1.71)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.24 (at 1.71Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.191 , 0.220 (Not available) , 0.216	Depositor DCC
R_{free} test set	1313 reflections (0.50%)	wwPDB-VP
Wilson B-factor (Å ²)	18.9	Xtriage
Anisotropy	0.333	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 38.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	18994	wwPDB-VP
Average B, all atoms (Å ²)	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.19% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PYR, TPP, MG

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	0.95	6/4411 (0.1%)	0.89	2/5998 (0.0%)
1	B	0.98	11/4411 (0.2%)	0.91	3/5998 (0.1%)
1	C	0.93	11/4411 (0.2%)	0.89	1/5998 (0.0%)
1	D	0.87	6/4411 (0.1%)	0.88	1/5998 (0.0%)
All	All	0.93	34/17644 (0.2%)	0.89	7/23992 (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	7	0
1	B	8	0
1	C	8	0
1	D	8	0
All	All	31	0

All (34) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	208	ASP	CB-CG	-9.45	1.28	1.52
1	B	208	ASP	CB-CG	-7.59	1.33	1.52
1	C	208	ASP	CA-CB	-6.95	1.42	1.53
1	B	232	LYS	C-O	-6.78	1.16	1.24
1	D	232	LYS	C-O	-6.75	1.16	1.24
1	D	230	GLU	C-O	-6.72	1.16	1.24
1	B	232	LYS	CE-NZ	-6.70	1.29	1.49
1	B	230	GLU	C-O	-6.24	1.16	1.24
1	D	475	THR	C-O	-6.12	1.17	1.24
1	D	330	LEU	C-O	-6.01	1.17	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	189	LEU	C-O	-5.85	1.16	1.23
1	C	232	LYS	C-O	-5.80	1.17	1.24
1	C	475	THR	C-O	-5.72	1.17	1.24
1	A	294	THR	C-O	-5.71	1.16	1.24
1	C	208	ASP	C-O	-5.70	1.17	1.24
1	A	203	THR	C-O	-5.61	1.17	1.24
1	B	475	THR	C-O	-5.53	1.17	1.24
1	C	111	LEU	C-O	-5.47	1.17	1.23
1	B	363	THR	C-O	-5.46	1.17	1.24
1	C	203	THR	C-O	-5.42	1.17	1.24
1	A	208	ASP	CB-CG	-5.36	1.38	1.52
1	B	189	LEU	C-O	-5.35	1.17	1.23
1	B	108	ALA	C-O	-5.34	1.17	1.24
1	D	111	LEU	C-O	-5.30	1.17	1.23
1	C	109	LYS	C-O	-5.27	1.16	1.24
1	B	109	LYS	CB-CG	-5.24	1.36	1.52
1	A	202	ASP	C-O	-5.20	1.18	1.24
1	D	203	THR	C-O	-5.16	1.18	1.24
1	B	305	ASN	C-O	-5.12	1.18	1.23
1	C	515	THR	C-O	-5.09	1.18	1.24
1	A	232	LYS	C-O	-5.08	1.18	1.24
1	B	127	ARG	C-O	-5.08	1.18	1.24
1	A	238	THR	C-O	-5.01	1.18	1.24
1	C	208	ASP	N-CA	-5.00	1.40	1.46

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	208	ASP	N-CA-C	6.18	117.69	111.07
1	A	433	ASP	CA-C-N	5.92	127.25	119.84
1	A	433	ASP	C-N-CA	5.92	127.25	119.84
1	D	82	LEU	N-CA-C	5.38	117.15	111.28
1	C	208	ASP	N-CA-CB	-5.14	102.56	110.01
1	B	124	VAL	N-CA-C	5.06	115.79	110.62
1	B	208	ASP	N-CA-CB	-5.05	102.69	110.01

All (31) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	A	203	THR	CB
1	A	231	THR	CB
1	A	238	THR	CB

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Mol	Chain	Res	Type	Atom
1	A	294	THR	CB
1	A	303	THR	CB
1	A	475	THR	CB
1	A	515	THR	CB
1	B	203	THR	CB
1	B	231	THR	CB
1	B	238	THR	CB
1	B	294	THR	CB
1	B	303	THR	CB
1	B	363	THR	CB
1	B	475	THR	CB
1	B	515	THR	CB
1	C	203	THR	CB
1	C	231	THR	CB
1	C	238	THR	CB
1	C	294	THR	CB
1	C	303	THR	CB
1	C	363	THR	CB
1	C	475	THR	CB
1	C	515	THR	CB
1	D	203	THR	CB
1	D	231	THR	CB
1	D	238	THR	CB
1	D	294	THR	CB
1	D	303	THR	CB
1	D	363	THR	CB
1	D	475	THR	CB
1	D	515	THR	CB

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	4320	0	4329	53	0
1	B	4320	0	4330	42	0
1	C	4320	0	4330	41	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	4320	0	4330	46	0
2	A	26	0	15	0	0
2	B	26	0	15	1	0
2	C	26	0	15	1	0
2	D	26	0	15	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
4	A	12	0	0	4	0
4	B	12	0	0	5	0
4	C	12	0	0	5	0
4	D	12	0	0	5	0
5	A	436	0	0	10	0
5	B	377	0	0	9	0
5	C	408	0	0	6	0
5	D	337	0	0	6	0
All	All	18994	0	17379	183	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 5.

All (183) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:221:CYS:SG	4:A:603:PYR:CA	2.06	1.43
1:D:221:CYS:SG	4:D:603:PYR:CA	2.09	1.41
1:C:221:CYS:SG	4:C:603:PYR:CA	2.14	1.35
1:B:221:CYS:SG	4:B:603:PYR:CA	2.18	1.32
1:C:336:ALA:HB2	5:C:2239:HOH:O	1.43	1.15
1:B:336:ALA:HB2	5:B:2245:HOH:O	1.45	1.14
1:D:303:THR:HG22	1:D:305:ASN:H	1.19	1.08
1:C:303:THR:HG22	1:C:305:ASN:H	1.17	1.07
1:D:294:THR:HG23	1:D:297:PHE:H	1.18	1.02
1:C:294:THR:HG23	1:C:297:PHE:H	1.23	1.01
1:B:303:THR:HG22	1:B:305:ASN:H	1.25	1.01
1:D:336:ALA:HB2	5:D:2194:HOH:O	1.60	1.01
1:B:294:THR:HG23	1:B:297:PHE:H	1.22	1.01
1:A:238:THR:HG23	1:A:240:PHE:H	1.23	1.01
1:A:187:MET:HA	1:A:187:MET:HE3	1.43	0.99
1:C:238:THR:HG23	1:C:240:PHE:H	1.28	0.98

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:336:ALA:HB2	5:A:2252:HOH:O	1.63	0.96
1:A:303:THR:HG22	1:A:305:ASN:H	1.29	0.96
1:A:187:MET:HA	1:A:187:MET:CE	1.96	0.95
1:A:294:THR:HG23	1:A:297:PHE:H	1.33	0.94
1:B:238:THR:HG23	1:B:240:PHE:H	1.34	0.93
1:A:154:ARG:HA	1:A:187:MET:HE1	1.51	0.91
1:C:336:ALA:HB2	5:C:2240:HOH:O	1.69	0.91
1:A:206:VAL:CG2	5:A:2155:HOH:O	2.17	0.90
5:B:2052:HOH:O	1:C:317:ARG:HD2	1.72	0.87
1:B:203:THR:HG21	5:B:2153:HOH:O	1.75	0.87
1:D:227:VAL:O	1:D:231:THR:HG23	1.75	0.86
1:A:221:CYS:SG	4:A:603:PYR:CB	2.64	0.86
1:D:203:THR:HG21	5:D:2122:HOH:O	1.76	0.85
1:C:221:CYS:SG	4:C:603:PYR:CB	2.67	0.83
1:A:203:THR:HG21	5:A:2151:HOH:O	1.79	0.83
1:D:238:THR:HG23	1:D:240:PHE:H	1.45	0.81
1:A:290:SER:O	1:A:294:THR:HG22	1.79	0.81
1:B:227:VAL:O	1:B:231:THR:HG23	1.81	0.81
1:C:203:THR:HG21	5:C:2151:HOH:O	1.80	0.81
1:C:360:PRO:O	1:C:363:THR:HG23	1.83	0.79
1:C:290:SER:O	1:C:294:THR:HG22	1.83	0.79
1:B:234:LEU:O	1:B:238:THR:HG22	1.84	0.78
1:B:290:SER:O	1:B:294:THR:HG22	1.83	0.77
1:D:234:LEU:O	1:D:238:THR:HG22	1.85	0.76
1:D:352:ARG:HG2	1:D:352:ARG:HH11	1.47	0.75
1:B:221:CYS:SG	4:B:603:PYR:CB	2.74	0.75
1:B:206:VAL:HG13	5:B:2158:HOH:O	1.86	0.74
1:C:303:THR:HG22	1:C:305:ASN:N	1.99	0.74
1:A:227:VAL:O	1:A:231:THR:HG23	1.88	0.74
1:A:199:GLU:O	1:A:203:THR:HG23	1.88	0.73
1:A:303:THR:HG23	5:A:2228:HOH:O	1.87	0.73
1:D:179:LYS:HE3	1:D:182:GLN:HG3	1.70	0.72
1:D:290:SER:O	1:D:294:THR:HG22	1.89	0.72
1:D:221:CYS:SG	4:D:603:PYR:C	2.76	0.71
1:C:359:VAL:HB	1:C:363:THR:HG21	1.74	0.70
1:B:199:GLU:O	1:B:203:THR:HG23	1.90	0.70
1:D:199:GLU:O	1:D:203:THR:HG23	1.92	0.70
1:B:360:PRO:O	1:B:363:THR:HG23	1.93	0.69
1:D:221:CYS:SG	4:D:603:PYR:CB	2.80	0.69
1:D:294:THR:CG2	1:D:297:PHE:H	2.02	0.69
1:B:221:CYS:SG	4:B:603:PYR:C	2.81	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:221:CYS:SG	4:A:603:PYR:C	2.80	0.68
1:C:234:LEU:O	1:C:238:THR:HG22	1.94	0.67
1:C:221:CYS:SG	4:C:603:PYR:C	2.82	0.67
1:C:294:THR:CG2	1:C:297:PHE:H	2.03	0.67
1:B:127:ARG:HH11	1:B:127:ARG:HG2	1.59	0.66
1:A:203:THR:O	1:A:206:VAL:HG22	1.96	0.65
1:C:227:VAL:O	1:C:231:THR:HG23	1.96	0.65
1:B:508:GLU:HG3	1:B:532:LYS:HD2	1.79	0.65
1:B:294:THR:HG23	1:B:297:PHE:N	2.05	0.65
1:D:303:THR:HG22	1:D:305:ASN:N	2.02	0.65
1:D:475:THR:HG22	1:D:542:VAL:O	1.98	0.64
1:B:206:VAL:HG11	5:B:2055:HOH:O	1.98	0.63
2:C:600:TPP:H7'2	4:C:602:PYR:C	2.29	0.62
1:A:221:CYS:CB	4:A:603:PYR:CA	2.78	0.62
1:D:300:SER:O	1:D:302:LYS:HE2	1.99	0.62
1:D:203:THR:O	1:D:206:VAL:HG12	1.98	0.62
1:B:359:VAL:HB	1:B:363:THR:HG21	1.81	0.61
1:D:380:GLU:HG2	1:D:402:ASN:O	2.00	0.61
1:A:336:ALA:CB	5:A:2252:HOH:O	2.35	0.61
1:B:247:MET:HE2	1:B:410:VAL:HB	1.83	0.60
1:B:206:VAL:HG23	5:B:2059:HOH:O	2.02	0.59
1:D:105:SER:O	1:D:109:LYS:HG2	2.01	0.59
1:D:206:VAL:HG13	5:D:2125:HOH:O	2.03	0.59
1:D:179:LYS:CE	1:D:182:GLN:HG3	2.32	0.59
1:A:234:LEU:O	1:A:238:THR:HG22	2.03	0.59
1:A:508:GLU:HG3	1:A:532:LYS:HD2	1.84	0.59
1:C:202:ASP:O	1:C:206:VAL:CG1	2.51	0.58
1:D:206:VAL:CG1	5:D:2125:HOH:O	2.51	0.58
1:C:202:ASP:O	1:C:206:VAL:HG12	2.04	0.58
1:A:206:VAL:HG21	5:A:2155:HOH:O	1.92	0.57
1:D:182:GLN:HA	1:D:182:GLN:HE21	1.70	0.57
1:A:187:MET:HA	1:A:187:MET:HE2	1.85	0.57
1:A:202:ASP:O	1:A:206:VAL:HG13	2.03	0.57
1:B:127:ARG:HH11	1:B:127:ARG:CG	2.18	0.56
1:C:199:GLU:O	1:C:203:THR:HG23	2.06	0.55
1:A:363:THR:HB	1:A:515:THR:CG2	2.35	0.55
1:A:475:THR:HG22	1:A:542:VAL:O	2.07	0.55
1:D:352:ARG:HG2	1:D:352:ARG:NH1	2.19	0.55
1:D:294:THR:HG23	1:D:297:PHE:N	2.03	0.54
1:D:333:LEU:O	1:D:337:ILE:HB	2.08	0.54
1:B:232:LYS:HE3	5:B:2171:HOH:O	2.06	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:459:ARG:NH1	5:C:2326:HOH:O	2.38	0.53
1:A:359:VAL:HG23	1:A:515:THR:HG21	1.91	0.53
1:C:475:THR:HG22	1:C:542:VAL:O	2.09	0.52
1:A:171:LEU:HD12	1:A:174:LEU:HD12	1.90	0.52
1:D:476:ILE:HG13	1:D:549:LEU:HD11	1.91	0.52
1:D:221:CYS:CB	4:D:603:PYR:CA	2.88	0.52
1:A:206:VAL:HG23	5:A:2155:HOH:O	1.97	0.52
1:A:363:THR:HB	1:A:515:THR:HG22	1.93	0.51
1:B:294:THR:CG2	1:B:297:PHE:H	2.11	0.51
1:C:206:VAL:HG22	5:C:2155:HOH:O	2.11	0.51
1:C:221:CYS:CB	4:C:603:PYR:CA	2.89	0.51
1:A:303:THR:HG22	1:A:305:ASN:N	2.12	0.50
1:B:206:VAL:CG1	5:B:2158:HOH:O	2.52	0.50
1:A:187:MET:CE	1:A:187:MET:CA	2.75	0.49
1:A:228:LYS:HE3	1:A:251:SER:HA	1.94	0.49
1:B:475:THR:HG22	1:B:542:VAL:O	2.11	0.49
1:B:477:GLU:OE2	4:B:602:PYR:OXT	2.31	0.49
1:A:105:SER:O	1:A:109:LYS:HG3	2.12	0.49
1:C:134:GLU:HB2	1:C:161:ARG:HB2	1.94	0.49
1:D:546:PRO:HB2	1:D:548:ASN:OD1	2.13	0.48
1:C:303:THR:HG21	1:C:305:ASN:HB3	1.96	0.48
1:C:95:VAL:O	1:C:162:PRO:HA	2.14	0.48
1:A:154:ARG:HA	1:A:187:MET:CE	2.32	0.48
1:D:255:GLN:HB2	1:D:402:ASN:OD1	2.13	0.48
1:A:95:VAL:O	1:A:162:PRO:HA	2.13	0.47
1:B:224:ARG:CZ	1:B:224:ARG:HA	2.44	0.47
1:A:515:THR:HG23	5:A:2283:HOH:O	2.13	0.47
1:D:206:VAL:HG23	5:D:2129:HOH:O	2.14	0.47
1:A:303:THR:HG22	1:A:304:LYS:N	2.30	0.46
2:B:600:TPP:H7'2	4:B:602:PYR:C	2.45	0.46
1:A:294:THR:CG2	1:A:297:PHE:H	2.15	0.46
1:C:232:LYS:NZ	1:C:253:ASP:OD2	2.48	0.46
1:A:273:LYS:HE2	5:A:2206:HOH:O	2.15	0.46
1:C:508:GLU:HG3	1:C:532:LYS:HD2	1.97	0.46
1:A:253:ASP:HB3	1:A:402:ASN:OD1	2.16	0.45
1:A:476:ILE:HG13	1:A:549:LEU:HD11	1.99	0.45
1:D:475:THR:CG2	1:D:542:VAL:O	2.63	0.45
1:B:127:ARG:CG	1:B:127:ARG:NH1	2.80	0.45
1:C:336:ALA:CB	5:C:2239:HOH:O	2.26	0.45
1:C:549:LEU:HD12	1:C:549:LEU:O	2.18	0.44
1:D:508:GLU:HG3	1:D:532:LYS:HD2	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:477:GLU:OE2	4:D:602:PYR:OXT	2.36	0.44
1:D:179:LYS:NZ	1:D:182:GLN:HG3	2.32	0.44
1:B:288:LEU:C	1:B:288:LEU:HD23	2.42	0.44
1:B:303:THR:HG22	1:B:305:ASN:N	2.10	0.44
1:D:222:CYS:SG	1:D:231:THR:HG21	2.57	0.44
1:C:476:ILE:HG13	1:C:549:LEU:HD11	1.99	0.43
1:C:4:ILE:HG12	1:C:8:LYS:HB3	2.00	0.43
1:B:271:GLU:HB3	1:B:350:PRO:HB3	1.99	0.43
1:B:336:ALA:CB	5:B:2245:HOH:O	2.28	0.43
1:A:546:PRO:HB2	1:A:548:ASN:OD1	2.19	0.43
1:B:253:ASP:HB3	1:B:402:ASN:OD1	2.18	0.43
1:C:303:THR:CG2	1:C:305:ASN:HB3	2.49	0.43
1:C:24:GLY:HA3	1:C:71:ILE:O	2.19	0.43
1:A:229:ALA:O	1:A:233:LYS:HG3	2.19	0.42
1:D:253:ASP:HB3	1:D:402:ASN:OD1	2.20	0.42
1:D:190:LYS:HB2	1:D:190:LYS:HE3	1.86	0.42
1:D:269:LYS:HB3	1:D:269:LYS:HE2	1.83	0.42
1:A:344:TYR:CE2	1:A:346:PRO:HA	2.55	0.42
1:B:4:ILE:HG12	1:B:8:LYS:HB3	2.02	0.42
1:B:32:SER:OG	1:B:173:ASP:OD2	2.32	0.42
1:A:224:ARG:HA	1:A:224:ARG:CZ	2.50	0.42
1:A:345:LYS:H	1:A:345:LYS:HG2	1.68	0.42
1:B:221:CYS:HB2	1:B:286:GLY:CA	2.51	0.41
1:C:110:GLN:HB3	1:C:122:PHE:HE2	1.85	0.41
1:C:532:LYS:HE3	1:C:532:LYS:HB3	1.82	0.41
1:A:224:ARG:HD2	5:A:2166:HOH:O	2.18	0.41
1:A:319:ALA:HB1	1:D:319:ALA:HB1	2.01	0.41
1:D:202:ASP:HB2	5:D:2124:HOH:O	2.20	0.41
1:D:179:LYS:HD2	1:D:179:LYS:HA	1.58	0.41
1:A:282:ILE:HD12	1:A:306:ILE:HD12	2.03	0.41
1:B:363:THR:HB	1:B:515:THR:HG22	2.02	0.41
1:C:222:CYS:SG	1:C:231:THR:HG21	2.61	0.41
1:C:508:GLU:HB2	1:C:534:ARG:HG2	2.03	0.41
1:D:142:ILE:H	1:D:142:ILE:HG13	1.53	0.41
1:A:475:THR:CG2	1:A:542:VAL:O	2.69	0.40
1:A:478:LYS:HB3	1:A:483:PRO:HA	2.03	0.40
1:B:203:THR:O	1:B:206:VAL:HG12	2.21	0.40
1:C:303:THR:CG2	1:C:305:ASN:CB	2.99	0.40
1:C:224:ARG:HA	1:C:224:ARG:CZ	2.51	0.40
1:A:255:GLN:HB2	1:A:402:ASN:OD1	2.20	0.40
1:B:496:LEU:HD22	1:B:509:THR:HB	2.03	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:506:ASP:OD1	1:B:532:LYS:HE3	2.21	0.40
1:B:546:PRO:HB2	1:B:548:ASN:OD1	2.21	0.40
1:D:515:THR:HG23	1:D:516:GLY:N	2.35	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	560/563 (100%)	551 (98%)	9 (2%)	0	100	100
1	B	560/563 (100%)	546 (98%)	14 (2%)	0	100	100
1	C	560/563 (100%)	546 (98%)	13 (2%)	1 (0%)	43	31
1	D	560/563 (100%)	550 (98%)	10 (2%)	0	100	100
All	All	2240/2252 (100%)	2193 (98%)	46 (2%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	110	GLN

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	465/466 (100%)	456 (98%)	9 (2%)	50	27
1	B	465/466 (100%)	452 (97%)	13 (3%)	38	15
1	C	465/466 (100%)	454 (98%)	11 (2%)	43	20
1	D	465/466 (100%)	455 (98%)	10 (2%)	45	23
All	All	1860/1864 (100%)	1817 (98%)	43 (2%)	44	21

All (43) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	82	LEU
1	A	109	LYS
1	A	171	LEU
1	A	187	MET
1	A	208	ASP
1	A	209	LYS
1	A	264	VAL
1	A	345	LYS
1	A	505	LYS
1	B	2	SER
1	B	109	LYS
1	B	112	LEU
1	B	127	ARG
1	B	172	VAL
1	B	179	LYS
1	B	208	ASP
1	B	210	ASP
1	B	234	LEU
1	B	271	GLU
1	B	302	LYS
1	B	345	LYS
1	B	352	ARG
1	C	2	SER
1	C	41	GLU
1	C	110	GLN
1	C	206	VAL
1	C	208	ASP
1	C	264	VAL
1	C	302	LYS
1	C	337	ILE
1	C	352	ARG
1	C	459	ARG
1	C	463	LYS

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Mol	Chain	Res	Type
1	D	112	LEU
1	D	142	ILE
1	D	179	LYS
1	D	182	GLN
1	D	190	LYS
1	D	208	ASP
1	D	302	LYS
1	D	337	ILE
1	D	345	LYS
1	D	352	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	305	ASN
1	A	397	GLN
1	B	110	GLN
1	B	175	ASN
1	B	325	GLN
1	B	397	GLN
1	C	114	HIS
1	C	175	ASN
1	C	213	ASN
1	C	239	GLN
1	D	403	ASN
1	D	486	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

Of 16 ligands modelled in this entry, 4 are monoatomic - leaving 12 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	PYR	B	603	-	5,5,5	2.52	3 (60%)	3,6,6	1.88	1 (33%)
4	PYR	C	603	-	5,5,5	2.40	3 (60%)	3,6,6	3.66	3 (100%)
2	TPP	A	600	4,3	26,27,27	1.61	5 (19%)	38,40,40	1.48	6 (15%)
4	PYR	C	602	2	5,5,5	2.61	2 (40%)	3,6,6	5.52	3 (100%)
4	PYR	D	603	-	5,5,5	2.73	2 (40%)	3,6,6	2.96	3 (100%)
2	TPP	B	600	4,3	26,27,27	1.30	5 (19%)	38,40,40	1.70	9 (23%)
4	PYR	A	603	-	5,5,5	2.45	2 (40%)	3,6,6	2.66	2 (66%)
2	TPP	C	600	4,3	26,27,27	1.74	9 (34%)	38,40,40	1.74	9 (23%)
4	PYR	B	602	2	5,5,5	2.43	2 (40%)	3,6,6	4.99	3 (100%)
4	PYR	A	602	2	5,5,5	2.68	2 (40%)	3,6,6	4.85	2 (66%)
4	PYR	D	602	2	5,5,5	2.50	2 (40%)	3,6,6	4.54	3 (100%)
2	TPP	D	600	4,3	26,27,27	1.67	7 (26%)	38,40,40	1.78	9 (23%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	PYR	B	603	-	-	1/4/4/4	-
4	PYR	C	603	-	-	2/4/4/4	-
2	TPP	A	600	4,3	-	3/17/17/17	0/2/2/2
4	PYR	C	602	2	-	2/4/4/4	-
4	PYR	D	603	-	-	1/4/4/4	-
2	TPP	B	600	4,3	-	2/17/17/17	0/2/2/2
4	PYR	A	603	-	-	2/4/4/4	-
2	TPP	C	600	4,3	-	2/17/17/17	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	PYR	B	602	2	-	2/4/4/4	-
4	PYR	A	602	2	-	3/4/4/4	-
4	PYR	D	602	2	-	3/4/4/4	-
2	TPP	D	600	4,3	-	2/17/17/17	0/2/2/2

All (44) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	603	PYR	CA-C	-5.03	1.37	1.54
4	C	602	PYR	CA-C	-4.59	1.39	1.54
4	D	602	PYR	CA-C	-4.54	1.39	1.54
4	A	603	PYR	CA-C	-4.42	1.39	1.54
4	B	602	PYR	CA-C	-4.07	1.40	1.54
4	A	602	PYR	CA-C	-4.05	1.40	1.54
2	C	600	TPP	C5-S1	-3.96	1.62	1.72
4	B	603	PYR	CA-C	-3.96	1.41	1.54
4	A	602	PYR	O-C	3.72	1.31	1.22
2	A	600	TPP	C2'-N1'	3.68	1.40	1.34
4	C	603	PYR	CA-C	-3.59	1.42	1.54
2	A	600	TPP	C5-S1	-3.28	1.64	1.72
2	D	600	TPP	C4'-N3'	3.20	1.39	1.35
4	B	602	PYR	O-C	3.15	1.30	1.22
2	D	600	TPP	C5-S1	-3.03	1.64	1.72
4	C	602	PYR	O-C	2.99	1.30	1.22
2	C	600	TPP	C4'-N3'	2.98	1.39	1.35
2	A	600	TPP	C6'-N1'	2.83	1.40	1.34
2	C	600	TPP	C6'-N1'	2.82	1.40	1.34
2	D	600	TPP	C5-C4	2.74	1.41	1.35
2	D	600	TPP	C2'-N3'	2.72	1.38	1.34
2	C	600	TPP	C2-N3	2.72	1.39	1.32
2	B	600	TPP	C5-S1	-2.69	1.65	1.72
2	D	600	TPP	C6'-N1'	2.65	1.39	1.34
2	D	600	TPP	C2'-N1'	2.64	1.38	1.34
4	C	603	PYR	O3-CA	2.58	1.29	1.23
2	C	600	TPP	C2'-N1'	2.54	1.38	1.34
4	D	603	PYR	O3-CA	2.51	1.28	1.23
4	B	603	PYR	O-C	2.49	1.28	1.22
2	B	600	TPP	C2-N3	2.48	1.38	1.32
2	B	600	TPP	C5-C4	2.43	1.40	1.35
2	A	600	TPP	C5-C4	2.40	1.40	1.35
2	D	600	TPP	C2-N3	2.40	1.38	1.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	600	TPP	C5-C4	2.39	1.40	1.35
2	B	600	TPP	C6'-N1'	2.28	1.39	1.34
2	A	600	TPP	C2-N3	2.25	1.37	1.32
2	C	600	TPP	C2'-N3'	2.21	1.37	1.34
2	C	600	TPP	C4-N3	-2.17	1.35	1.39
4	D	602	PYR	OXT-C	-2.15	1.24	1.30
4	B	603	PYR	OXT-C	-2.13	1.24	1.30
2	C	600	TPP	C2-S1	-2.13	1.62	1.69
4	C	603	PYR	O-C	2.11	1.27	1.22
4	A	603	PYR	O3-CA	2.07	1.27	1.23
2	B	600	TPP	C2'-N1'	2.06	1.37	1.34

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	602	PYR	O3-CA-CB	-8.78	100.12	119.77
4	A	602	PYR	O3-CA-CB	-7.65	102.64	119.77
4	B	602	PYR	O3-CA-CB	-7.37	103.25	119.77
4	D	602	PYR	OXT-C-O	-5.14	111.66	123.90
4	D	602	PYR	O3-CA-CB	-5.12	108.30	119.77
2	D	600	TPP	CM2-C2'-N1'	4.57	122.07	117.20
4	C	603	PYR	OXT-C-O	-4.45	113.30	123.90
2	C	600	TPP	N1'-C2'-N3'	-4.24	118.47	125.53
2	B	600	TPP	N1'-C2'-N3'	-4.14	118.65	125.53
2	D	600	TPP	C2-N3-C4	-4.09	108.53	114.06
2	A	600	TPP	N1'-C2'-N3'	-3.99	118.89	125.53
2	C	600	TPP	C2-N3-C4	-3.95	108.73	114.06
2	D	600	TPP	S1-C2-N3	3.93	117.27	112.30
2	B	600	TPP	CM2-C2'-N1'	3.78	121.23	117.20
2	A	600	TPP	CM2-C2'-N1'	3.75	121.20	117.20
2	B	600	TPP	C2-N3-C4	-3.75	108.99	114.06
4	B	602	PYR	OXT-C-O	-3.55	115.45	123.90
4	A	603	PYR	O3-CA-CB	-3.48	111.98	119.77
2	D	600	TPP	N1'-C2'-N3'	-3.46	119.77	125.53
2	B	600	TPP	S1-C2-N3	3.42	116.63	112.30
4	C	603	PYR	O3-CA-CB	-3.37	112.23	119.77
2	A	600	TPP	C2-N3-C4	-3.34	109.55	114.06
2	B	600	TPP	C6'-N1'-C2'	3.25	121.42	116.07
2	C	600	TPP	S1-C2-N3	3.16	116.30	112.30
4	A	602	PYR	OXT-C-O	-3.10	116.51	123.90
2	D	600	TPP	C6'-N1'-C2'	3.08	121.13	116.07
4	D	603	PYR	OXT-C-CA	3.04	122.02	113.59

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	602	PYR	OXT-C-CA	3.04	122.02	113.59
4	C	603	PYR	OXT-C-CA	3.01	121.93	113.59
2	C	600	TPP	CM2-C2'-N3'	3.00	121.61	117.13
4	C	602	PYR	OXT-C-O	-2.97	116.82	123.90
4	D	603	PYR	O3-CA-CB	-2.97	113.12	119.77
2	D	600	TPP	C2-S1-C5	-2.93	89.28	91.22
2	A	600	TPP	C2'-N3'-C4'	2.89	122.54	118.10
4	D	603	PYR	OXT-C-O	-2.88	117.05	123.90
4	B	602	PYR	OXT-C-CA	2.77	121.28	113.59
2	C	600	TPP	C6'-N1'-C2'	2.75	120.59	116.07
2	C	600	TPP	C2'-N3'-C4'	2.66	122.19	118.10
2	C	600	TPP	C4-C5-S1	2.63	114.67	110.56
4	B	603	PYR	OXT-C-O	-2.57	117.78	123.90
2	C	600	TPP	CM2-C2'-N1'	2.55	119.91	117.20
2	D	600	TPP	C5'-C6'-N1'	-2.41	119.92	123.83
2	A	600	TPP	S1-C2-N3	2.39	115.33	112.30
4	A	603	PYR	OXT-C-O	-2.39	118.22	123.90
4	C	602	PYR	OXT-C-CA	2.39	120.20	113.59
2	D	600	TPP	C4-C5-S1	2.35	114.23	110.56
2	C	600	TPP	C2-S1-C5	-2.29	89.70	91.22
2	B	600	TPP	C2'-N3'-C4'	2.28	121.61	118.10
2	B	600	TPP	C2-S1-C5	-2.24	89.73	91.22
2	B	600	TPP	C4-C5-S1	2.23	114.03	110.56
2	A	600	TPP	C6'-N1'-C2'	2.21	119.71	116.07
2	D	600	TPP	C6'-C5'-C4'	2.16	118.20	115.55
2	B	600	TPP	CM2-C2'-N3'	2.00	120.12	117.13

There are no chirality outliers.

All (25) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	600	TPP	PA-O3A-PB-O3B
2	B	600	TPP	PA-O3A-PB-O3B
2	C	600	TPP	PA-O3A-PB-O3B
2	D	600	TPP	PA-O3A-PB-O3B
4	A	602	PYR	O-C-CA-CB
4	A	602	PYR	OXT-C-CA-CB
4	A	603	PYR	OXT-C-CA-CB
4	B	602	PYR	OXT-C-CA-CB
4	B	603	PYR	OXT-C-CA-CB
4	C	602	PYR	O-C-CA-CB
4	D	602	PYR	OXT-C-CA-CB

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Mol	Chain	Res	Type	Atoms
4	D	603	PYR	OXT-C-CA-CB
4	B	602	PYR	O-C-CA-CB
4	D	602	PYR	O-C-CA-CB
4	A	602	PYR	OXT-C-CA-O3
4	C	602	PYR	OXT-C-CA-CB
4	C	603	PYR	OXT-C-CA-CB
4	D	602	PYR	OXT-C-CA-O3
4	A	603	PYR	O-C-CA-CB
4	C	603	PYR	O-C-CA-CB
2	A	600	TPP	PA-O3A-PB-O1B
2	A	600	TPP	PA-O3A-PB-O2B
2	B	600	TPP	PA-O3A-PB-O2B
2	C	600	TPP	PA-O3A-PB-O2B
2	D	600	TPP	PA-O3A-PB-O2B

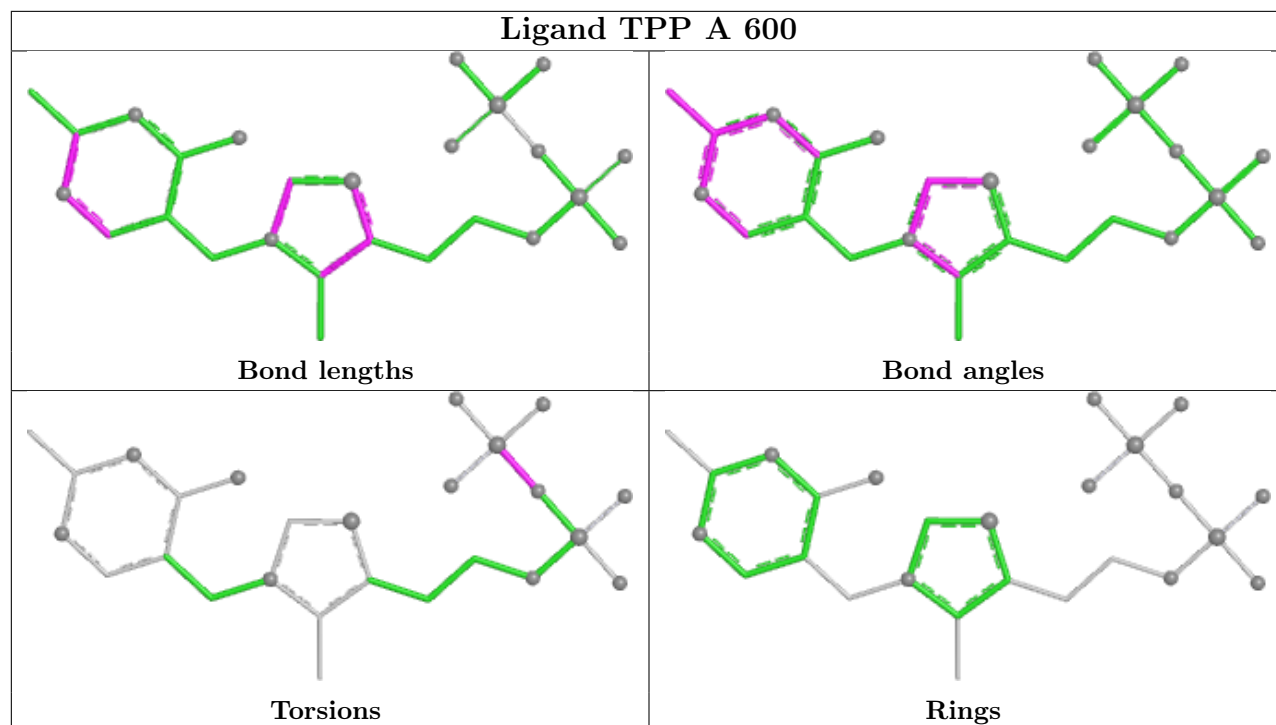
There are no ring outliers.

9 monomers are involved in 19 short contacts:

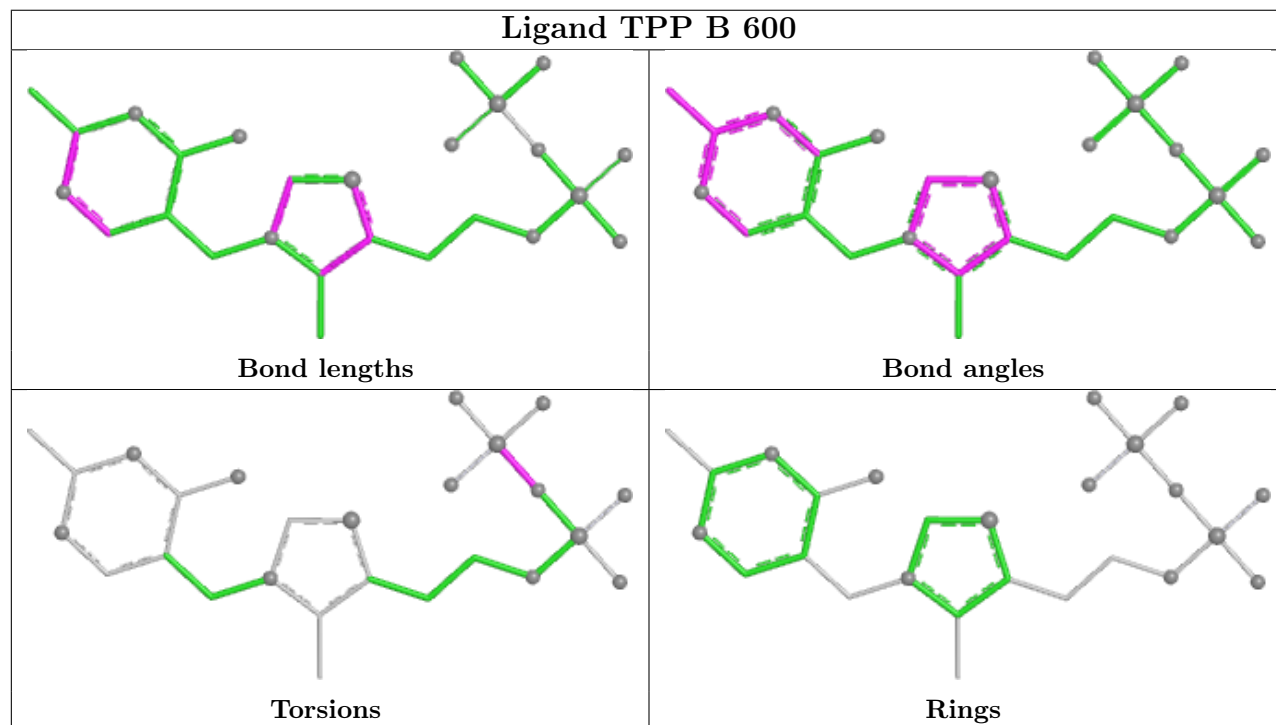
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	603	PYR	3	0
4	C	603	PYR	4	0
4	C	602	PYR	1	0
4	D	603	PYR	4	0
2	B	600	TPP	1	0
4	A	603	PYR	4	0
2	C	600	TPP	1	0
4	B	602	PYR	2	0
4	D	602	PYR	1	0

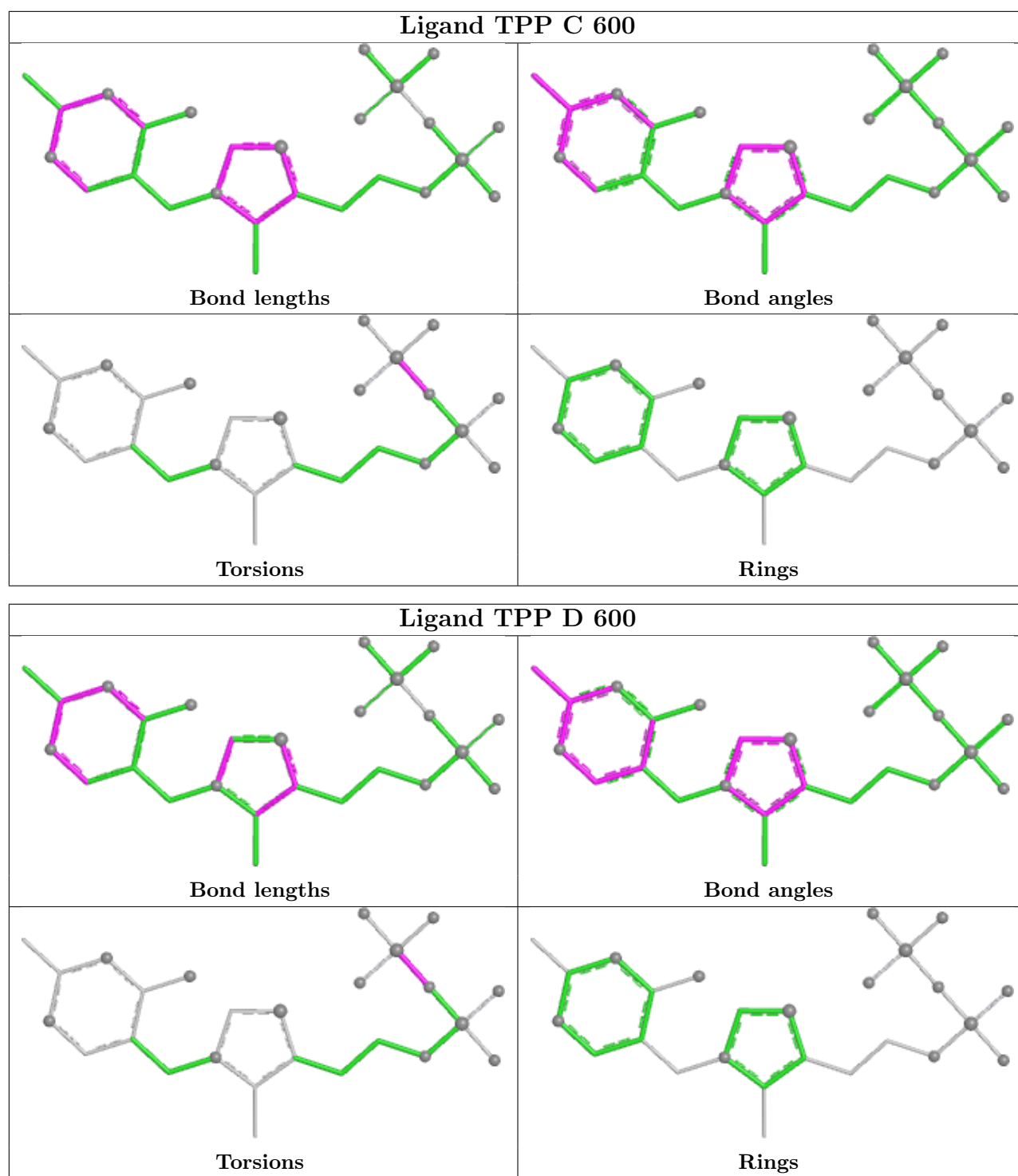
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

Ligand TPP A 600



Ligand TPP B 600





5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	562/563 (99%)	-0.09	3 (0%) 87 90	10, 18, 30, 39	0
1	B	562/563 (99%)	-0.10	8 (1%) 73 79	10, 17, 27, 38	0
1	C	562/563 (99%)	-0.02	4 (0%) 84 88	11, 19, 31, 41	0
1	D	562/563 (99%)	0.25	11 (1%) 65 72	12, 22, 35, 40	0
All	All	2248/2252 (99%)	0.01	26 (1%) 76 81	10, 19, 32, 41	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	553	ALA	4.1
1	D	206	VAL	3.7
1	C	206	VAL	3.6
1	B	206	VAL	3.1
1	B	405	TYR	3.1
1	A	206	VAL	2.9
1	D	142	ILE	2.9
1	C	553	ALA	2.8
1	D	351	ALA	2.7
1	D	347	VAL	2.5
1	D	208	ASP	2.5
1	B	558	ALA	2.4
1	B	561	ALA	2.4
1	A	4	ILE	2.3
1	A	178	ALA	2.3
1	D	334	LEU	2.3
1	B	182	GLN	2.3
1	D	405	TYR	2.3
1	D	190	LYS	2.3
1	B	526	SER	2.2
1	C	550	VAL	2.2

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Mol	Chain	Res	Type	RSRZ
1	C	106	ALA	2.1
1	D	106	ALA	2.1
1	B	352	ARG	2.1
1	D	341	ALA	2.0
1	D	403	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 oligosaccharides in this entry.

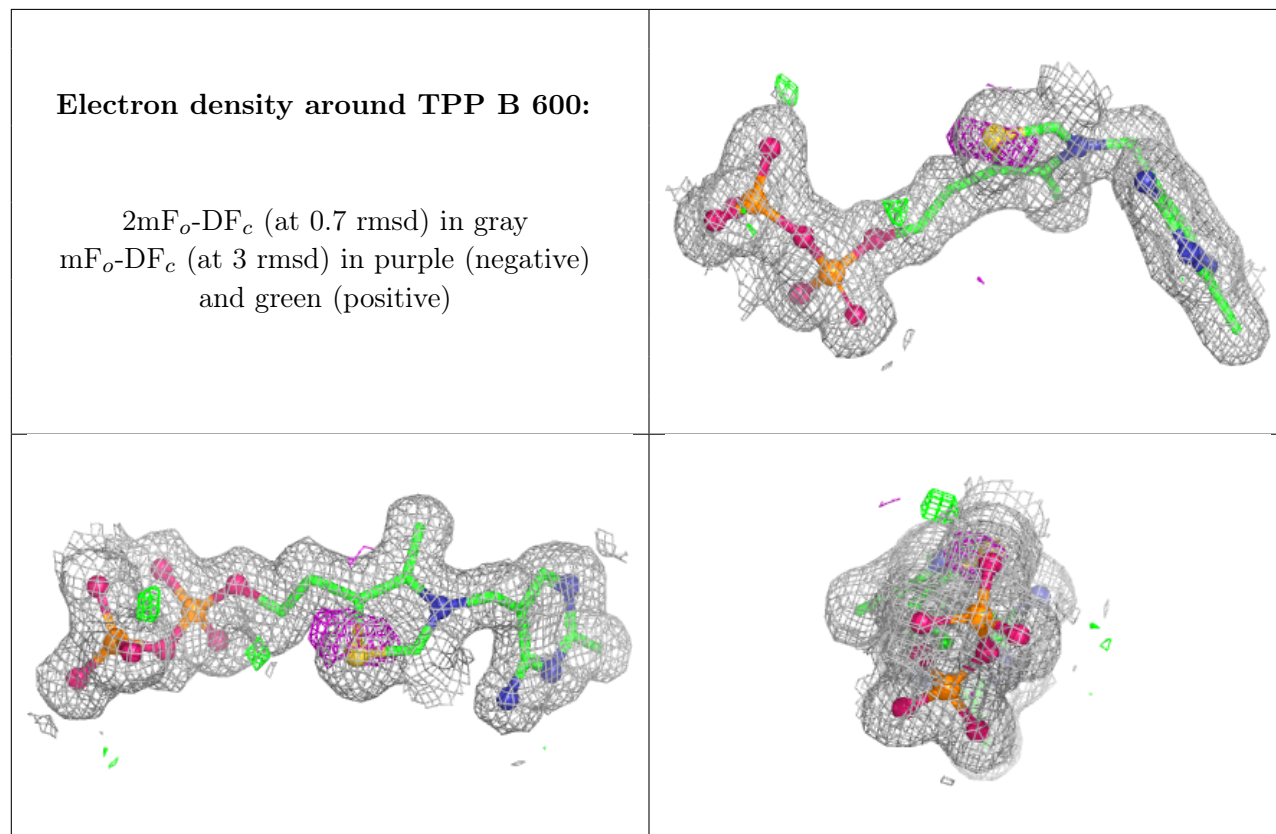
6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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
4	PYR	B	602	6/6	0.88	0.10	32,33,35,35	0
4	PYR	C	603	6/6	0.88	0.11	23,23,25,25	0
4	PYR	D	602	6/6	0.88	0.10	33,35,37,39	0
4	PYR	A	602	6/6	0.89	0.12	32,34,35,36	0
4	PYR	C	602	6/6	0.90	0.11	34,38,39,39	0
4	PYR	B	603	6/6	0.94	0.08	16,19,20,21	0
4	PYR	A	603	6/6	0.94	0.09	22,23,25,26	0
4	PYR	D	603	6/6	0.94	0.09	24,26,27,28	0
3	MG	A	601	1/1	0.98	0.03	15,15,15,15	0
3	MG	B	601	1/1	0.98	0.03	15,15,15,15	0
3	MG	C	601	1/1	0.98	0.04	17,17,17,17	0
3	MG	D	601	1/1	0.98	0.04	19,19,19,19	0
2	TPP	B	600	26/26	0.98	0.05	10,13,15,16	0
2	TPP	D	600	26/26	0.98	0.04	13,15,16,17	0
2	TPP	C	600	26/26	0.99	0.04	13,15,18,20	0
2	TPP	A	600	26/26	0.99	0.04	10,13,15,15	0

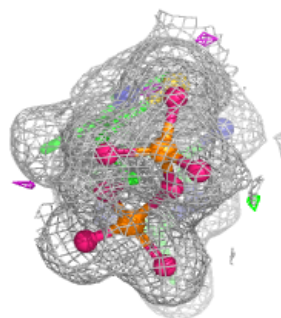
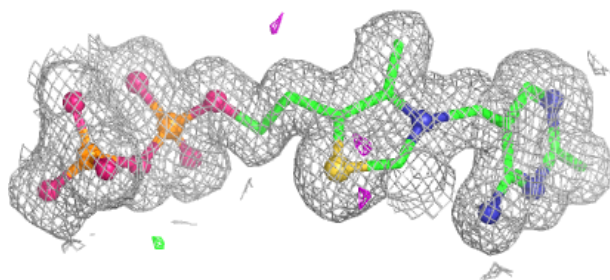
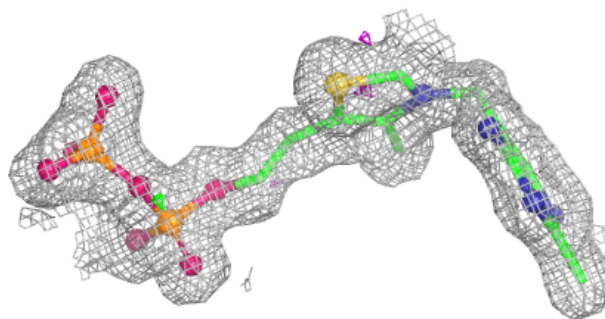
The following is a graphical depiction of the model fit to experimental electron density of all

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.

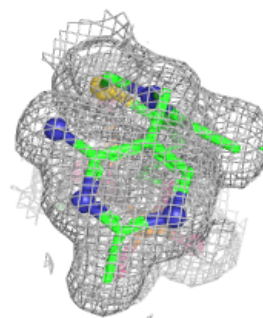
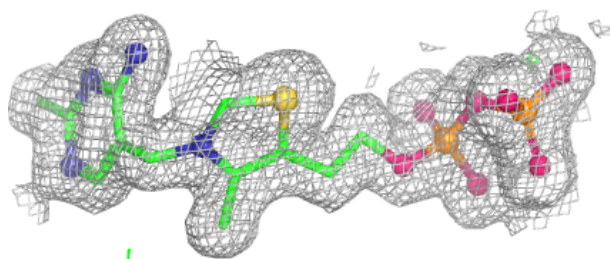
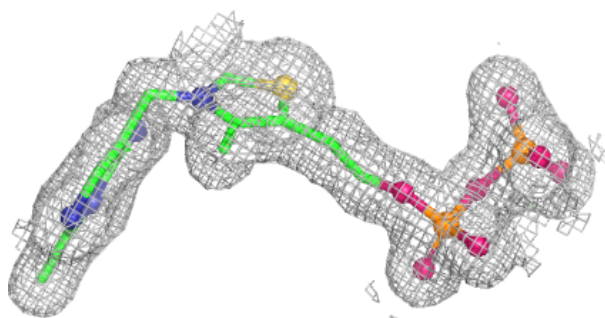


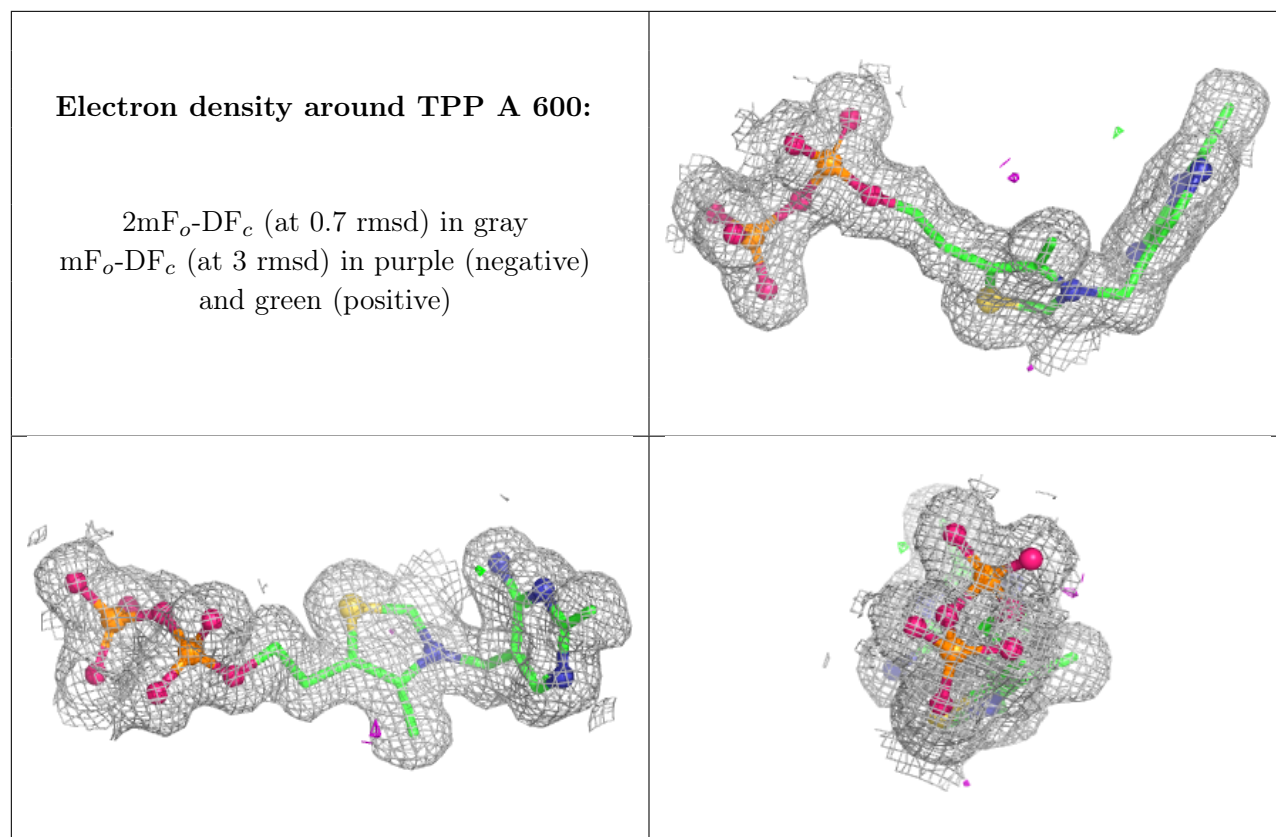
Electron density around TPP D 600:

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

**Electron density around TPP C 600:**

$2mF_o-DF_c$ (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.