Full wwPDB X-ray Structure Validation Report ⓘ

Dec 8, 2025 – 12:32 PM EST

PDB ID	:	9ZGL / pdb_00009zgl
Title	:	Ancestrally reconstructed acetolactate synthase - Ancestor N259 with bound ThDP and magnesium.
Authors	:	Douw, A.; Guddat, L.W.
Deposited on	:	2025-12-03
Resolution	:	2.99 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:

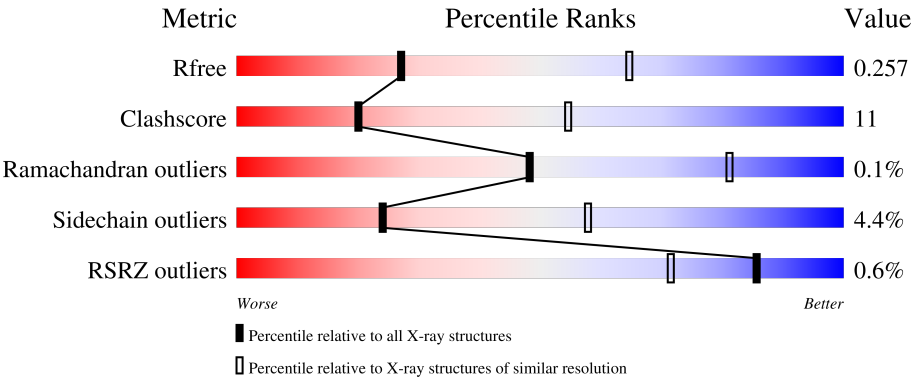
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.47

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 2.99 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	2511 (3.00-3.00)
Clashscore	180529	2866 (3.00-3.00)
Ramachandran outliers	177936	2778 (3.00-3.00)
Sidechain outliers	177891	2781 (3.00-3.00)
RSRZ outliers	164620	2523 (3.00-3.00)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	572	71% 22% • 6%
1	B	572	72% 22% • 5%
1	C	572	69% 24% • 6%
1	D	572	71% 22% • 6%

2 Entry composition

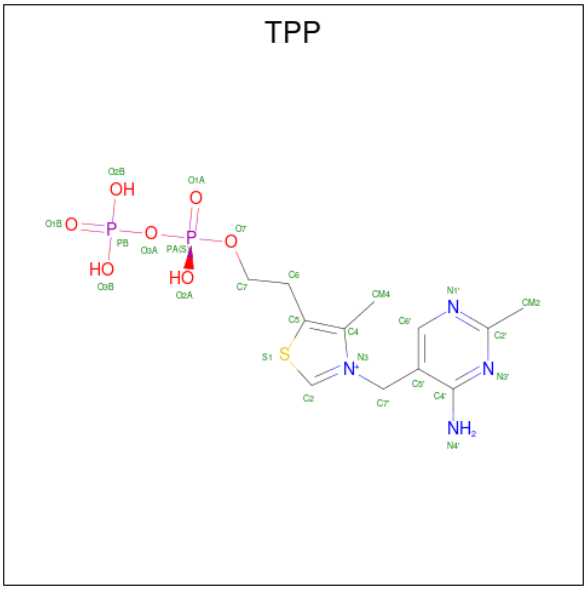
There are 4 unique types of molecules in this entry. The entry contains 16389 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Ancestral acetolactate synthase, catabolic.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	537	Total	C	N	O	S	0	0	0
			4042	2578	681	772	11			
1	B	541	Total	C	N	O	S	0	0	0
			4073	2597	685	780	11			
1	C	538	Total	C	N	O	S	0	0	0
			4051	2583	682	775	11			
1	D	540	Total	C	N	O	S	0	0	0
			4067	2594	684	778	11			

- Molecule 2 is THIAMINE DIPHOSPHATE (CCD ID: TPP) (formula: $C_{12}H_{19}N_4O_7P_2S$) (labeled as "Ligand of Interest" by depositor).



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

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

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

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

- Molecule 4 is water.

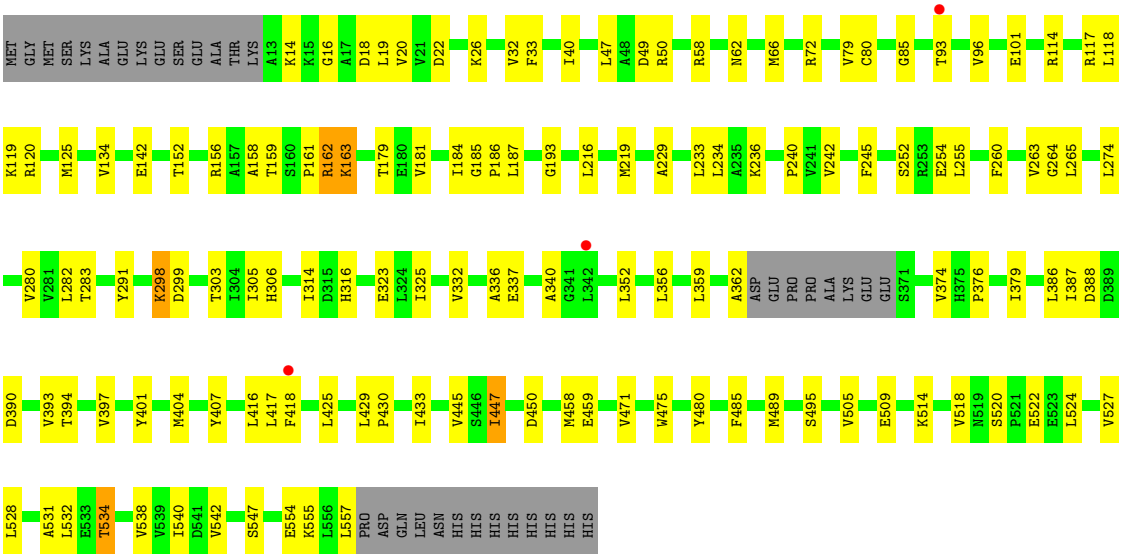
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	13	Total	O	0	0
			13	13		
4	B	14	Total	O	0	0
			14	14		
4	C	13	Total	O	0	0
			13	13		
4	D	8	Total	O	0	0
			8	8		

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.

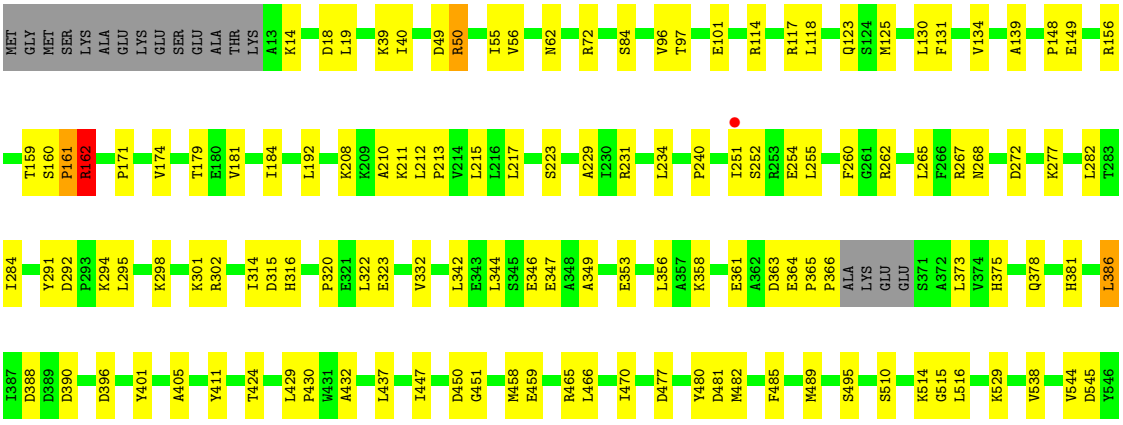
• Molecule 1: Ancestral acetolactate synthase, catabolic

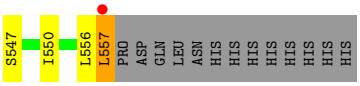
Chain A:



• Molecule 1: Ancestral acetolactate synthase, catabolic

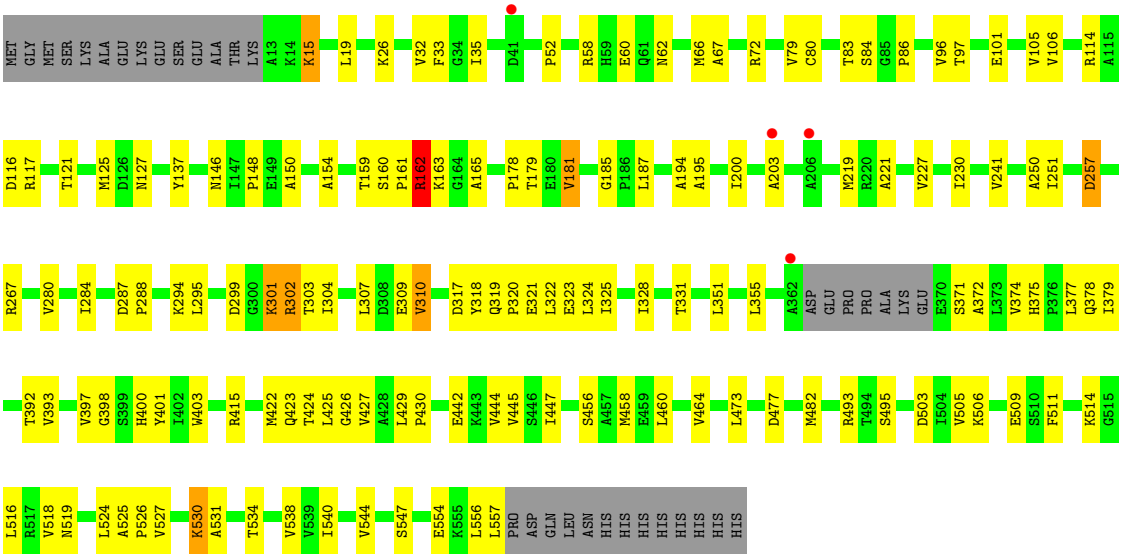
Chain B:





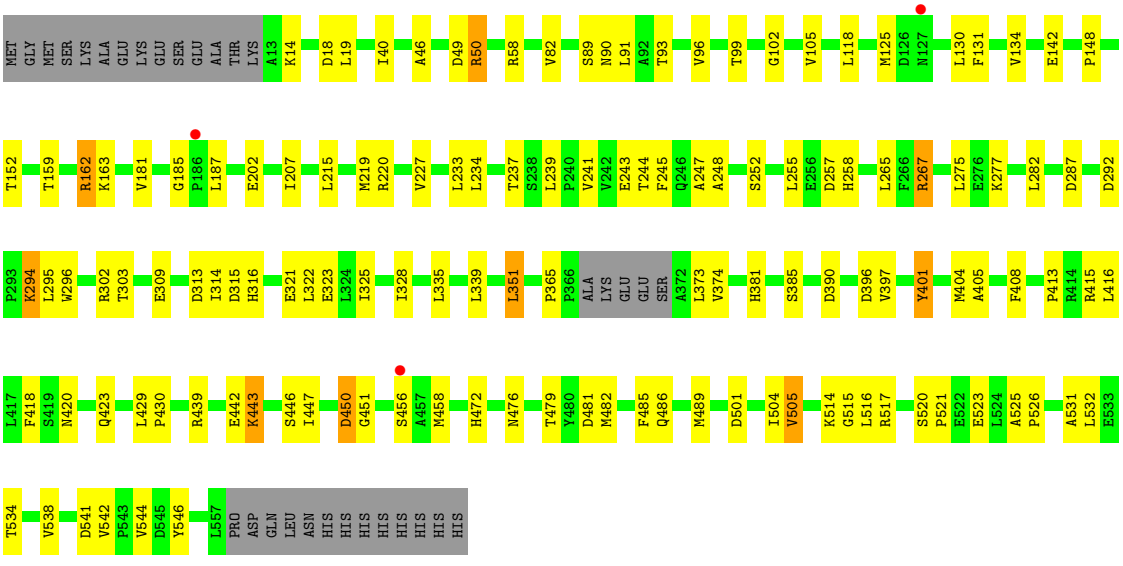
• Molecule 1: Ancestral acetolactate synthase, catabolic

Chain C:



• Molecule 1: Ancestral acetolactate synthase, catabolic

Chain D:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	162.94Å 163.08Å 86.31Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.27 – 2.99 44.27 – 2.99	Depositor EDS
% Data completeness (in resolution range)	80.3 (44.27-2.99) 73.5 (44.27-2.99)	Depositor EDS
R_{merge}	0.20	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	0.94 (at 3.01Å)	Xtriage
Refinement program	PHENIX 1.20.1-4487	Depositor
R, R_{free}	0.195 , 0.255 0.195 , 0.257	Depositor DCC
R_{free} test set	1990 reflections (4.22%)	wwPDB-VP
Wilson B-factor (Å^2)	46.1	Xtriage
Anisotropy	0.132	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 40.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.47$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	0.025 for k,h,-l	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	16389	wwPDB-VP
Average B, all atoms (Å^2)	51.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.38% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 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	0.39	0/4118	0.62	1/5601 (0.0%)
1	B	0.39	0/4151	0.59	2/5648 (0.0%)
1	C	0.38	0/4127	0.59	1/5613 (0.0%)
1	D	0.37	0/4145	0.56	1/5640 (0.0%)
All	All	0.38	0/16541	0.59	5/22502 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	B	0	2
1	C	0	1
1	D	0	1
All	All	0	5

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	162	ARG	N-CA-C	-7.12	101.56	111.52
1	D	162	ARG	N-CA-C	-6.41	102.40	111.56
1	C	162	ARG	N-CA-C	-6.29	102.72	111.52
1	B	477	ASP	N-CA-C	-5.78	106.88	114.04
1	B	162	ARG	N-CA-C	-5.51	103.85	111.28

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	50	ARG	Sidechain
1	B	162	ARG	Sidechain
1	B	50	ARG	Sidechain
1	C	162	ARG	Sidechain
1	D	162	ARG	Sidechain

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4042	0	4096	105	0
1	B	4073	0	4120	89	0
1	C	4051	0	4102	108	0
1	D	4067	0	4115	90	0
2	A	26	0	16	1	0
2	B	26	0	16	2	0
2	C	26	0	16	0	0
2	D	26	0	16	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	13	0	0	0	0
4	B	14	0	0	0	0
4	C	13	0	0	1	0
4	D	8	0	0	1	0
All	All	16389	0	16497	368	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 11.

All (368) 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:D:303:THR:HG23	1:D:321:GLU:OE1	1.75	0.87
1:B:125:MET:HE3	1:C:96:VAL:HG21	1.62	0.80
1:D:19:LEU:HD21	1:D:181:VAL:HG23	1.69	0.75

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:518:VAL:HG12	1:A:527:VAL:HG21	1.68	0.74
1:A:534:THR:HG21	1:A:538:VAL:HG21	1.70	0.72
1:A:374:VAL:HG11	1:A:524:LEU:HD12	1.71	0.71
1:C:460:LEU:O	1:C:464:VAL:HG23	1.91	0.70
1:A:19:LEU:HD21	1:A:181:VAL:HG23	1.74	0.69
1:D:233:LEU:HD21	1:D:239:LEU:HD12	1.76	0.68
1:D:125:MET:HE3	1:D:130:LEU:HD22	1.75	0.67
1:C:32:VAL:HG22	1:C:79:VAL:HG21	1.76	0.67
1:B:56:VAL:O	1:B:465:ARG:NH2	2.27	0.67
1:C:32:VAL:HG22	1:C:79:VAL:CG2	2.24	0.67
1:A:242:VAL:CG2	1:A:263:VAL:HG13	2.24	0.66
1:A:393:VAL:HG22	1:A:445:VAL:HB	1.78	0.66
1:A:242:VAL:HG21	1:A:263:VAL:HG13	1.77	0.66
1:B:215:LEU:HD12	1:B:284:ILE:HD11	1.78	0.66
1:B:347:GLU:OE1	1:B:347:GLU:N	2.26	0.65
1:B:432:ALA:HB1	1:B:470:ILE:HD13	1.80	0.64
1:A:118:LEU:HD11	1:B:139:ALA:HB1	1.77	0.64
1:A:26:LYS:HD2	1:A:185:GLY:HA2	1.80	0.64
1:D:215:LEU:HB2	1:D:241:VAL:HG22	1.78	0.63
1:B:480:TYR:HB3	2:B:601:TPP:H61	1.80	0.63
1:B:123:GLN:HA	1:C:422:MET:HE3	1.81	0.63
1:A:534:THR:HG21	1:A:538:VAL:CG2	2.28	0.62
1:A:96:VAL:HB	1:A:134:VAL:HG13	1.80	0.62
1:A:387:ILE:HG22	1:A:532:LEU:HD21	1.81	0.62
1:B:125:MET:CE	1:C:96:VAL:HG21	2.30	0.62
1:B:364:GLU:HG2	1:B:365:PRO:HD3	1.81	0.62
1:B:251:ILE:HD12	1:B:251:ILE:O	2.00	0.61
1:A:72:ARG:HG2	1:A:417:LEU:HD22	1.82	0.61
1:A:185:GLY:O	1:A:186:PRO:C	2.44	0.61
1:B:252:SER:OG	1:B:255:LEU:HD12	2.01	0.61
1:B:424:THR:HG22	1:C:86:PRO:HB3	1.83	0.61
1:B:215:LEU:HD12	1:B:284:ILE:CD1	2.31	0.60
1:C:424:THR:HG23	1:C:427:VAL:CG1	2.31	0.60
1:B:130:LEU:HD23	1:B:131:PHE:CE2	2.37	0.60
1:B:432:ALA:CB	1:B:470:ILE:HD13	2.31	0.60
1:B:556:LEU:O	1:B:557:LEU:HD22	2.02	0.60
1:C:35:ILE:HD12	1:C:60:GLU:CD	2.26	0.59
1:C:79:VAL:HG12	1:C:106:VAL:HG22	1.83	0.59
1:C:67:ALA:HB1	1:C:105:VAL:HG23	1.85	0.59
1:A:32:VAL:HG13	1:A:79:VAL:HG12	1.85	0.59
1:A:518:VAL:CG1	1:A:527:VAL:HG21	2.33	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:315:ASP:OD1	1:D:316:HIS:N	2.36	0.58
1:B:215:LEU:CD1	1:B:284:ILE:HD11	2.34	0.58
1:A:117:ARG:HB2	1:A:118:LEU:HD22	1.86	0.58
1:C:241:VAL:HG11	1:C:251:ILE:HD11	1.84	0.58
1:D:365:PRO:HG3	1:D:381:HIS:ND1	2.19	0.58
1:C:280:VAL:HG22	1:C:303:THR:HB	1.86	0.57
1:A:216:LEU:HB3	1:A:283:THR:HG22	1.86	0.57
1:B:215:LEU:HD11	1:B:282:LEU:HD23	1.87	0.57
1:C:161:PRO:HB2	1:C:310:VAL:HG22	1.86	0.57
1:B:556:LEU:HD12	1:B:556:LEU:C	2.29	0.57
1:A:480:TYR:HB3	2:A:601:TPP:H61	1.86	0.57
1:A:240:PRO:HB2	1:A:274:LEU:HD21	1.86	0.56
1:A:524:LEU:HD23	1:A:528:LEU:HG	1.87	0.56
1:D:46:ALA:HB1	1:D:50:ARG:HH12	1.71	0.56
1:A:252:SER:OG	1:A:255:LEU:HD12	2.03	0.56
1:D:267:ARG:HD2	1:D:295:LEU:O	2.05	0.56
1:B:148:PRO:HB2	1:B:184:ILE:HD13	1.87	0.56
1:C:195:ALA:H	1:C:331:THR:HG22	1.70	0.56
1:D:148:PRO:O	1:D:152:THR:OG1	2.22	0.56
1:A:260:PHE:CZ	1:A:352:LEU:HD23	2.41	0.56
1:D:277:LYS:HD2	1:D:351:LEU:HD11	1.87	0.56
1:A:233:LEU:HD12	1:A:336:ALA:HA	1.88	0.56
1:B:373:LEU:HD23	1:B:544:VAL:O	2.06	0.55
1:C:514:LYS:HB3	1:C:538:VAL:HG22	1.89	0.55
1:D:446:SER:HB2	1:D:472:HIS:CD2	2.41	0.55
1:C:503:ASP:OD1	1:C:505:VAL:HG22	2.05	0.55
1:A:303:THR:HG22	1:A:305:ILE:CD1	2.37	0.55
1:D:516:LEU:CD1	1:D:538:VAL:HG13	2.37	0.55
1:A:93:THR:HG21	1:D:90:ASN:OD1	2.07	0.54
1:A:524:LEU:HD21	1:A:528:LEU:HD11	1.88	0.54
1:C:392:THR:HB	1:C:444:VAL:HG23	1.88	0.54
1:B:556:LEU:HD12	1:B:557:LEU:N	2.22	0.54
1:A:337:GLU:HA	1:A:337:GLU:OE1	2.06	0.54
1:A:518:VAL:O	1:A:518:VAL:HG23	2.08	0.54
1:C:554:GLU:HB3	1:C:556:LEU:HD21	1.90	0.54
1:C:62:ASN:O	1:C:66:MET:HG3	2.07	0.54
1:C:230:ILE:HD11	1:C:284:ILE:HG21	1.90	0.54
1:D:415:ARG:HH12	1:D:439:ARG:CZ	2.21	0.54
1:A:101:GLU:C	1:A:219:MET:HE1	2.33	0.53
1:C:114:ARG:HA	1:C:117:ARG:HG3	1.90	0.53
1:D:456:SER:HA	1:D:458:MET:HE3	1.90	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:515:GLY:C	1:B:516:LEU:HD12	2.33	0.53
1:A:394:THR:HG22	1:A:417:LEU:HD12	1.91	0.53
1:A:134:VAL:O	1:A:134:VAL:HG12	2.07	0.52
1:B:181:VAL:HG11	1:D:316:HIS:CE1	2.44	0.52
1:A:298:LYS:HD3	1:A:299:ASP:H	1.74	0.52
1:C:106:VAL:O	1:C:106:VAL:HG23	2.09	0.52
1:D:252:SER:OG	1:D:255:LEU:HD12	2.10	0.52
1:B:458:MET:HE1	1:C:458:MET:HE1	1.92	0.52
1:A:14:LYS:NZ	1:A:22:ASP:OD2	2.37	0.52
1:A:524:LEU:HD23	1:A:524:LEU:C	2.35	0.52
1:D:234:LEU:HD23	1:D:258:HIS:CG	2.45	0.51
1:C:323:GLU:HB3	1:C:325:ILE:HD13	1.92	0.51
1:D:233:LEU:C	1:D:233:LEU:HD23	2.35	0.51
1:D:207:ILE:HG21	1:D:339:LEU:HD21	1.92	0.51
1:C:195:ALA:H	1:C:331:THR:CG2	2.24	0.51
1:C:426:GLY:O	1:C:456:SER:OG	2.28	0.51
1:C:516:LEU:HD23	1:C:527:VAL:HG13	1.92	0.51
1:B:364:GLU:HG2	1:B:365:PRO:CD	2.40	0.51
1:C:398:GLY:HA3	1:C:400:HIS:CE1	2.46	0.51
1:C:105:VAL:HG12	1:C:165:ALA:HA	1.93	0.51
1:A:66:MET:HE2	1:A:433:ILE:HB	1.92	0.50
1:D:220:ARG:NH2	1:D:287:ASP:OD2	2.45	0.50
1:D:514:LYS:HB3	1:D:538:VAL:HG22	1.92	0.50
1:B:424:THR:HG22	1:C:86:PRO:HG3	1.92	0.50
1:C:299:ASP:CG	1:C:302:ARG:HH12	2.19	0.50
1:B:268:ASN:OD1	1:B:268:ASN:N	2.43	0.50
1:C:372:ALA:HB1	1:C:519:ASN:O	2.11	0.50
1:D:233:LEU:O	1:D:237:THR:HG23	2.11	0.50
1:B:429:LEU:HB3	1:B:430:PRO:HD3	1.93	0.50
1:C:318:TYR:CE1	1:C:320:PRO:HG3	2.47	0.50
1:A:540:ILE:HG22	1:A:542:VAL:HG23	1.94	0.50
1:C:374:VAL:HG21	1:C:518:VAL:HG11	1.93	0.50
1:D:99:THR:O	4:D:701:HOH:O	2.20	0.50
1:D:323:GLU:HB3	1:D:325:ILE:CD1	2.42	0.50
1:D:505:VAL:HG23	1:D:517:ARG:NH2	2.27	0.50
1:B:171:PRO:O	1:B:174:VAL:HG22	2.10	0.50
1:A:282:LEU:HD12	1:A:305:ILE:HG22	1.93	0.50
1:D:185:GLY:O	1:D:187:LEU:HD12	2.11	0.50
1:A:298:LYS:NZ	1:A:299:ASP:HB2	2.26	0.49
1:B:375:HIS:HB3	1:B:378:GLN:HG3	1.95	0.49
1:A:240:PRO:HB3	1:A:352:LEU:HD21	1.93	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:404:MET:HE3	1:A:447:ILE:HG12	1.94	0.49
1:C:351:LEU:C	1:C:351:LEU:HD23	2.38	0.49
1:A:527:VAL:HG23	1:A:528:LEU:HD23	1.93	0.49
1:B:184:ILE:HD11	1:D:316:HIS:ND1	2.27	0.49
1:C:83:THR:OG1	1:C:84:SER:N	2.44	0.49
1:A:62:ASN:O	1:A:66:MET:HG3	2.12	0.49
1:A:554:GLU:HG2	1:A:555:LYS:N	2.28	0.49
1:C:267:ARG:HD2	1:C:295:LEU:O	2.13	0.49
1:D:374:VAL:HG12	1:D:521:PRO:HA	1.95	0.49
1:D:243:GLU:HB3	1:D:247:ALA:HB3	1.94	0.49
1:D:234:LEU:HB3	1:D:255:LEU:HD22	1.93	0.48
1:A:260:PHE:HZ	1:A:352:LEU:HD23	1.76	0.48
1:B:292:ASP:HB2	1:B:295:LEU:HD23	1.95	0.48
1:D:248:ALA:CB	1:D:416:LEU:HD23	2.43	0.48
1:D:516:LEU:HD13	1:D:538:VAL:HG13	1.95	0.48
1:B:49:ASP:OD1	1:C:493:ARG:NH1	2.47	0.48
1:C:429:LEU:HB3	1:C:430:PRO:HD3	1.95	0.48
1:A:514:LYS:HB3	1:A:538:VAL:HG22	1.95	0.48
1:B:556:LEU:HD12	1:B:557:LEU:HB2	1.96	0.48
1:C:19:LEU:HD21	1:C:148:PRO:CG	2.44	0.48
1:C:146:ASN:OD1	4:C:701:HOH:O	2.20	0.48
1:A:280:VAL:HG22	1:A:303:THR:HB	1.95	0.48
1:D:82:VAL:HG21	1:D:91:LEU:HD11	1.95	0.48
1:A:254:GLU:OE1	1:A:254:GLU:N	2.43	0.47
1:B:55:ILE:HD13	1:B:55:ILE:N	2.29	0.47
1:C:284:ILE:HG12	1:C:307:LEU:HD22	1.95	0.47
1:C:534:THR:HG21	1:C:538:VAL:CG2	2.44	0.47
1:A:58:ARG:HH21	1:D:451:GLY:HA2	1.79	0.47
1:A:85:GLY:HA2	1:A:125:MET:CE	2.44	0.47
1:C:377:LEU:CD1	1:C:403:TRP:CE3	2.97	0.47
1:D:335:LEU:CD2	1:D:339:LEU:HD22	2.44	0.47
1:B:294:LYS:O	1:B:298:LYS:HG2	2.14	0.47
1:B:545:ASP:OD1	1:B:547:SER:OG	2.29	0.47
1:D:443:LYS:HD2	1:D:532:LEU:O	2.14	0.47
1:B:346:GLU:OE1	1:B:346:GLU:HA	2.14	0.47
1:C:26:LYS:HE3	1:C:185:GLY:HA2	1.96	0.47
1:B:40:ILE:O	1:B:40:ILE:HG13	2.15	0.47
1:B:314:ILE:HD12	1:D:187:LEU:HD22	1.96	0.47
1:C:19:LEU:CD2	1:C:148:PRO:HD3	2.45	0.47
1:B:386:LEU:HD21	1:B:529:LYS:HB3	1.97	0.47
1:B:62:ASN:ND2	1:B:459:GLU:HG2	2.29	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:192:LEU:CD2	1:D:325:ILE:HG22	2.45	0.47
1:C:379:ILE:HA	1:C:524:LEU:HD21	1.97	0.47
1:C:503:ASP:HB3	1:C:506:LYS:HB2	1.97	0.47
1:D:202:GLU:HG2	1:D:322:LEU:HD22	1.97	0.47
1:B:267:ARG:HG2	1:B:267:ARG:HH11	1.80	0.46
1:B:315:ASP:OD1	1:B:316:HIS:N	2.48	0.46
1:A:374:VAL:HG11	1:A:524:LEU:CD1	2.44	0.46
1:A:445:VAL:HG22	1:A:471:VAL:HG12	1.97	0.46
1:B:489:MET:HG3	1:B:550:ILE:HD11	1.97	0.46
1:D:396:ASP:O	1:D:401:TYR:HB2	2.15	0.46
1:A:471:VAL:CG1	1:A:471:VAL:O	2.63	0.46
1:C:97:THR:HG21	1:C:424:THR:HG21	1.97	0.46
1:D:374:VAL:HG21	1:D:542:VAL:CG1	2.45	0.46
1:B:14:LYS:HG2	1:B:18:ASP:HB2	1.96	0.46
1:C:301:LYS:HD3	1:C:301:LYS:HA	1.59	0.46
1:A:184:ILE:HG23	1:C:319:GLN:OE1	2.16	0.46
1:A:234:LEU:HB2	1:A:255:LEU:HD22	1.97	0.46
1:A:245:PHE:HB3	1:A:418:PHE:CD2	2.51	0.46
1:B:514:LYS:HB3	1:B:538:VAL:HG13	1.97	0.46
1:B:212:LEU:HD23	1:B:277:LYS:C	2.40	0.46
1:D:82:VAL:CG2	1:D:91:LEU:HD11	2.46	0.46
1:C:375:HIS:HB3	1:C:378:GLN:HG3	1.98	0.46
1:D:458:MET:HE2	1:D:458:MET:H	1.79	0.46
1:A:376:PRO:HB3	1:A:475:TRP:CZ3	2.51	0.46
1:B:366:PRO:HG3	1:B:375:HIS:CD2	2.51	0.46
1:B:251:ILE:HD12	1:B:251:ILE:C	2.41	0.46
1:C:304:ILE:N	1:C:321:GLU:OE1	2.49	0.46
1:D:476:ASN:ND2	1:D:541:ASP:OD1	2.48	0.46
1:D:531:ALA:HB1	1:D:538:VAL:HG11	1.97	0.46
1:D:245:PHE:HB2	1:D:420:ASN:ND2	2.31	0.45
1:C:299:ASP:OD2	1:C:301:LYS:HB2	2.15	0.45
1:D:450:ASP:HB3	1:D:476:ASN:OD1	2.16	0.45
1:C:426:GLY:CA	1:C:456:SER:OG	2.64	0.45
1:A:120:ARG:HD3	1:D:313:ASP:OD2	2.17	0.45
1:D:58:ARG:HB2	1:D:458:MET:HG3	1.97	0.45
1:D:89:SER:HB3	1:D:125:MET:HE1	1.98	0.45
1:A:40:ILE:O	1:A:40:ILE:HG13	2.16	0.45
1:D:102:GLY:HA3	1:D:219:MET:HE1	1.98	0.45
1:B:349:ALA:O	1:B:353:GLU:HG3	2.17	0.45
1:C:15:LYS:HA	1:C:178:PRO:HA	1.98	0.45
1:C:33:PHE:O	1:C:80:CYS:HA	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:379:ILE:HD11	1:C:544:VAL:HG12	1.99	0.45
1:A:505:VAL:O	1:A:509:GLU:HG3	2.17	0.45
1:C:114:ARG:HG2	1:D:142:GLU:HB2	1.98	0.45
1:C:309:GLU:HG2	1:C:328:ILE:HG13	1.98	0.45
1:C:377:LEU:HD11	1:C:403:TRP:CE3	2.51	0.45
1:D:404:MET:HE3	1:D:408:PHE:CB	2.46	0.45
1:B:217:LEU:CD2	1:B:284:ILE:HD12	2.46	0.45
1:C:241:VAL:CG1	1:C:251:ILE:HD11	2.47	0.45
1:C:72:ARG:NH2	1:C:101:GLU:HB3	2.32	0.45
1:C:161:PRO:HB2	1:C:310:VAL:CG2	2.47	0.45
1:B:272:ASP:OD1	1:B:291:TYR:OH	2.34	0.44
1:D:516:LEU:HD12	1:D:516:LEU:N	2.32	0.44
1:A:524:LEU:O	1:A:527:VAL:HG22	2.18	0.44
1:A:531:ALA:HB2	1:A:540:ILE:HD11	1.99	0.44
1:C:137:TYR:CE2	1:C:154:ALA:HB2	2.52	0.44
1:B:114:ARG:HA	1:B:117:ARG:HG3	2.00	0.44
1:B:234:LEU:HB2	1:B:255:LEU:HD22	1.99	0.44
1:B:485:PHE:CD1	1:B:485:PHE:C	2.96	0.44
1:D:234:LEU:HD23	1:D:258:HIS:CB	2.48	0.44
1:D:292:ASP:HB2	1:D:295:LEU:HD23	1.99	0.44
1:D:429:LEU:HB3	1:D:430:PRO:HD3	1.99	0.44
1:B:267:ARG:HG2	1:B:267:ARG:O	2.18	0.44
1:C:415:ARG:NH1	1:C:442:GLU:OE1	2.47	0.44
1:A:388:ASP:HB2	1:A:390:ASP:OD1	2.17	0.44
1:C:397:VAL:HG21	1:C:423:GLN:C	2.43	0.44
1:A:362:ALA:HB1	1:A:407:TYR:CE1	2.52	0.44
1:A:152:THR:O	1:A:156:ARG:HG3	2.18	0.44
1:C:79:VAL:HG12	1:C:106:VAL:CG2	2.48	0.44
1:A:520:SER:HB3	1:A:522:GLU:OE1	2.18	0.43
1:B:556:LEU:O	1:B:557:LEU:CB	2.65	0.43
1:C:32:VAL:HG13	1:C:79:VAL:HG23	2.00	0.43
1:D:390:ASP:O	1:D:442:GLU:OE1	2.36	0.43
1:C:525:ALA:HB3	1:C:526:PRO:HD3	2.00	0.43
1:A:323:GLU:OE1	1:A:325:ILE:HD11	2.19	0.43
1:C:114:ARG:HE	1:C:114:ARG:HB2	1.69	0.43
1:C:393:VAL:HA	1:C:445:VAL:O	2.19	0.43
1:B:358:LYS:HD2	1:B:358:LYS:HA	1.87	0.43
1:C:179:THR:OG1	1:C:181:VAL:HG23	2.19	0.43
1:D:404:MET:HE3	1:D:408:PHE:HB2	2.00	0.43
1:A:229:ALA:HB1	1:A:332:VAL:HG23	2.01	0.43
1:A:240:PRO:HB3	1:A:260:PHE:HE2	1.84	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:424:THR:HG23	1:C:427:VAL:HG11	2.01	0.43
1:C:257:ASP:OD1	1:C:257:ASP:N	2.47	0.43
1:A:429:LEU:HB3	1:A:430:PRO:HD3	2.01	0.43
1:B:19:LEU:HD22	1:B:179:THR:HG21	2.00	0.43
1:B:171:PRO:HB2	1:B:174:VAL:HG13	1.99	0.43
1:B:240:PRO:HB3	1:B:260:PHE:HE2	1.84	0.43
1:B:437:LEU:HD11	1:B:466:LEU:HD13	2.00	0.43
1:C:302:ARG:HG2	1:C:302:ARG:HH11	1.84	0.43
1:D:504:ILE:HB	1:D:541:ASP:HB2	2.01	0.43
1:D:102:GLY:HA2	1:D:163:LYS:O	2.17	0.43
1:A:134:VAL:O	1:A:134:VAL:CG1	2.66	0.43
1:A:158:ALA:O	1:A:163:LYS:HB3	2.19	0.43
1:A:242:VAL:HG21	1:A:263:VAL:CG1	2.47	0.43
1:A:531:ALA:CB	1:A:540:ILE:HD11	2.49	0.43
1:B:322:LEU:HD12	1:B:323:GLU:H	1.83	0.43
1:D:481:ASP:O	1:D:482:MET:C	2.60	0.43
1:A:114:ARG:HA	1:A:117:ARG:HG3	2.01	0.42
1:A:416:LEU:HD21	1:A:418:PHE:CZ	2.54	0.42
1:A:518:VAL:HG22	1:A:542:VAL:HA	2.01	0.42
1:B:97:THR:OG1	1:B:424:THR:HG21	2.19	0.42
1:D:14:LYS:HD3	1:D:18:ASP:CB	2.49	0.42
1:A:119:LYS:NZ	1:B:149:GLU:OE2	2.46	0.42
1:B:96:VAL:CG1	1:B:134:VAL:HB	2.49	0.42
2:B:601:TPP:H6'	2:B:601:TPP:HM41	2.01	0.42
1:C:116:ASP:HB3	1:C:121:THR:HG21	2.00	0.42
1:C:505:VAL:O	1:C:509:GLU:HG3	2.20	0.42
1:C:518:VAL:HG21	1:C:524:LEU:HD12	2.01	0.42
1:C:221:ALA:HB2	1:C:284:ILE:HG22	2.01	0.42
1:C:351:LEU:HD23	1:C:355:LEU:HD12	2.02	0.42
1:D:275:LEU:HD13	1:D:296:TRP:CE3	2.54	0.42
1:B:156:ARG:CZ	1:D:314:ILE:HD11	2.50	0.42
1:C:84:SER:O	1:C:86:PRO:HD2	2.19	0.42
1:A:471:VAL:O	1:A:471:VAL:HG13	2.19	0.42
1:B:39:LYS:HG3	1:B:84:SER:OG	2.20	0.42
1:C:106:VAL:O	1:C:106:VAL:CG2	2.67	0.42
1:C:200:ILE:HG12	1:C:324:LEU:HD13	2.01	0.42
1:C:323:GLU:HB3	1:C:325:ILE:CD1	2.49	0.42
1:A:379:ILE:HD13	1:A:542:VAL:HG11	2.01	0.42
1:B:267:ARG:HG2	1:B:267:ARG:NH1	2.34	0.42
1:C:162:ARG:HA	1:C:162:ARG:HD3	1.55	0.42
1:D:525:ALA:HB3	1:D:526:PRO:HD3	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:363:ASP:CG	1:B:381:HIS:HE2	2.28	0.42
1:B:458:MET:CE	1:C:458:MET:HE1	2.50	0.42
1:C:26:LYS:CE	1:C:185:GLY:HA2	2.49	0.42
1:D:19:LEU:HD23	1:D:148:PRO:HD3	2.02	0.42
1:D:131:PHE:HA	1:D:134:VAL:HG22	2.02	0.42
1:A:193:GLY:HA3	1:C:194:ALA:O	2.20	0.42
1:C:150:ALA:HB2	1:D:118:LEU:HD12	2.01	0.42
1:D:40:ILE:O	1:D:40:ILE:HG13	2.19	0.42
1:D:309:GLU:HG3	1:D:328:ILE:HG13	2.02	0.42
1:A:306:HIS:HB3	1:A:323:GLU:HG2	2.01	0.42
1:B:301:LYS:O	1:B:302:ARG:HG3	2.20	0.42
1:D:520:SER:HB3	1:D:523:GLU:HG3	2.02	0.42
1:A:316:HIS:NE2	1:C:181:VAL:HG11	2.34	0.41
1:C:287:ASP:OD1	1:C:288:PRO:HD2	2.20	0.41
1:D:244:THR:O	1:D:245:PHE:C	2.61	0.41
1:D:485:PHE:O	1:D:489:MET:HG3	2.20	0.41
1:D:397:VAL:HG21	1:D:423:GLN:HA	2.02	0.41
1:A:416:LEU:HD21	1:A:418:PHE:HZ	1.85	0.41
1:C:32:VAL:HG23	1:C:52:PRO:HB2	2.01	0.41
1:C:125:MET:HE2	1:C:127:ASN:OD1	2.20	0.41
1:A:16:GLY:O	1:A:20:VAL:HG23	2.20	0.41
1:A:19:LEU:HD22	1:A:179:THR:HG21	2.02	0.41
1:A:458:MET:HE3	1:A:458:MET:HB3	1.93	0.41
1:A:485:PHE:O	1:A:489:MET:HG3	2.21	0.41
1:B:72:ARG:NH2	1:B:101:GLU:HB3	2.36	0.41
1:C:227:VAL:HG22	1:C:250:ALA:HA	2.02	0.41
1:C:460:LEU:HD23	1:C:511:PHE:CD1	2.55	0.41
1:C:530:LYS:HD2	1:C:530:LYS:HA	1.59	0.41
1:A:33:PHE:O	1:A:80:CYS:HA	2.20	0.41
1:A:260:PHE:CD2	1:A:274:LEU:HD22	2.54	0.41
1:A:397:VAL:HB	1:A:425:LEU:HD12	2.03	0.41
1:A:485:PHE:CD1	1:A:485:PHE:C	2.98	0.41
1:B:388:ASP:HB3	1:B:390:ASP:OD1	2.20	0.41
1:C:19:LEU:HD21	1:C:148:PRO:HD3	2.02	0.41
1:D:544:VAL:HG21	1:D:546:TYR:CE1	2.55	0.41
1:A:314:ILE:CD1	1:C:187:LEU:HG	2.51	0.41
1:D:227:VAL:HG21	1:D:413:PRO:HB3	2.02	0.41
1:D:534:THR:HG21	1:D:538:VAL:CG2	2.50	0.41
1:B:481:ASP:O	1:B:482:MET:C	2.63	0.41
1:C:426:GLY:C	1:C:456:SER:HG	2.27	0.41
1:A:114:ARG:NH1	1:A:142:GLU:O	2.54	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:236:LYS:HE3	1:A:340:ALA:CB	2.51	0.41
1:B:96:VAL:HG12	1:B:134:VAL:HB	2.02	0.41
1:B:208:LYS:HG2	1:B:342:LEU:HD13	2.02	0.41
1:B:210:ALA:HB3	1:B:213:PRO:HG3	2.03	0.41
1:B:262:ARG:HD2	1:B:405:ALA:O	2.20	0.41
1:B:373:LEU:HD23	1:B:544:VAL:C	2.45	0.41
1:B:451:GLY:HA2	1:C:58:ARG:NH2	2.36	0.41
1:C:219:MET:HE3	1:C:287:ASP:HB3	2.03	0.41
1:C:473:LEU:CD2	1:C:540:ILE:HD12	2.51	0.41
1:D:93:THR:HA	1:D:96:VAL:HG22	2.03	0.41
1:D:456:SER:CA	1:D:458:MET:HE3	2.51	0.41
1:D:458:MET:H	1:D:458:MET:CE	2.33	0.41
1:B:229:ALA:HB1	1:B:332:VAL:HG13	2.02	0.41
1:C:531:ALA:CB	1:C:540:ILE:HD11	2.51	0.41
1:D:215:LEU:HD22	1:D:282:LEU:HD23	2.03	0.41
1:A:62:ASN:HB3	1:A:459:GLU:HG3	2.03	0.40
1:A:96:VAL:CB	1:A:134:VAL:HG13	2.49	0.40
1:A:118:LEU:HD22	1:A:118:LEU:N	2.36	0.40
1:A:47:LEU:HD23	1:A:47:LEU:HA	1.86	0.40
1:A:264:GLY:O	1:A:291:TYR:CD1	2.74	0.40
1:A:265:LEU:HD23	1:A:265:LEU:N	2.36	0.40
1:A:531:ALA:O	1:A:534:THR:HG22	2.21	0.40
1:D:292:ASP:HB3	1:D:294:LYS:HG3	2.02	0.40
1:D:404:MET:CE	1:D:408:PHE:HB2	2.51	0.40
1:D:505:VAL:HG13	1:D:515:GLY:C	2.46	0.40
1:B:260:PHE:HE1	1:B:356:LEU:HG	1.85	0.40
1:C:294:LYS:HG3	1:C:317:ASP:OD2	2.22	0.40
1:D:245:PHE:CD1	1:D:405:ALA:HB1	2.56	0.40
1:A:152:THR:O	1:A:156:ARG:CG	2.69	0.40
1:B:231:ARG:NH2	1:B:411:TYR:O	2.55	0.40
1:C:323:GLU:C	1:C:324:LEU:HD23	2.46	0.40
1:A:96:VAL:CA	1:A:134:VAL:HG13	2.51	0.40
1:A:260:PHE:HE1	1:A:356:LEU:HG	1.86	0.40
1:B:254:GLU:OE1	1:B:254:GLU:N	2.48	0.40
1:C:203:ALA:HB2	1:C:322:LEU:HD23	2.02	0.40
1:D:416:LEU:HD21	1:D:418:PHE:CE2	2.57	0.40
1:D:482:MET:HG2	1:D:486:GLN:NE2	2.36	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	533/572 (93%)	517 (97%)	15 (3%)	1 (0%)	44 77
1	B	537/572 (94%)	520 (97%)	16 (3%)	1 (0%)	44 77
1	C	534/572 (93%)	520 (97%)	14 (3%)	0	100 100
1	D	536/572 (94%)	519 (97%)	17 (3%)	0	100 100
All	All	2140/2288 (94%)	2076 (97%)	62 (3%)	2 (0%)	48 81

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	161	PRO
1	A	161	PRO

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	421/452 (93%)	405 (96%)	16 (4%)	28 62
1	B	425/452 (94%)	405 (95%)	20 (5%)	22 56
1	C	422/452 (93%)	403 (96%)	19 (4%)	23 57
1	D	424/452 (94%)	405 (96%)	19 (4%)	23 57
All	All	1692/1808 (94%)	1618 (96%)	74 (4%)	24 58

All (74) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	ASP
1	A	49	ASP
1	A	159	THR
1	A	162	ARG
1	A	163	LYS
1	A	187	LEU
1	A	298	LYS
1	A	359	LEU
1	A	386	LEU
1	A	401	TYR
1	A	447	ILE
1	A	450	ASP
1	A	495	SER
1	A	534	THR
1	A	547	SER
1	A	557	LEU
1	B	50	ARG
1	B	118	LEU
1	B	159	THR
1	B	160	SER
1	B	161	PRO
1	B	162	ARG
1	B	211	LYS
1	B	223	SER
1	B	265	LEU
1	B	320	PRO
1	B	344	LEU
1	B	361	GLU
1	B	386	LEU
1	B	396	ASP
1	B	401	TYR
1	B	447	ILE
1	B	450	ASP
1	B	495	SER
1	B	510	SER
1	B	557	LEU
1	C	15	LYS
1	C	159	THR
1	C	160	SER
1	C	163	LYS
1	C	181	VAL
1	C	257	ASP
1	C	301	LYS

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Mol	Chain	Res	Type
1	C	302	ARG
1	C	310	VAL
1	C	371	SER
1	C	401	TYR
1	C	425	LEU
1	C	447	ILE
1	C	477	ASP
1	C	482	MET
1	C	495	SER
1	C	530	LYS
1	C	547	SER
1	C	557	LEU
1	D	49	ASP
1	D	50	ARG
1	D	105	VAL
1	D	159	THR
1	D	257	ASP
1	D	265	LEU
1	D	267	ARG
1	D	294	LYS
1	D	302	ARG
1	D	351	LEU
1	D	373	LEU
1	D	385	SER
1	D	401	TYR
1	D	443	LYS
1	D	447	ILE
1	D	450	ASP
1	D	479	THR
1	D	501	ASP
1	D	505	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	400	HIS
1	C	61	GLN
1	C	146	ASN
1	C	381	HIS
1	D	146	ASN
1	D	486	GLN

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 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	$\#\|Z\| > 2$
2	TPP	A	601	3	23,27,27	1.48	2 (8%)	30,40,40	1.66	6 (20%)
2	TPP	D	601	3	23,27,27	1.03	1 (4%)	30,40,40	0.91	1 (3%)
2	TPP	B	601	3	23,27,27	1.52	2 (8%)	30,40,40	1.64	7 (23%)
2	TPP	C	601	3	23,27,27	1.12	1 (4%)	30,40,40	1.04	3 (10%)

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	TPP	A	601	3	-	0/16/17/17	0/2/2/2
2	TPP	D	601	3	-	3/16/17/17	0/2/2/2
2	TPP	B	601	3	-	1/16/17/17	0/2/2/2
2	TPP	C	601	3	-	2/16/17/17	0/2/2/2

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	601	TPP	C4-N3	-5.89	1.34	1.39
2	A	601	TPP	C4-N3	-5.70	1.34	1.39
2	C	601	TPP	C6-C5	-3.82	1.48	1.51
2	D	601	TPP	C6-C5	-3.65	1.48	1.51
2	B	601	TPP	C5'-C4'	3.10	1.48	1.42
2	A	601	TPP	C5'-C4'	2.86	1.47	1.42

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	601	TPP	C6'-N1'-C2'	3.81	122.32	116.07
2	B	601	TPP	C6'-N1'-C2'	3.66	122.08	116.07
2	B	601	TPP	C5'-C6'-N1'	-2.86	119.18	123.83
2	D	601	TPP	C5-C4-N3	2.85	113.28	107.57
2	A	601	TPP	N4'-C4'-N3'	2.77	120.77	117.03
2	C	601	TPP	C5-C4-N3	2.75	113.07	107.57
2	A	601	TPP	C5'-C6'-N1'	-2.71	119.43	123.83
2	B	601	TPP	N4'-C4'-N3'	2.60	120.53	117.03
2	A	601	TPP	CM4-C4-N3	2.46	125.66	122.53
2	A	601	TPP	N1'-C2'-N3'	-2.42	121.51	125.53
2	C	601	TPP	O2A-PA-O1A	2.29	123.11	112.44
2	B	601	TPP	C5'-C7'-N3	-2.24	109.54	113.28
2	A	601	TPP	C5'-C7'-N3	-2.21	109.60	113.28
2	B	601	TPP	CM4-C4-N3	2.20	125.33	122.53
2	B	601	TPP	N1'-C2'-N3'	-2.18	121.91	125.53
2	B	601	TPP	C6'-C5'-C4'	2.17	118.21	115.55
2	C	601	TPP	O3A-PB-O1B	-2.07	100.14	111.04

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	601	TPP	C7-O7-PA-O1A
2	D	601	TPP	C5-C6-C7-O7
2	D	601	TPP	PA-O3A-PB-O2B
2	D	601	TPP	PA-O3A-PB-O3B
2	C	601	TPP	PB-O3A-PA-O7
2	B	601	TPP	PA-O3A-PB-O3B

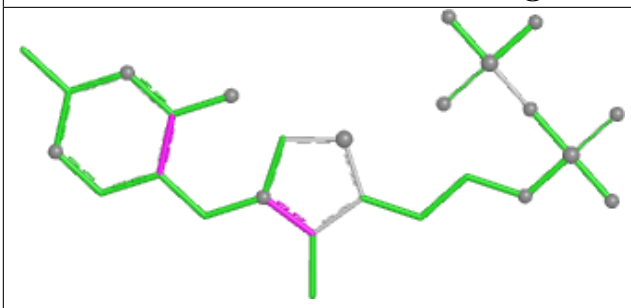
There are no ring outliers.

2 monomers are involved in 3 short contacts:

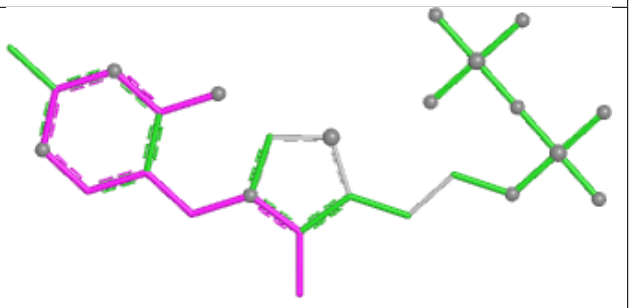
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	601	TPP	1	0
2	B	601	TPP	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

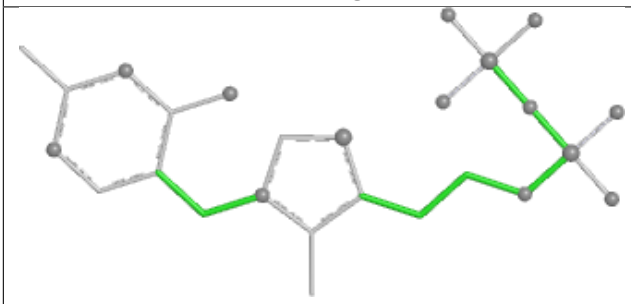
Ligand TPP A 601



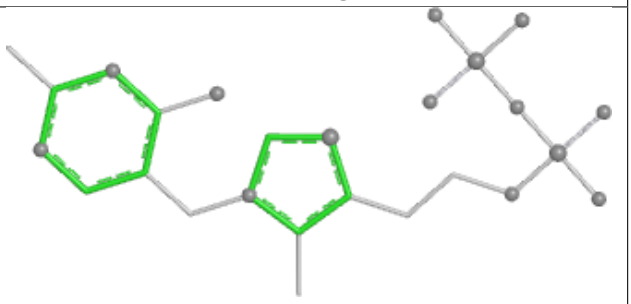
Bond lengths



Bond angles

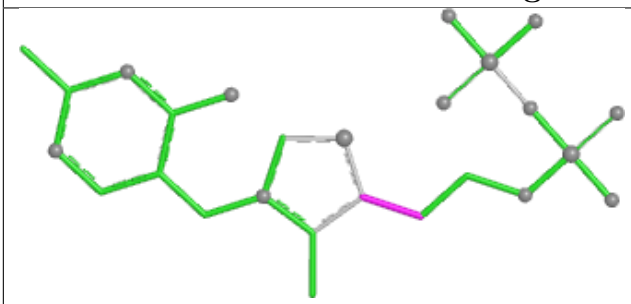


Torsions

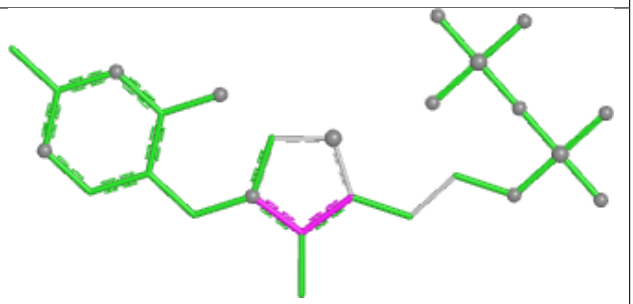


Rings

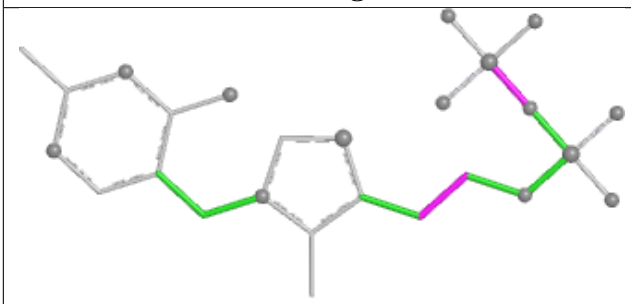
Ligand TPP D 601



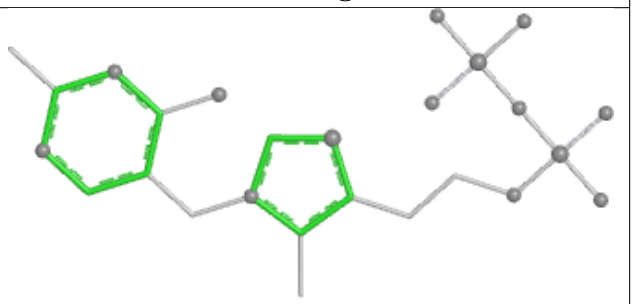
Bond lengths



Bond angles

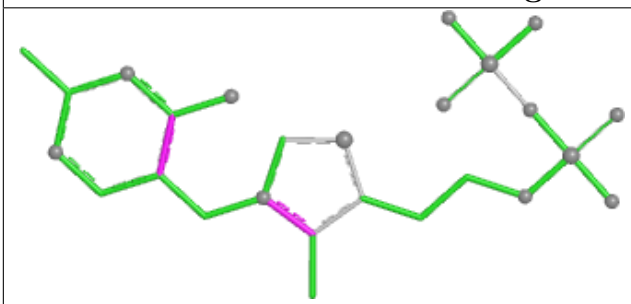


Torsions

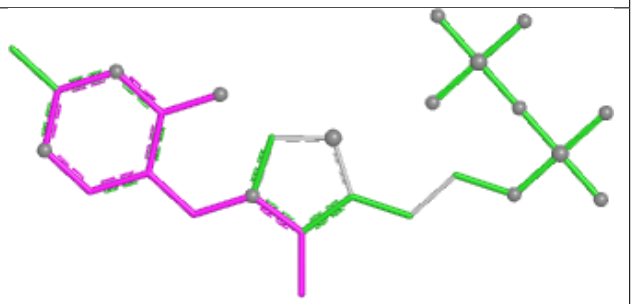


Rings

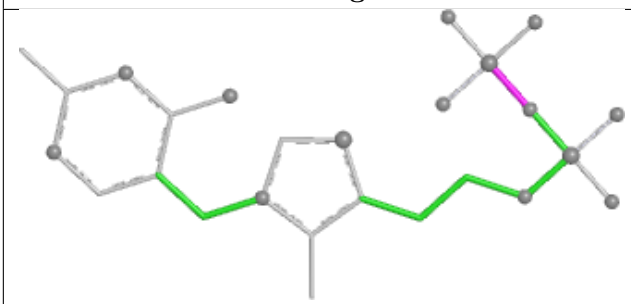
Ligand TPP B 601



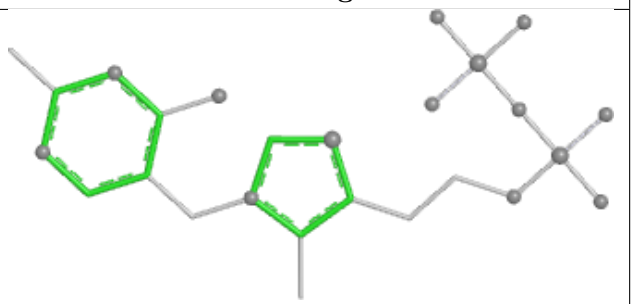
Bond lengths



Bond angles

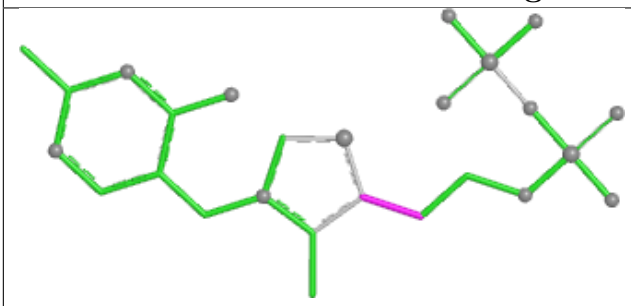


Torsions

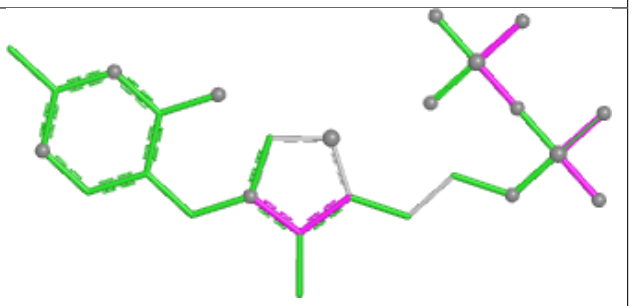


Rings

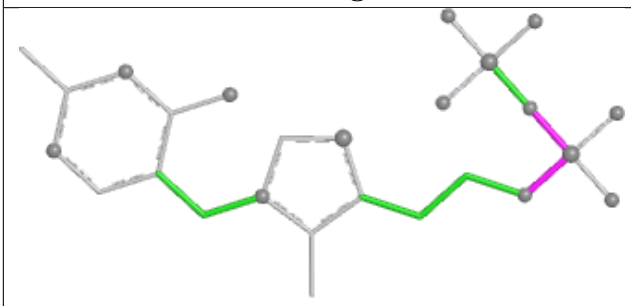
Ligand TPP C 601



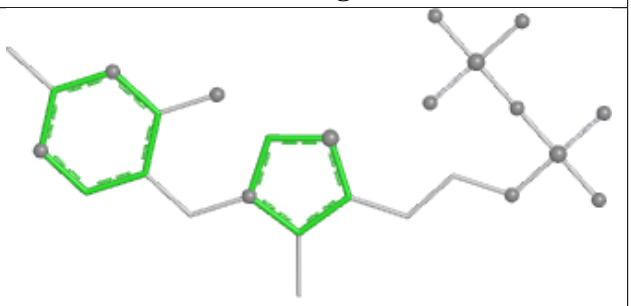
Bond lengths



Bond angles



Torsions



Rings

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, 95^{th} percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	537/572 (93%)	-0.13	3 (0%)	85	71	28, 52, 83, 127	0
1	B	541/572 (94%)	-0.29	2 (0%)	89	77	24, 46, 74, 111	0
1	C	538/572 (94%)	-0.19	4 (0%)	84	68	28, 51, 82, 114	0
1	D	540/572 (94%)	-0.25	3 (0%)	85	71	27, 46, 73, 107	0
All	All	2156/2288 (94%)	-0.21	12 (0%)	85	71	24, 49, 79, 127	0

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	93	THR	3.2
1	C	206	ALA	2.9
1	C	203	ALA	2.7
1	C	41	ASP	2.6
1	D	186	PRO	2.6
1	A	418	PHE	2.5
1	D	127	ASN	2.5
1	C	362	ALA	2.3
1	D	456	SER	2.3
1	B	251	ILE	2.2
1	A	342	LEU	2.0
1	B	557	LEU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates

There are no oligosaccharides in this entry.

6.4 Ligands (i)

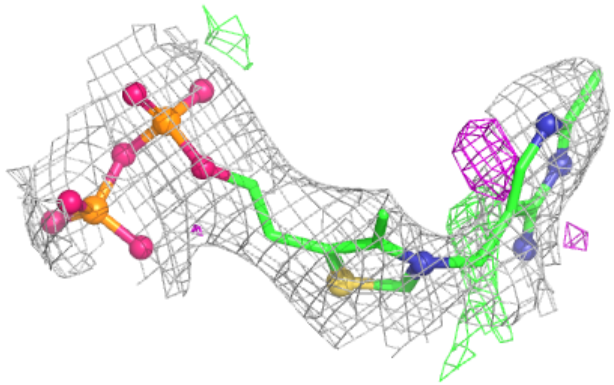
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

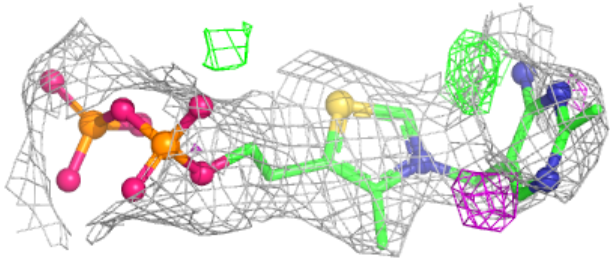
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	TPP	C	601	26/26	0.93	0.10	38,42,45,45	0
2	TPP	A	601	26/26	0.94	0.11	44,47,49,51	0
2	TPP	B	601	26/26	0.95	0.08	41,43,46,46	0
2	TPP	D	601	26/26	0.95	0.08	37,41,46,47	0
3	MG	A	602	1/1	0.98	0.05	47,47,47,47	0
3	MG	C	602	1/1	0.98	0.04	43,43,43,43	0
3	MG	D	602	1/1	0.98	0.05	44,44,44,44	0
3	MG	B	602	1/1	0.99	0.03	45,45,45,45	0

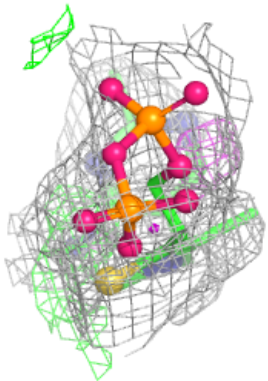
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around TPP C 601:

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

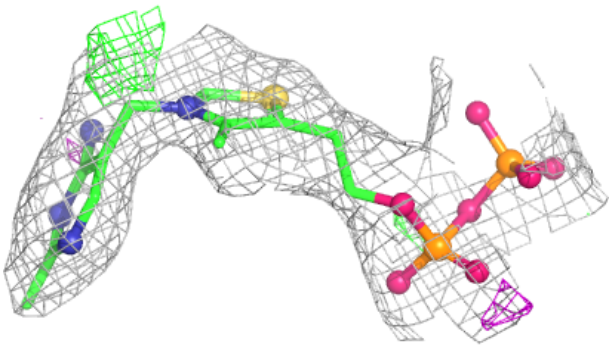


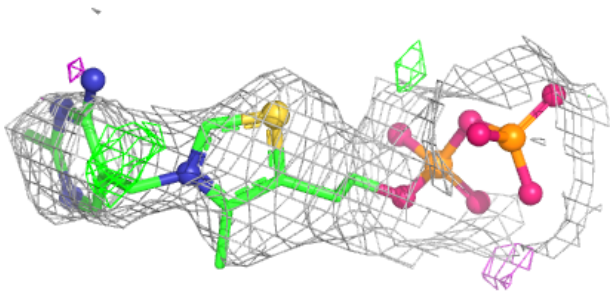


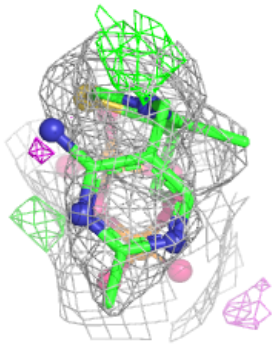


Electron density around TPP A 601:

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

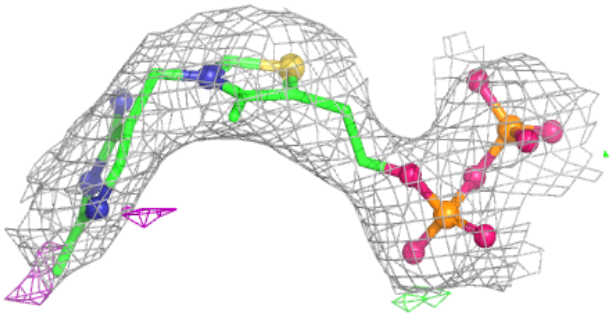


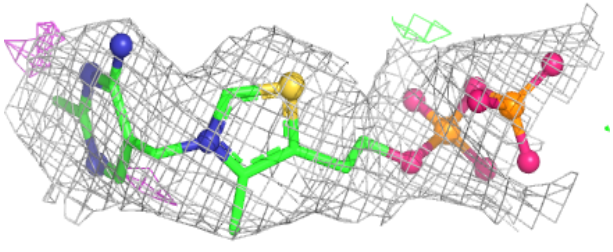


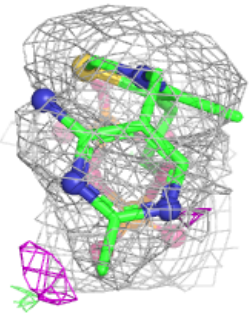


Electron density around TPP B 601:

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

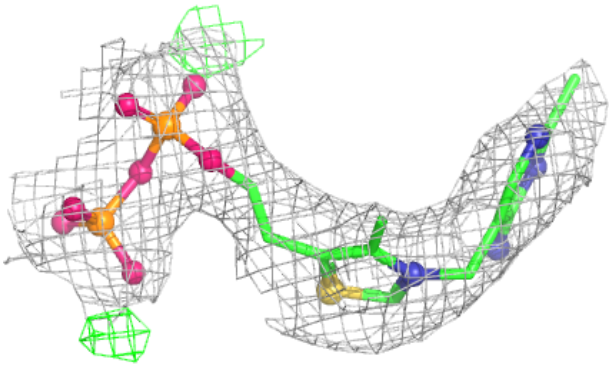


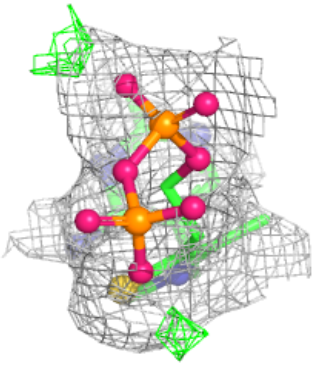




Electron density around TPP D 601:

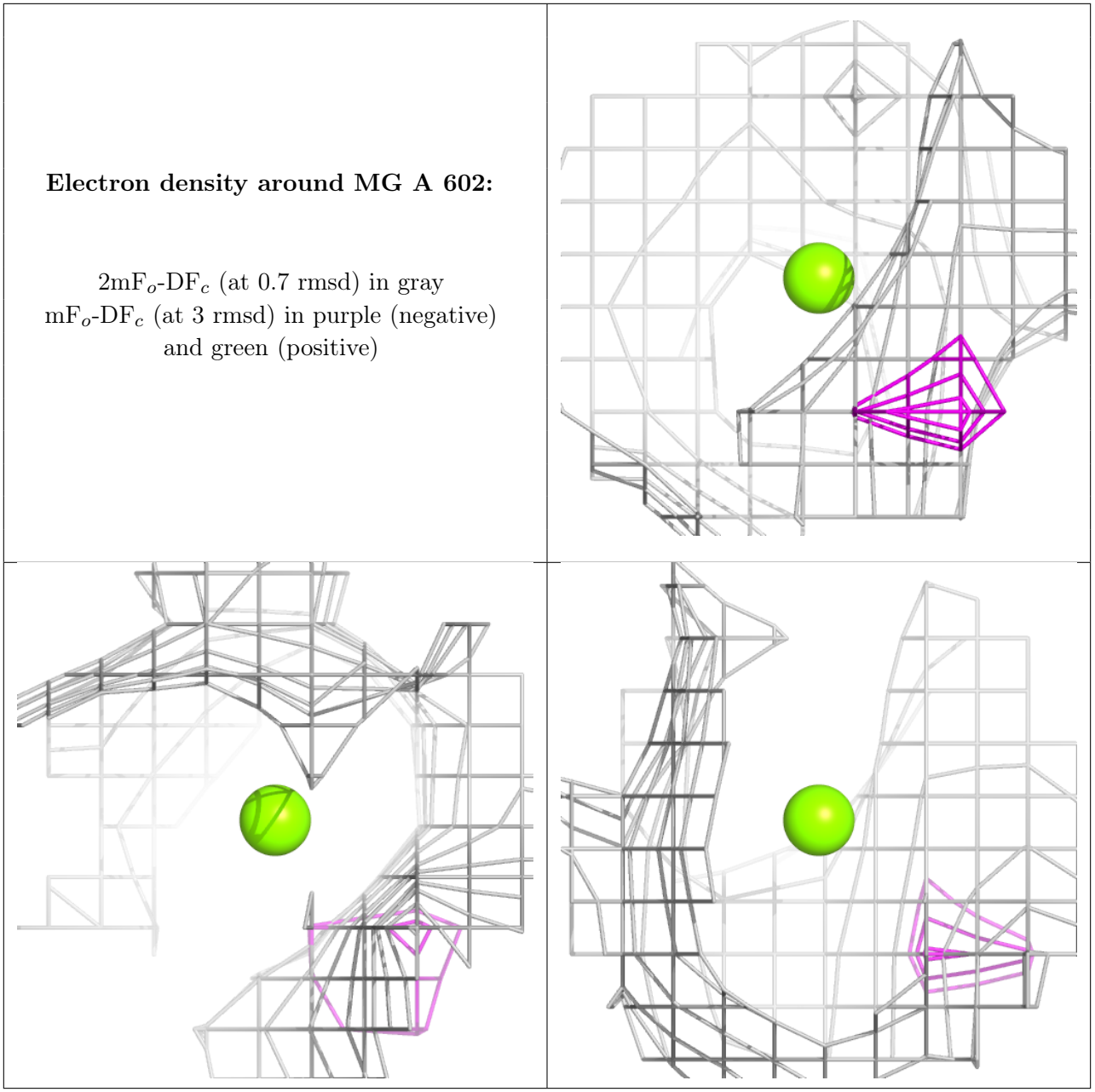
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)





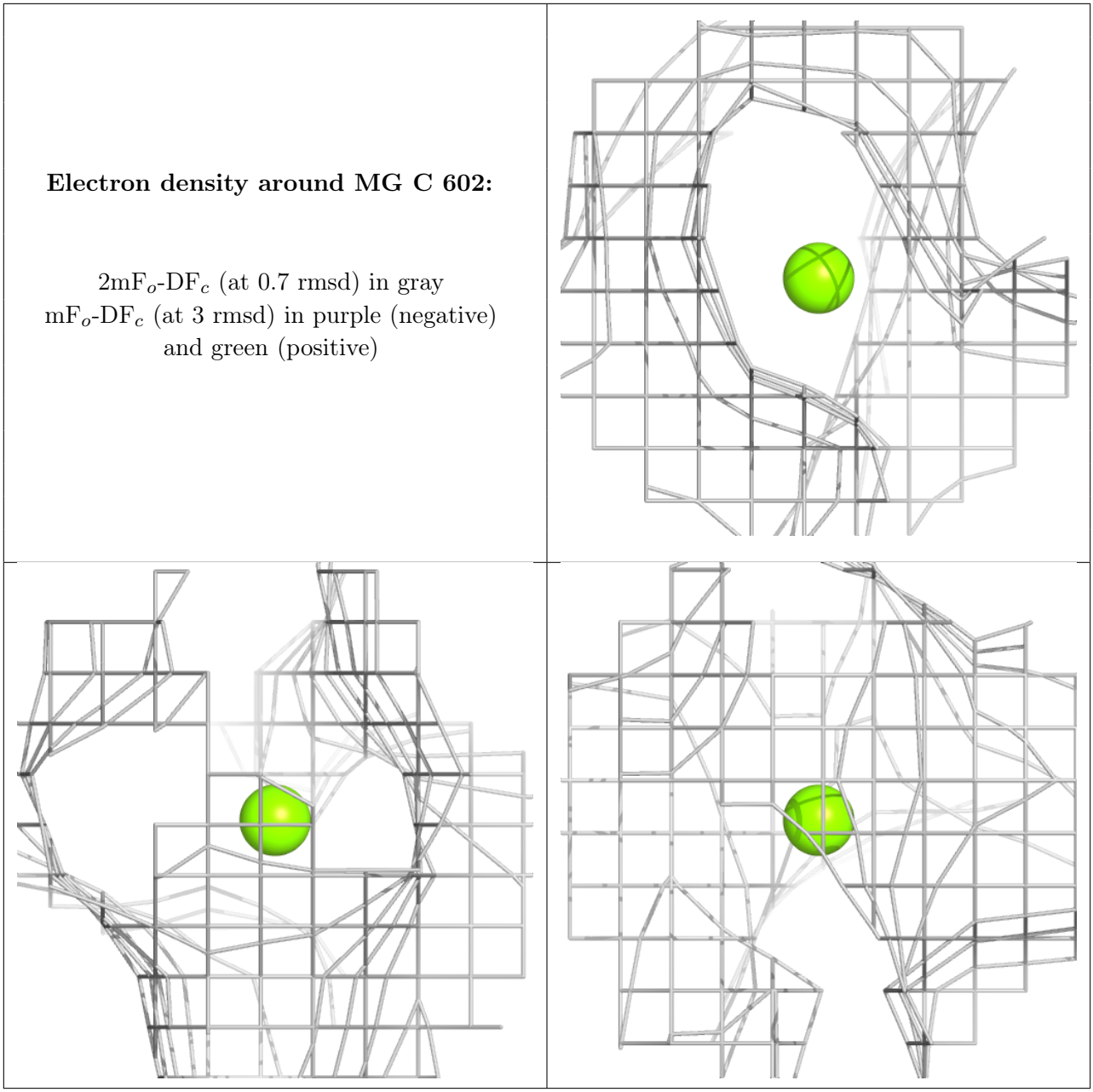
Electron density around MG A 602:

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



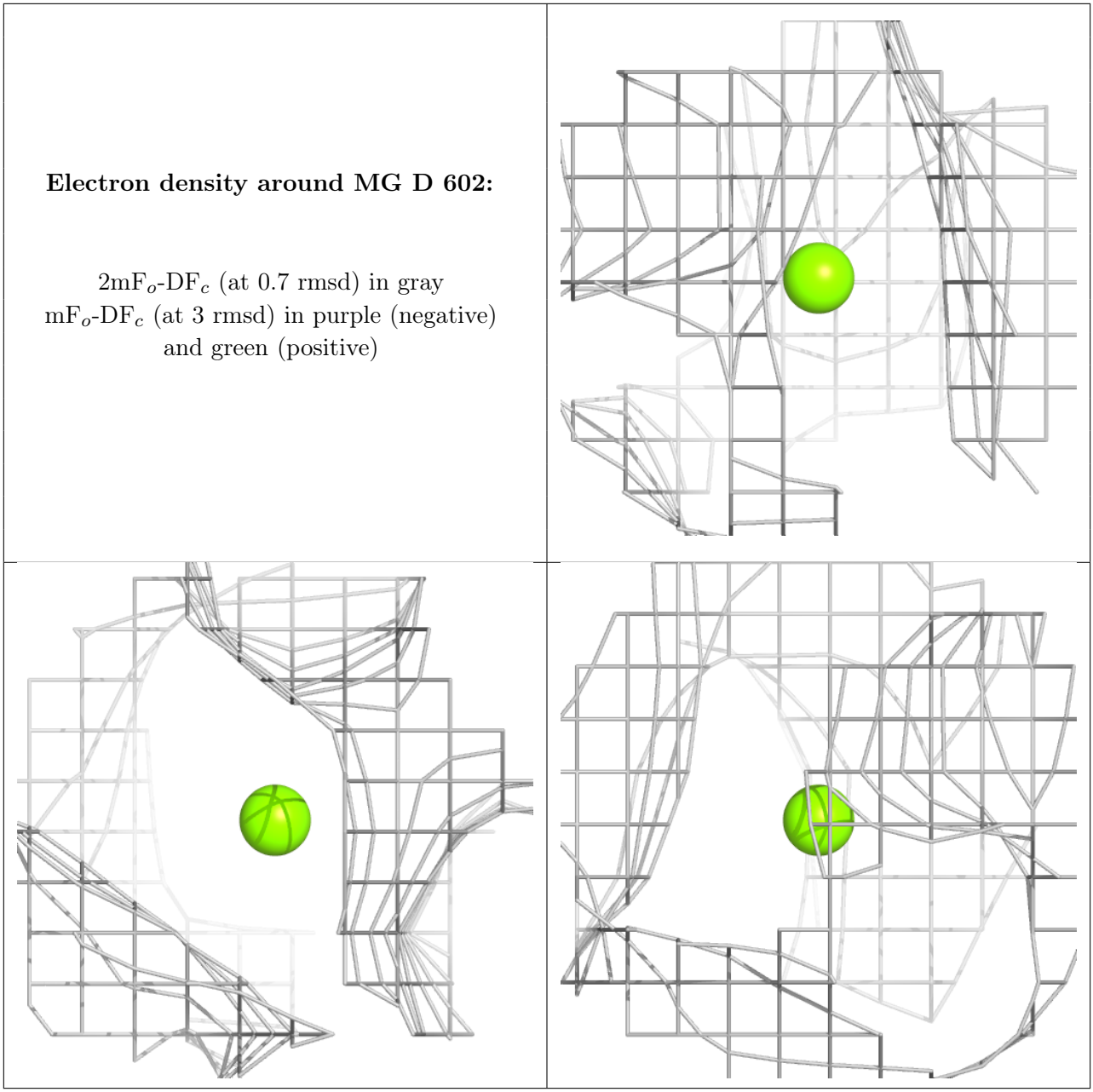
Electron density around MG C 602:

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



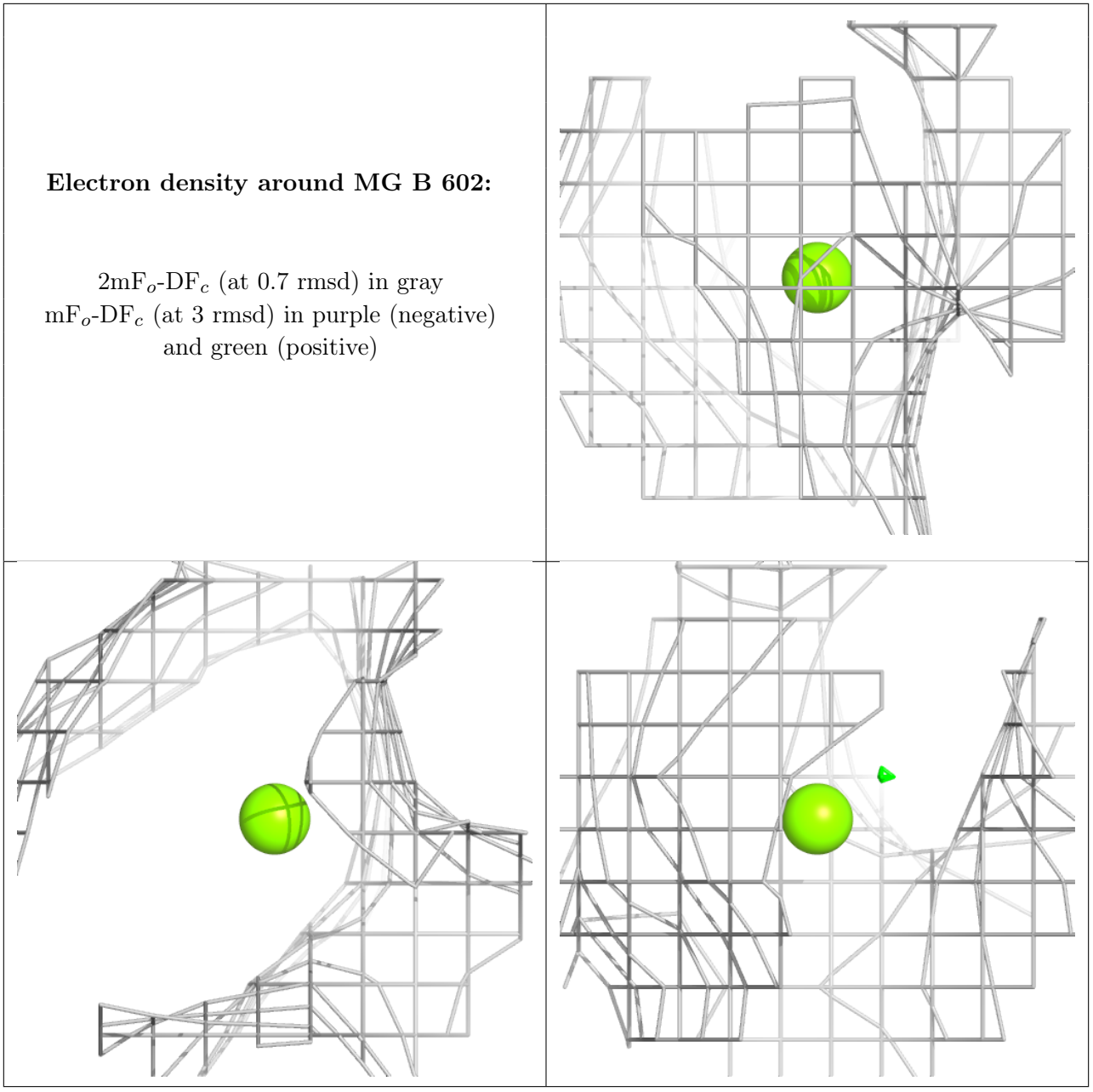
Electron density around MG D 602:

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



Electron density around MG B 602:

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



6.5 Other polymers (i)

There are no such residues in this entry.