



Full wwPDB X-ray Structure Validation Report ⓘ

May 23, 2022 – 05:58 pm BST

PDB ID : 6ZH0
Title : Structure of human galactokinase 1 bound with 2-(4-chlorophenyl)-N-(pyrimidin-2-yl)acetamide
Authors : Mackinnon, S.R.; Bezerra, G.A.; Zhang, M.; Foster, W.; Krojer, T.; Brandao-Neto, J.; Douangamath, A.; Arrowsmith, C.; Edwards, A.; Bountra, C.; Brennan, P.; Lai, K.; Yue, W.W.
Deposited on : 2020-06-20
Resolution : 2.50 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.28.1
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0267
CCP4 : 7.1.010 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.28.1

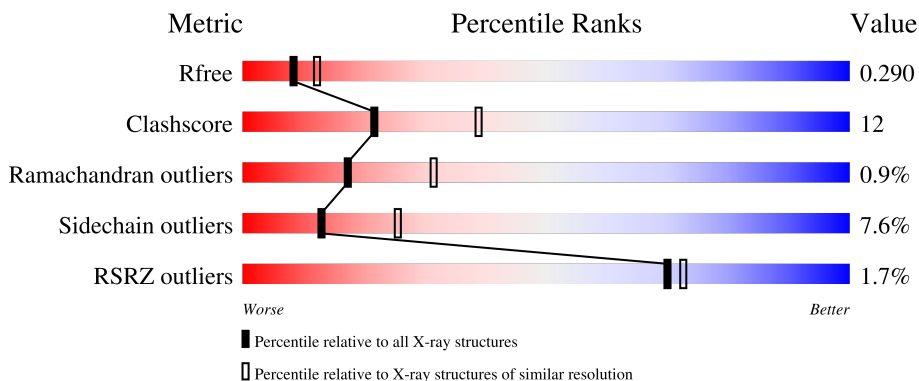
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	399	 3% 66% 26% 6% ..
1	B	399	 % 76% 18% ..
1	D	399	 2% 66% 21% 6% 7%
1	E	399	 78% 17% ..

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	WNP	A	403	-	-	-	X
4	WNP	E	403	-	-	-	X

2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 11258 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 Galactokinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	390	2704	1697	480	512	15	0	0	0
1	B	390	2750	1722	483	530	15	0	0	0
1	E	391	2821	1766	499	540	16	0	1	0
1	D	371	2582	1617	457	495	13	0	0	0

There are 40 discrepancies between the modelled and reference sequences:

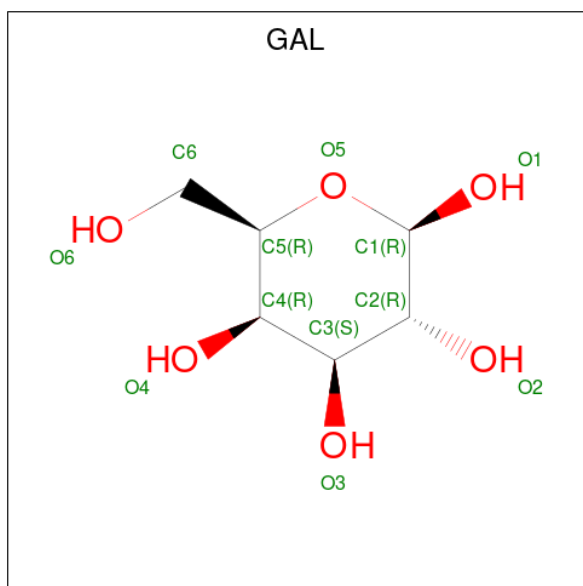
Chain	Residue	Modelled	Actual	Comment	Reference
A	-6	MET	-	initiating methionine	UNP P51570
A	-5	ALA	-	expression tag	UNP P51570
A	-4	HIS	-	expression tag	UNP P51570
A	-3	HIS	-	expression tag	UNP P51570
A	-2	HIS	-	expression tag	UNP P51570
A	-1	HIS	-	expression tag	UNP P51570
A	0	HIS	-	expression tag	UNP P51570
A	1	HIS	-	expression tag	UNP P51570
A	252	ALA	LYS	engineered mutation	UNP P51570
A	253	ALA	GLU	engineered mutation	UNP P51570
B	-6	MET	-	initiating methionine	UNP P51570
B	-5	ALA	-	expression tag	UNP P51570
B	-4	HIS	-	expression tag	UNP P51570
B	-3	HIS	-	expression tag	UNP P51570
B	-2	HIS	-	expression tag	UNP P51570
B	-1	HIS	-	expression tag	UNP P51570
B	0	HIS	-	expression tag	UNP P51570
B	1	HIS	-	expression tag	UNP P51570
B	252	ALA	LYS	engineered mutation	UNP P51570
B	253	ALA	GLU	engineered mutation	UNP P51570
E	-6	MET	-	initiating methionine	UNP P51570

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-5	ALA	-	expression tag	UNP P51570
E	-4	HIS	-	expression tag	UNP P51570
E	-3	HIS	-	expression tag	UNP P51570
E	-2	HIS	-	expression tag	UNP P51570
E	-1	HIS	-	expression tag	UNP P51570
E	0	HIS	-	expression tag	UNP P51570
E	1	HIS	-	expression tag	UNP P51570
E	252	ALA	LYS	engineered mutation	UNP P51570
E	253	ALA	GLU	engineered mutation	UNP P51570
D	-6	MET	-	initiating methionine	UNP P51570
D	-5	ALA	-	expression tag	UNP P51570
D	-4	HIS	-	expression tag	UNP P51570
D	-3	HIS	-	expression tag	UNP P51570
D	-2	HIS	-	expression tag	UNP P51570
D	-1	HIS	-	expression tag	UNP P51570
D	0	HIS	-	expression tag	UNP P51570
D	1	HIS	-	expression tag	UNP P51570
D	252	ALA	LYS	engineered mutation	UNP P51570
D	253	ALA	GLU	engineered mutation	UNP P51570

- Molecule 2 is beta-D-galactopyranose (three-letter code: GAL) (formula: C₆H₁₂O₆).



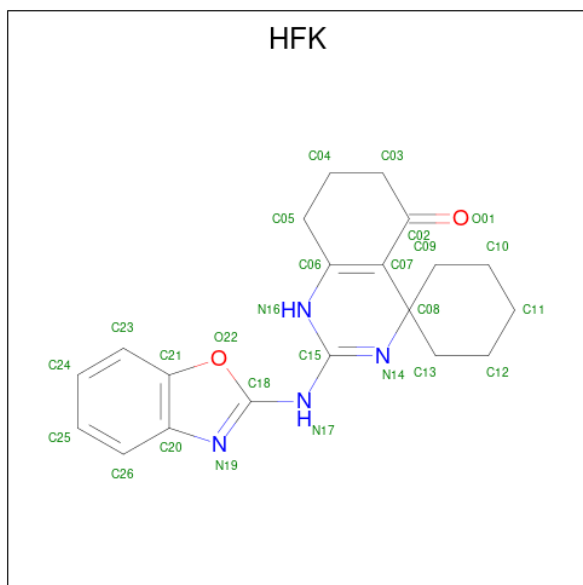
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf		
2	A	1	Total	C	O	0	0
			12	6	6		
2	B	1	Total	C	O	0	0
			12	6	6		

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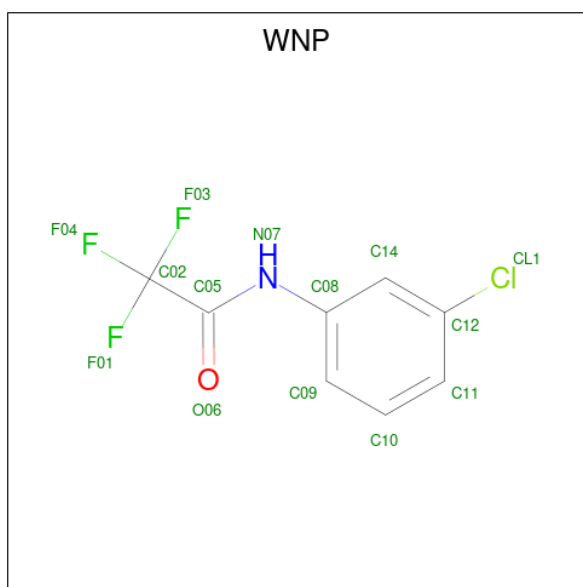
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	E	1	Total	C	O	0	0
			12	6	6		

- Molecule 3 is 2-(1,3-benzoxazol-2-ylamino)spiro[1,6,7,8-tetrahydroquinazoline-4,1'-cyclohexane]-5-one (three-letter code: HFK) (formula: C₂₀H₂₂N₄O₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			26	20	4	2		
3	B	1	Total	C	N	O	0	0
			26	20	4	2		
3	E	1	Total	C	N	O	1	0
			26	20	4	2		

- Molecule 4 is N-(3-chlorophenyl)-2,2,2-trifluoroacetamide (three-letter code: WNP) (formula: C₈H₅ClF₃NO) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	Cl	F	N			O
4	A	1	Total 14	C 8	Cl 1	F 3	N 1	O 1	0	0
4	B	1	Total 14	C 8	Cl 1	F 3	N 1	O 1	0	0
4	E	1	Total 14	C 8	Cl 1	F 3	N 1	O 1	0	0
4	D	1	Total 14	C 8	Cl 1	F 3	N 1	O 1	0	0

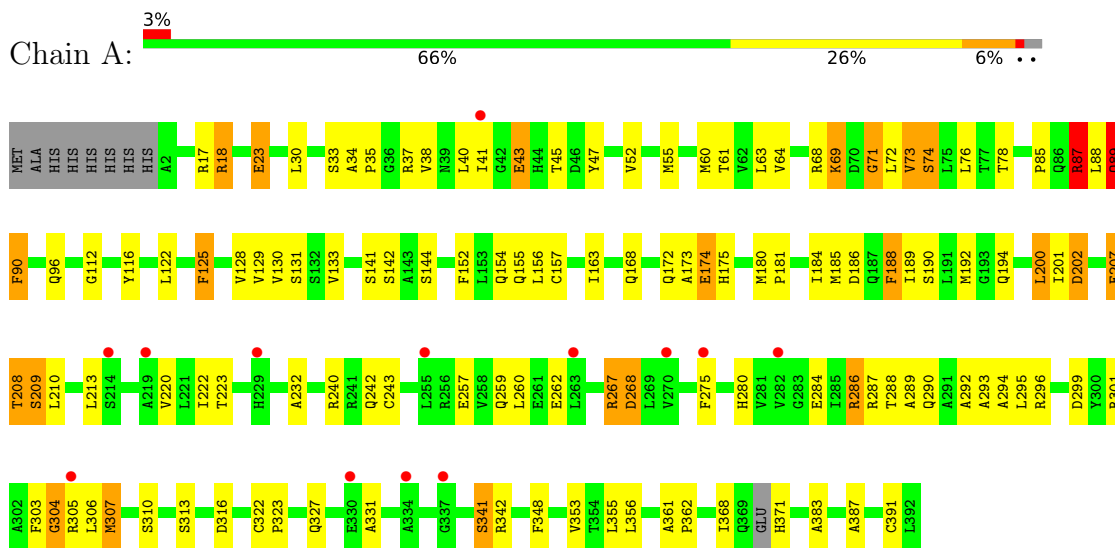
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	71	Total 71	O 71	0	0
5	B	47	Total 47	O 47	0	0
5	E	63	Total 63	O 63	0	0
5	D	50	Total 50	O 50	0	0

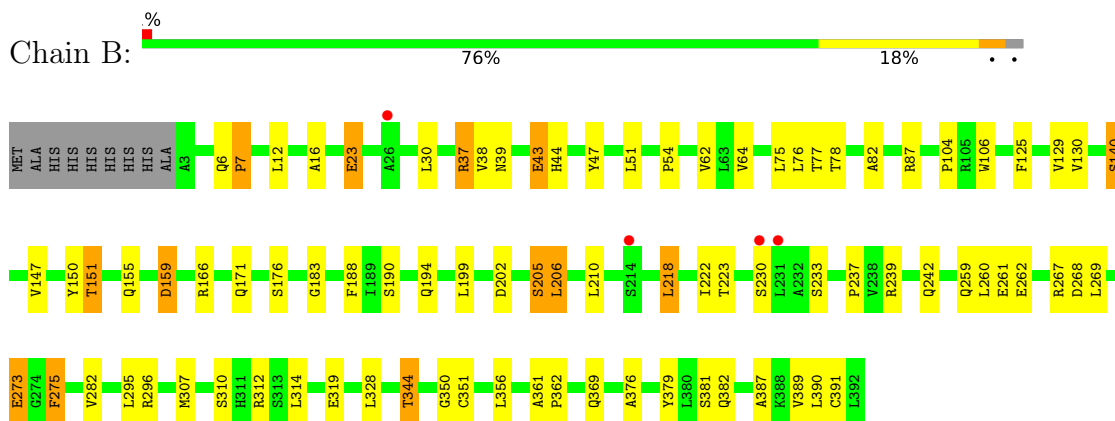
3 Residue-property plots i

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.

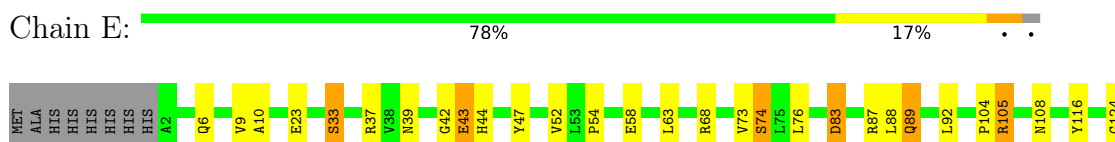
- Molecule 1: Galactokinase

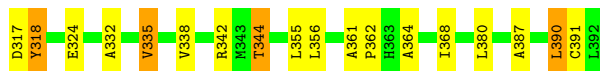
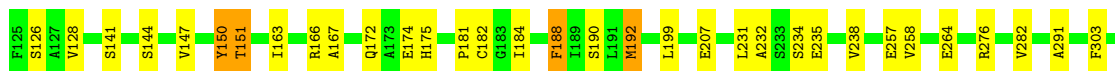


- Molecule 1: Galactokinase

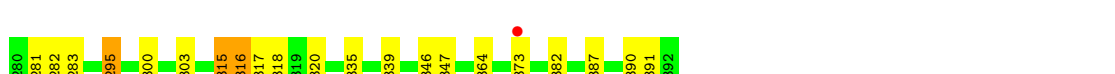
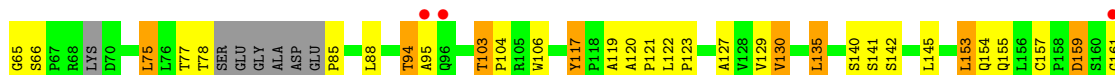
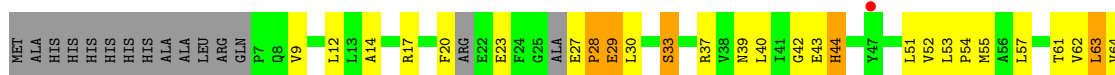


- Molecule 1: Galactokinase





• Molecule 1: Galactokinase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	73.53Å 115.00Å 120.85Å 90.00° 100.65° 90.00°	Depositor
Resolution (Å)	118.77 – 2.50 118.77 – 2.27	Depositor EDS
% Data completeness (in resolution range)	99.7 (118.77-2.50) 99.7 (118.77-2.27)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.16 (at 2.27Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.239 , 0.290 0.241 , 0.290	Depositor DCC
R_{free} test set	4466 reflections (4.91%)	wwPDB-VP
Wilson B-factor (Å ²)	41.0	Xtriage
Anisotropy	0.581	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	(Not available) , (Not available)	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	11258	wwPDB-VP
Average B, all atoms (Å ²)	58.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.69% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality i

5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: GAL, WNP, HFK

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	1.48	31/2753 (1.1%)	1.10	15/3763 (0.4%)
1	B	1.01	8/2802 (0.3%)	0.95	3/3828 (0.1%)
1	D	1.03	10/2624 (0.4%)	0.96	6/3579 (0.2%)
1	E	0.96	6/2876 (0.2%)	0.97	1/3920 (0.0%)
All	All	1.14	55/11055 (0.5%)	1.00	25/15090 (0.2%)

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	14
1	B	0	3
1	D	0	3
1	E	0	1
All	All	0	21

All (55) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	207	GLU	CD-OE1	29.70	1.58	1.25
1	D	23	GLU	CD-OE2	16.67	1.44	1.25
1	A	89	GLN	CD-NE2	15.68	1.72	1.32
1	A	87	ARG	C-O	12.53	1.47	1.23
1	A	90	PHE	C-O	11.79	1.45	1.23
1	A	71	GLY	C-O	-11.56	1.05	1.23
1	A	257	GLU	CD-OE1	11.00	1.37	1.25
1	B	23	GLU	CG-CD	9.93	1.66	1.51
1	A	69	LYS	C-O	9.75	1.41	1.23
1	A	243	CYS	CB-SG	9.74	1.98	1.82

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	33	SER	CB-OG	7.98	1.52	1.42
1	A	301	ARG	C-O	7.96	1.38	1.23
1	A	23	GLU	CG-CD	7.96	1.63	1.51
1	B	23	GLU	CD-OE2	7.93	1.34	1.25
1	E	324	GLU	CD-OE2	7.59	1.34	1.25
1	A	89	GLN	C-N	7.56	1.51	1.34
1	D	316	ASP	CB-CG	7.56	1.67	1.51
1	B	262	GLU	CD-OE2	7.47	1.33	1.25
1	D	23	GLU	CD-OE1	-7.42	1.17	1.25
1	A	299	ASP	C-O	7.38	1.37	1.23
1	D	270	VAL	C-O	7.13	1.36	1.23
1	D	62	VAL	C-O	7.08	1.36	1.23
1	A	200	LEU	C-O	7.03	1.36	1.23
1	A	286	ARG	C-O	6.82	1.36	1.23
1	A	41	ILE	C-O	6.71	1.36	1.23
1	B	296	ARG	CZ-NH2	6.66	1.41	1.33
1	A	88	LEU	C-O	6.63	1.35	1.23
1	A	45	THR	C-O	6.62	1.35	1.23
1	A	41	ILE	C-N	6.55	1.44	1.33
1	A	154	GLN	CD-NE2	6.47	1.49	1.32
1	E	23	GLU	CG-CD	6.46	1.61	1.51
1	A	310	SER	C-O	6.35	1.35	1.23
1	A	71	GLY	C-N	6.27	1.48	1.34
1	A	313	SER	CB-OG	6.19	1.50	1.42
1	B	205	SER	CB-OG	6.03	1.50	1.42
1	A	89	GLN	C-O	5.85	1.34	1.23
1	A	43	GLU	CG-CD	5.79	1.60	1.51
1	A	74	SER	CB-OG	5.79	1.49	1.42
1	E	88	LEU	C-O	5.78	1.34	1.23
1	E	43	GLU	CD-OE1	5.75	1.31	1.25
1	A	208	THR	CA-C	5.75	1.67	1.52
1	A	71	GLY	CA-C	5.74	1.61	1.51
1	A	174	GLU	C-O	5.66	1.34	1.23
1	B	282	VAL	C-O	5.64	1.34	1.23
1	B	350	GLY	C-O	5.56	1.32	1.23
1	D	261	GLU	C-O	5.54	1.33	1.23
1	B	268	ASP	CB-CG	5.52	1.63	1.51
1	A	275	PHE	C-O	5.47	1.33	1.23
1	D	29	GLU	CD-OE2	5.43	1.31	1.25
1	E	23	GLU	C-O	5.30	1.33	1.23
1	A	40	LEU	C-O	5.20	1.33	1.23
1	E	207	GLU	CG-CD	5.13	1.59	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	157	CYS	CB-SG	5.10	1.91	1.82
1	D	382	GLN	C-O	5.01	1.32	1.23
1	D	27	GLU	CD-OE1	5.00	1.31	1.25

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	87	ARG	NE-CZ-NH2	-9.12	115.74	120.30
1	B	23	GLU	OE1-CD-OE2	-8.03	113.67	123.30
1	E	74	SER	O-C-N	7.28	134.35	122.70
1	A	73	VAL	O-C-N	6.81	133.60	122.70
1	A	209	SER	O-C-N	6.72	133.46	122.70
1	D	391	CYS	CA-CB-SG	-6.59	102.14	114.00
1	D	85	PRO	N-CA-CB	6.59	111.20	103.30
1	A	74	SER	O-C-N	6.35	132.87	122.70
1	A	202	ASP	O-C-N	6.34	132.85	122.70
1	A	186	ASP	O-C-N	6.17	132.57	122.70
1	A	125	PHE	O-C-N	6.12	132.50	122.70
1	A	207	GLU	OE1-CD-OE2	5.77	130.22	123.30
1	A	87	ARG	O-C-N	-5.63	113.70	122.70
1	B	391	CYS	CA-CB-SG	-5.49	104.12	114.00
1	A	73	VAL	CA-C-O	-5.40	108.76	120.10
1	D	276	ARG	NE-CZ-NH1	5.34	122.97	120.30
1	A	87	ARG	CA-C-N	-5.26	105.62	117.20
1	A	207	GLU	CG-CD-OE1	-5.26	107.78	118.30
1	D	315	ARG	CG-CD-NE	5.19	122.70	111.80
1	D	391	CYS	CB-CA-C	5.19	120.78	110.40
1	A	207	GLU	CB-CA-C	5.15	120.70	110.40
1	D	259	GLN	CB-CA-C	5.14	120.67	110.40
1	A	243	CYS	CA-CB-SG	-5.13	104.76	114.00
1	B	23	GLU	CG-CD-OE2	-5.08	108.14	118.30
1	A	391	CYS	CA-CB-SG	-5.03	104.95	114.00

There are no chirality outliers.

All (21) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	125	PHE	Mainchain
1	A	200	LEU	Mainchain
1	A	202	ASP	Mainchain
1	A	207	GLU	Sidechain
1	A	208	THR	Mainchain

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Mol	Chain	Res	Type	Group
1	A	288	THR	Mainchain
1	A	316	ASP	Mainchain
1	A	69	LYS	Mainchain
1	A	71	GLY	Mainchain
1	A	73	VAL	Mainchain
1	A	87	ARG	Mainchain,Sidechain
1	A	89	GLN	Mainchain
1	A	90	PHE	Mainchain
1	B	23	GLU	Sidechain
1	B	275	PHE	Mainchain
1	B	312	ARG	Mainchain
1	D	28	PRO	Mainchain
1	D	283	GLY	Peptide
1	D	42	GLY	Peptide
1	E	150	TYR	Sidechain

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	2704	0	2522	62	0
1	B	2750	0	2580	54	0
1	D	2582	0	2390	81	0
1	E	2821	0	2723	57	0
2	A	12	0	12	0	0
2	B	12	0	12	0	0
2	E	12	0	12	1	0
3	A	26	0	0	0	0
3	B	26	0	0	0	0
3	E	26	0	0	0	0
4	A	14	0	0	1	0
4	B	14	0	0	0	0
4	D	14	0	0	1	0
4	E	14	0	0	1	0
5	A	71	0	0	0	0
5	B	47	0	0	0	0
5	D	50	0	0	0	0
5	E	63	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	11258	0	10251	253	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 12.

All (253) 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:121:PRO:HG2	1:D:157:CYS:SG	1.49	1.52
1:A:89:GLN:NE2	1:A:89:GLN:CD	1.72	1.41
1:D:121:PRO:CG	1:D:157:CYS:SG	2.11	1.36
1:D:121:PRO:CD	1:D:157:CYS:SG	2.52	0.98
1:D:236:TYR:OH	1:D:346:GLY:O	1.87	0.91
1:D:121:PRO:HD2	1:D:157:CYS:SG	2.12	0.88
1:B:369:GLN:HE22	1:B:376:ALA:H	1.18	0.85
1:E:141:SER:O	1:E:144:SER:OG	1.99	0.81
1:B:259:GLN:NE2	1:B:261:GLU:HB2	1.95	0.80
1:D:239:ARG:HA	1:D:242:GLN:HE21	1.46	0.80
1:E:147:VAL:O	1:E:151:THR:HG22	1.82	0.80
1:B:369:GLN:HE22	1:B:376:ALA:N	1.82	0.78
1:D:30:LEU:HD21	1:D:155:GLN:CB	2.17	0.75
1:D:117:TYR:CE2	1:D:153:LEU:HB3	2.22	0.74
1:E:147:VAL:O	1:E:151:THR:CG2	2.37	0.72
1:A:63:LEU:HD11	1:A:129:VAL:HG22	1.71	0.72
1:D:117:TYR:HE2	1:D:153:LEU:HB3	1.56	0.71
1:B:171:GLN:HE21	1:B:183:GLY:C	1.92	0.71
1:B:39:ASN:O	1:B:344:THR:HG22	1.91	0.71
1:B:38:VAL:HG22	1:B:344:THR:HG21	1.74	0.70
1:D:54:PRO:HD2	1:D:199:LEU:O	1.92	0.69
1:E:43:GLU:OE1	2:E:401:GAL:O6	2.10	0.69
1:D:276:ARG:HH11	1:D:276:ARG:CG	2.05	0.68
1:D:119:ALA:HB1	1:D:157:CYS:SG	2.34	0.68
1:D:276:ARG:HH11	1:D:276:ARG:HG2	1.58	0.68
1:B:150:TYR:CZ	1:B:166:ARG:HG2	2.30	0.67
1:A:72:LEU:C	1:A:72:LEU:HD12	2.14	0.67
1:D:202:ASP:O	1:D:205:SER:O	2.13	0.67
1:D:135:LEU:N	1:D:135:LEU:HD23	2.11	0.66
1:E:184:ILE:HG13	1:E:188:PHE:HD2	1.61	0.65
1:D:44:HIS:ND1	1:D:44:HIS:N	2.45	0.65
1:D:121:PRO:HG3	1:D:157:CYS:SG	2.32	0.64
1:D:30:LEU:HD21	1:D:155:GLN:HB3	1.79	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:39:ASN:O	1:E:344:THR:HG23	1.98	0.64
1:B:54:PRO:HD2	1:B:199:LEU:O	1.97	0.64
1:B:194:GLN:HG3	1:B:210:LEU:HD13	1.79	0.63
1:A:89:GLN:NE2	1:A:89:GLN:CG	2.61	0.63
1:D:103:THR:CB	1:D:104:PRO:CD	2.77	0.62
1:D:268:ASP:O	1:D:269:LEU:CB	2.48	0.62
1:B:30:LEU:HD11	1:B:155:GLN:HB3	1.83	0.61
1:D:335:VAL:HG21	1:D:364:ALA:HA	1.82	0.61
1:D:295:LEU:HD13	1:D:303:PHE:CD2	2.36	0.60
1:D:75:LEU:HA	1:D:127:ALA:O	2.01	0.60
1:D:28:PRO:HG3	1:D:64:VAL:CG1	2.32	0.60
1:E:42:GLY:O	1:E:52:VAL:HG12	2.02	0.60
1:D:218:LEU:HD11	1:D:339:TYR:HE2	1.66	0.60
1:A:304:GLY:O	1:A:305:ARG:C	2.39	0.59
1:A:303:PHE:CB	4:A:403:WNP:CL1	2.88	0.59
1:E:172:GLN:HA	1:E:172:GLN:NE2	2.18	0.59
1:D:103:THR:CB	1:D:104:PRO:HD3	2.32	0.59
1:E:150:TYR:CE1	1:E:166:ARG:HD3	2.37	0.58
1:E:364:ALA:O	1:E:368:ILE:HD12	2.04	0.58
1:A:47:TYR:CD1	1:A:240:ARG:HG2	2.38	0.58
1:A:293:ALA:HA	1:A:296:ARG:HH11	1.67	0.58
1:E:92:LEU:HD11	1:E:124:GLY:N	2.19	0.57
1:B:150:TYR:CE1	1:B:166:ARG:HG2	2.39	0.57
1:A:213:LEU:HD11	1:A:295:LEU:HD21	1.86	0.57
1:B:155:GLN:HE21	1:B:389:VAL:HG21	1.69	0.57
1:B:205:SER:O	1:B:206:LEU:HB2	2.05	0.57
1:D:276:ARG:HG2	1:D:276:ARG:NH1	2.21	0.56
1:A:35:PRO:O	1:A:144:SER:HB3	2.06	0.56
1:D:30:LEU:HD21	1:D:155:GLN:HB2	1.87	0.56
1:E:257:GLU:HG3	5:E:533:HOH:O	2.06	0.56
1:E:33:SER:O	1:E:387:ALA:HA	2.06	0.56
1:E:89:GLN:NE2	5:E:501:HOH:O	2.38	0.55
1:B:51:LEU:HD23	1:B:202:ASP:HA	1.87	0.55
1:D:315:ARG:NH1	1:D:316:ASP:OD1	2.39	0.55
1:D:117:TYR:OH	1:D:154:GLN:HA	2.07	0.55
1:D:276:ARG:HH11	1:D:276:ARG:CB	2.19	0.55
1:D:43:GLU:CB	1:D:44:HIS:ND1	2.70	0.55
1:A:52:VAL:CG2	1:A:201:ILE:HB	2.37	0.55
1:D:170:CYS:HB2	1:D:187:GLN:HG2	1.89	0.55
1:A:55:MET:SD	1:A:383:ALA:HB2	2.47	0.55
1:A:116:TYR:CE2	1:A:172:GLN:HG3	2.43	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:242:GLN:NE2	1:B:273:GLU:OE1	2.39	0.54
1:A:85:PRO:HG2	1:A:87:ARG:O	2.08	0.54
1:B:151:THR:HG21	1:B:387:ALA:HB1	1.88	0.54
1:E:390:LEU:HD22	1:E:391:CYS:H	1.73	0.53
1:B:259:GLN:HE21	1:B:261:GLU:HB2	1.71	0.53
1:E:174:GLU:HG2	1:E:182:CYS:SG	2.48	0.53
1:D:117:TYR:CE1	1:D:119:ALA:HB2	2.43	0.53
1:E:44:HIS:ND1	1:E:47:TYR:OH	2.30	0.53
1:B:223:THR:O	1:B:351:CYS:HA	2.08	0.53
1:B:259:GLN:HE22	1:B:261:GLU:HB2	1.71	0.53
1:D:20:PHE:CE2	1:D:65:GLY:HA2	2.44	0.53
1:D:230:SER:OG	1:D:235:GLU:OE1	2.13	0.53
1:A:267:ARG:O	1:A:268:ASP:CB	2.56	0.53
1:D:39:ASN:HD21	1:D:43:GLU:HA	1.73	0.52
1:D:255:LEU:HD12	1:D:281:VAL:HG11	1.90	0.52
1:B:39:ASN:O	1:B:344:THR:CG2	2.57	0.52
1:D:44:HIS:HD2	1:D:236:TYR:CE1	2.28	0.52
1:D:271:SER:O	1:D:272:LYS:CB	2.58	0.52
1:D:272:LYS:O	1:D:276:ARG:HG3	2.10	0.52
1:A:30:LEU:HD21	1:A:155:GLN:CB	2.39	0.51
1:A:78:THR:OG1	1:A:130:VAL:HG12	2.10	0.51
1:E:6:GLN:OE1	1:E:58:GLU:HB2	2.10	0.51
1:D:63:LEU:HD11	1:D:129:VAL:HG22	1.93	0.51
1:A:185:MET:O	1:A:189:ILE:HG22	2.11	0.51
1:B:155:GLN:OE1	1:B:155:GLN:HA	2.10	0.51
1:D:61:THR:HG21	1:D:145:LEU:HA	1.93	0.51
1:D:218:LEU:HD11	1:D:339:TYR:CE2	2.46	0.51
1:E:54:PRO:HD2	1:E:199:LEU:O	2.11	0.51
1:D:51:LEU:HD23	1:D:202:ASP:HA	1.93	0.51
1:A:152:PHE:CE2	1:A:156:LEU:HD11	2.47	0.50
1:A:192:MET:HE1	1:B:210:LEU:HD12	1.92	0.50
1:D:120:ALA:N	1:D:121:PRO:HD2	2.27	0.50
1:B:104:PRO:HB2	1:B:106:TRP:CD1	2.46	0.50
1:E:390:LEU:HD22	1:E:391:CYS:N	2.27	0.50
1:B:30:LEU:O	1:B:64:VAL:HA	2.12	0.50
1:E:276:ARG:O	1:E:317:ASP:HB3	2.11	0.50
1:D:14:ALA:O	1:D:17:ARG:N	2.45	0.50
1:D:320:VAL:O	1:D:347:GLY:HA3	2.12	0.49
1:A:43:GLU:HB2	1:A:342:ARG:NH2	2.28	0.49
1:A:368:ILE:O	1:A:371:HIS:N	2.45	0.49
1:B:218:LEU:C	1:B:218:LEU:HD23	2.33	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:232:ALA:HA	1:A:348:PHE:CD2	2.48	0.49
1:B:147:VAL:O	1:B:151:THR:HG23	2.13	0.49
1:D:57:LEU:HD21	1:D:222:ILE:HD11	1.95	0.49
1:A:184:ILE:O	1:A:188:PHE:HB2	2.13	0.49
1:B:147:VAL:HG21	1:B:190:SER:HB3	1.93	0.49
1:D:12:LEU:HD23	1:D:130:VAL:HG23	1.93	0.48
1:A:112:GLY:HA3	1:A:173:ALA:HB1	1.94	0.48
1:E:39:ASN:H	1:E:344:THR:HG21	1.76	0.48
1:E:68:ARG:HD2	1:E:126:SER:OG	2.13	0.48
1:E:83:ASP:OD2	1:E:105:ARG:HB2	2.13	0.48
1:A:180:MET:SD	1:A:181:PRO:HD2	2.54	0.48
1:A:52:VAL:HG22	1:A:201:ILE:HB	1.95	0.48
1:D:44:HIS:HD2	1:D:236:TYR:HE1	1.62	0.48
1:D:121:PRO:CG	1:D:157:CYS:HG	2.19	0.48
1:A:361:ALA:HB3	1:A:362:PRO:HD3	1.95	0.48
1:D:276:ARG:CG	1:D:276:ARG:NH1	2.72	0.48
1:A:174:GLU:HG3	1:A:180:MET:HB3	1.96	0.48
1:B:44:HIS:ND1	1:B:47:TYR:OH	2.34	0.48
1:A:194:GLN:HG3	1:A:210:LEU:HD13	1.95	0.48
1:E:167:ALA:CB	1:E:184:ILE:HD11	2.44	0.47
1:D:300:TYR:HA	4:D:401:WNP:F01	2.04	0.47
1:B:369:GLN:NE2	1:B:376:ALA:H	1.97	0.47
1:A:175:HIS:CD2	1:A:181:PRO:HA	2.50	0.47
1:D:121:PRO:HG2	1:D:157:CYS:CB	2.41	0.47
1:A:290:GLN:O	1:A:294:ALA:N	2.48	0.47
1:D:231:LEU:O	1:D:235:GLU:HG2	2.15	0.47
1:A:30:LEU:O	1:A:64:VAL:HA	2.15	0.46
1:A:341:SER:HA	1:A:353:VAL:O	2.15	0.46
1:E:150:TYR:CZ	1:E:166:ARG:HG2	2.50	0.46
1:B:218:LEU:HD23	1:B:218:LEU:O	2.15	0.46
1:E:39:ASN:N	1:E:344:THR:HG21	2.30	0.46
1:A:232:ALA:HB2	1:A:348:PHE:HB2	1.97	0.46
1:D:266:ALA:O	1:D:268:ASP:O	2.33	0.46
1:A:289:ALA:O	1:A:292:ALA:HB3	2.16	0.46
1:A:303:PHE:CB	1:A:355:LEU:HD23	2.46	0.46
1:E:151:THR:HG21	1:E:387:ALA:HB1	1.96	0.46
1:B:16:ALA:HB2	1:B:130:VAL:CG2	2.45	0.46
1:B:30:LEU:CD1	1:B:155:GLN:HB3	2.45	0.46
1:B:78:THR:OG1	1:B:130:VAL:HG12	2.16	0.46
1:D:122:LEU:N	1:D:123:PRO:CD	2.79	0.46
1:D:159:ASP:OD1	1:D:161:GLY:N	2.49	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:16:ALA:HB2	1:B:130:VAL:HG21	1.98	0.46
1:B:233:SER:O	1:B:237:PRO:HD2	2.16	0.46
1:B:37:ARG:HG3	1:B:140:SER:OG	2.16	0.46
1:A:280:HIS:O	1:A:284:GLU:N	2.40	0.45
1:E:332:ALA:O	1:E:335:VAL:HG13	2.16	0.45
1:E:361:ALA:HB3	1:E:362:PRO:HD3	1.97	0.45
1:D:44:HIS:CD2	1:D:236:TYR:HE1	2.34	0.45
1:D:276:ARG:O	1:D:317:ASP:HB3	2.15	0.45
1:B:267:ARG:CZ	1:B:275:PHE:CZ	3.00	0.45
1:E:147:VAL:O	1:E:151:THR:HG23	2.15	0.45
1:E:291:ALA:HB1	1:E:303:PHE:CE2	2.52	0.45
1:A:61:THR:HA	1:A:130:VAL:O	2.17	0.45
1:A:286:ARG:O	1:A:289:ALA:HB3	2.17	0.45
1:B:361:ALA:N	1:B:362:PRO:CD	2.80	0.45
1:A:280:HIS:O	1:A:284:GLU:HB2	2.17	0.45
1:B:76:LEU:HD12	1:B:87:ARG:HB2	1.98	0.45
1:D:117:TYR:CD2	1:D:153:LEU:HB3	2.52	0.45
1:A:260:LEU:O	1:A:260:LEU:HD12	2.17	0.45
1:E:89:GLN:NE2	1:E:89:GLN:N	2.64	0.45
1:E:83:ASP:OD1	1:E:83:ASP:N	2.50	0.44
1:A:322:CYS:O	1:A:323:PRO:C	2.55	0.44
1:D:279:ARG:O	1:D:282:VAL:O	2.35	0.44
1:B:239:ARG:NH2	1:B:319:GLU:O	2.50	0.44
1:E:231:LEU:O	1:E:232:ALA:C	2.55	0.44
1:D:63:LEU:HD12	1:D:129:VAL:HG13	1.98	0.44
1:B:222:ILE:HB	1:B:379:TYR:HB2	1.99	0.44
1:A:76:LEU:O	1:A:128:VAL:HA	2.18	0.44
1:B:62:VAL:HB	1:B:130:VAL:HG23	2.00	0.44
1:E:184:ILE:HG13	1:E:188:PHE:CD2	2.46	0.44
1:D:28:PRO:HG3	1:D:64:VAL:HG11	1.99	0.44
1:D:141:SER:OG	1:D:142:SER:N	2.51	0.44
1:A:327:GLN:O	1:A:331:ALA:HB2	2.18	0.44
1:D:40:LEU:HB2	1:D:53:LEU:O	2.18	0.44
1:A:304:GLY:O	1:A:307:MET:N	2.51	0.43
1:B:150:TYR:OH	1:B:166:ARG:HG2	2.18	0.43
1:E:172:GLN:NE2	1:E:172:GLN:CA	2.81	0.43
1:E:83:ASP:HB2	1:E:104:PRO:HB2	2.00	0.43
1:E:175:HIS:CD2	1:E:181:PRO:HA	2.53	0.43
1:D:52:VAL:HG23	1:D:54:PRO:HD3	2.00	0.43
1:A:30:LEU:HD21	1:A:155:GLN:HB3	2.00	0.43
1:A:303:PHE:O	1:A:307:MET:HB2	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:76:LEU:O	1:E:128:VAL:HA	2.18	0.43
1:E:163:ILE:HG21	1:E:192:MET:SD	2.58	0.43
1:D:235:GLU:O	1:D:238:VAL:HG13	2.19	0.43
1:A:68:ARG:CZ	1:A:72:LEU:HD11	2.49	0.43
1:B:43:GLU:HB3	1:B:314:LEU:HD21	2.01	0.43
1:D:117:TYR:HE2	1:D:153:LEU:CB	2.29	0.43
1:A:152:PHE:HE2	1:A:156:LEU:HD11	1.84	0.43
1:B:295:LEU:HD12	1:B:295:LEU:HA	1.80	0.43
1:A:259:GLN:O	1:A:262:GLU:N	2.49	0.43
1:E:116:TYR:CE2	1:E:172:GLN:HG3	2.53	0.43
1:E:235:GLU:O	1:E:238:VAL:HB	2.19	0.43
1:D:159:ASP:OD1	1:D:159:ASP:C	2.57	0.43
1:D:218:LEU:HD12	1:D:218:LEU:HA	1.86	0.43
1:A:34:ALA:HB3	1:A:144:SER:O	2.20	0.42
1:E:74:SER:O	1:E:126:SER:HA	2.18	0.42
1:A:210:LEU:HD23	1:A:210:LEU:HA	1.88	0.42
1:E:231:LEU:HA	1:E:234:SER:OG	2.18	0.42
1:A:304:GLY:O	1:A:306:LEU:N	2.53	0.42
1:E:335:VAL:HG13	1:E:338:VAL:HG21	2.00	0.42
1:A:23:GLU:CD	1:A:76:LEU:HD22	2.39	0.42
1:D:29:GLU:N	1:D:66:SER:OG	2.48	0.42
1:D:33:SER:O	1:D:387:ALA:HA	2.19	0.42
1:D:273:GLU:HA	1:D:276:ARG:HG3	2.01	0.42
1:B:159:ASP:OD1	1:B:159:ASP:C	2.58	0.42
1:A:38:VAL:HG21	1:A:222:ILE:HG12	2.01	0.42
1:B:77:THR:HA	1:B:129:VAL:O	2.20	0.42
1:B:171:GLN:NE2	1:B:183:GLY:C	2.68	0.42
1:E:380:LEU:HD23	1:E:380:LEU:HA	1.87	0.41
1:D:135:LEU:HD23	1:D:135:LEU:H	1.85	0.41
1:E:9:VAL:HG13	1:E:10:ALA:N	2.35	0.41
1:A:60:MET:O	1:A:131:SER:HA	2.21	0.41
1:E:73:VAL:O	1:E:89:GLN:HA	2.20	0.41
1:A:63:LEU:CD1	1:A:129:VAL:HG22	2.46	0.41
1:B:267:ARG:NH2	1:B:275:PHE:CE2	2.89	0.41
1:E:39:ASN:O	1:E:342:ARG:NH1	2.53	0.41
1:D:315:ARG:NH1	1:D:316:ASP:OD2	2.54	0.41
1:A:280:HIS:O	1:A:284:GLU:CB	2.69	0.41
1:B:6:GLN:O	1:B:7:PRO:CB	2.69	0.41
1:E:39:ASN:H	1:E:344:THR:CG2	2.34	0.41
1:E:44:HIS:HB3	1:E:318:TYR:CE2	2.56	0.41
1:B:307:MET:O	1:B:310:SER:HB3	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:39:ASN:HB3	1:E:344:THR:HG22	2.03	0.41
1:D:94:THR:OG1	1:D:95:ALA:N	2.54	0.41
1:A:163:ILE:HG21	1:A:192:MET:SD	2.61	0.40
1:D:44:HIS:CD2	1:D:236:TYR:CE1	3.09	0.40
1:A:33:SER:O	1:A:387:ALA:HA	2.21	0.40
1:E:150:TYR:CE1	1:E:166:ARG:CD	3.04	0.40
1:E:258:VAL:O	1:E:282:VAL:HG22	2.21	0.40
1:E:355:LEU:HD13	4:E:403:WNP:C09	2.51	0.40
1:B:361:ALA:HB3	1:B:362:PRO:HD3	2.04	0.40
1:E:105:ARG:HA	1:E:108:ASN:ND2	2.36	0.40
1:D:63:LEU:CD1	1:D:129:VAL:HG22	2.51	0.40
1:B:147:VAL:O	1:B:151:THR:CG2	2.70	0.40
1:B:223:THR:HG21	1:B:328:LEU:HD22	2.03	0.40
1:D:120:ALA:N	1:D:121:PRO:CD	2.85	0.40
1:A:133:VAL:HG11	1:A:141:SER:HA	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	386/399 (97%)	349 (90%)	32 (8%)	5 (1%)	12 21
1	B	388/399 (97%)	362 (93%)	23 (6%)	3 (1%)	19 35
1	D	359/399 (90%)	317 (88%)	36 (10%)	6 (2%)	9 16
1	E	390/399 (98%)	367 (94%)	23 (6%)	0	100 100
All	All	1523/1596 (95%)	1395 (92%)	114 (8%)	14 (1%)	17 31

All (14) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	96	GLN
1	B	7	PRO
1	D	272	LYS
1	A	268	ASP
1	A	304	GLY
1	B	82	ALA
1	D	103	THR
1	D	269	LEU
1	A	18	ARG
1	B	125	PHE
1	D	373	GLY
1	D	9	VAL
1	D	106	TRP
1	A	267	ARG

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	247/315 (78%)	230 (93%)	17 (7%)	15	30
1	B	262/315 (83%)	242 (92%)	20 (8%)	13	25
1	D	238/315 (76%)	214 (90%)	24 (10%)	7	14
1	E	280/315 (89%)	263 (94%)	17 (6%)	18	36
All	All	1027/1260 (82%)	949 (92%)	78 (8%)	13	25

All (78) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	17	ARG
1	A	18	ARG
1	A	37	ARG
1	A	74	SER
1	A	122	LEU
1	A	142	SER
1	A	168	GLN
1	A	188	PHE

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Mol	Chain	Res	Type
1	A	190	SER
1	A	209	SER
1	A	220	VAL
1	A	223	THR
1	A	242	GLN
1	A	287	ARG
1	A	307	MET
1	A	341	SER
1	A	356	LEU
1	B	12	LEU
1	B	37	ARG
1	B	43	GLU
1	B	75	LEU
1	B	140	SER
1	B	151	THR
1	B	159	ASP
1	B	176	SER
1	B	188	PHE
1	B	206	LEU
1	B	218	LEU
1	B	230	SER
1	B	260	LEU
1	B	269	LEU
1	B	273	GLU
1	B	344	THR
1	B	356	LEU
1	B	381	SER
1	B	382	GLN
1	B	390	LEU
1	E	33	SER
1	E	37	ARG
1	E	63	LEU
1	E	83	ASP
1	E	87	ARG
1	E	89	GLN
1	E	105	ARG
1	E	151	THR
1	E	188	PHE
1	E	190	SER
1	E	192	MET
1	E	264	GLU
1	E	318	TYR

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Mol	Chain	Res	Type
1	E	335	VAL
1	E	344	THR
1	E	356	LEU
1	E	390	LEU
1	D	37	ARG
1	D	44	HIS
1	D	55	MET
1	D	63	LEU
1	D	75	LEU
1	D	77	THR
1	D	78	THR
1	D	88	LEU
1	D	94	THR
1	D	117	TYR
1	D	130	VAL
1	D	135	LEU
1	D	140	SER
1	D	153	LEU
1	D	159	ASP
1	D	218	LEU
1	D	230	SER
1	D	231	LEU
1	D	238	VAL
1	D	276	ARG
1	D	277	ARG
1	D	295	LEU
1	D	318	TYR
1	D	390	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	172	GLN
1	A	226	ASN
1	B	171	GLN
1	B	259	GLN
1	B	369	GLN
1	B	371	HIS
1	B	382	GLN
1	E	49	GLN
1	E	89	GLN
1	E	168	GLN

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Mol	Chain	Res	Type
1	E	172	GLN
1	D	39	ASN
1	D	242	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

10 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	GAL	B	401	-	12,12,12	0.76	0	17,17,17	1.93	6 (35%)
3	HFK	E	402	-	26,30,30	1108.53	11 (42%)	24,44,44	12.03	4 (16%)
4	WNP	A	403	-	14,14,14	0.34	0	20,20,20	0.57	0
4	WNP	B	403	-	14,14,14	0.45	0	20,20,20	0.82	1 (5%)
4	WNP	D	401	-	14,14,14	0.37	0	20,20,20	0.68	1 (5%)
3	HFK	B	402	-	26,30,30	2.99	9 (34%)	24,44,44	1.68	5 (20%)
3	HFK	A	402	-	26,30,30	3.29	10 (38%)	24,44,44	2.74	9 (37%)
2	GAL	A	401	-	12,12,12	0.54	0	17,17,17	1.75	4 (23%)
4	WNP	E	403	-	14,14,14	0.36	0	20,20,20	0.52	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	GAL	E	401	-	12,12,12	1.18	1 (8%)	17,17,17	2.62	6 (35%)

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	GAL	B	401	-	-	1/2/22/22	0/1/1/1
3	HFK	E	402	-	-	2/2/43/43	0/5/5/5
4	WNP	A	403	-	-	0/10/10/10	0/1/1/1
4	WNP	B	403	-	-	0/10/10/10	0/1/1/1
4	WNP	D	401	-	-	2/10/10/10	0/1/1/1
3	HFK	B	402	-	-	2/2/43/43	0/5/5/5
3	HFK	A	402	-	-	0/2/43/43	0/5/5/5
2	GAL	A	401	-	-	2/2/22/22	0/1/1/1
4	WNP	E	403	-	-	0/10/10/10	0/1/1/1
2	GAL	E	401	-	-	2/2/22/22	0/1/1/1

All (31) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	E	402	HFK	O01-C02	5652.38	115.51	1.23
3	A	402	HFK	C06-C07	12.27	1.53	1.37
3	E	402	HFK	C06-C07	10.85	1.51	1.37
3	B	402	HFK	C06-C07	9.76	1.49	1.37
3	B	402	HFK	C15-N14	6.14	1.46	1.30
3	A	402	HFK	C15-N14	5.88	1.45	1.30
3	E	402	HFK	C15-N14	5.47	1.44	1.30
3	B	402	HFK	C15-N17	4.85	1.45	1.36
3	A	402	HFK	C06-N16	4.58	1.45	1.37
3	E	402	HFK	C15-N17	4.49	1.44	1.36
3	E	402	HFK	C18-N17	4.46	1.44	1.36
3	E	402	HFK	C15-N16	4.11	1.43	1.36
3	B	402	HFK	C18-N17	4.03	1.43	1.36
3	B	402	HFK	C15-N16	3.94	1.43	1.36
3	E	402	HFK	C06-N16	3.46	1.43	1.37
3	B	402	HFK	C05-C06	3.42	1.55	1.49
3	A	402	HFK	C15-N17	3.40	1.42	1.36
3	A	402	HFK	C15-N16	3.32	1.42	1.36
3	E	402	HFK	C05-C06	3.06	1.54	1.49

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	402	HFk	C18-N17	3.03	1.42	1.36
3	A	402	HFk	C24-C23	2.99	1.43	1.36
3	B	402	HFk	C06-N16	2.88	1.42	1.37
3	A	402	HFk	C05-C06	2.87	1.54	1.49
3	B	402	HFk	C03-C02	2.66	1.54	1.50
3	A	402	HFk	C18-N19	2.31	1.38	1.35
3	E	402	HFk	C13-C08	2.31	1.57	1.53
2	E	401	GAL	O3-C3	2.26	1.48	1.43
3	E	402	HFk	C25-C26	2.23	1.41	1.36
3	B	402	HFk	C02-C07	2.16	1.52	1.46
3	A	402	HFk	C20-C21	-2.16	1.35	1.42
3	E	402	HFk	C03-C02	2.04	1.53	1.50

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	402	HFk	O01-C02-C03	-43.62	49.38	120.86
3	E	402	HFk	O01-C02-C07	-39.18	67.57	121.54
3	A	402	HFk	N17-C15-N14	-7.98	104.55	117.81
2	E	401	GAL	C1-O5-C5	-6.93	100.58	113.66
3	A	402	HFk	C18-N17-C15	5.64	139.00	126.49
2	E	401	GAL	O1-C1-C2	4.85	122.69	109.03
3	A	402	HFk	C05-C06-C07	-4.34	117.25	122.97
2	A	401	GAL	O5-C1-C2	-4.30	102.62	110.28
3	B	402	HFk	C05-C06-N16	4.10	121.65	115.34
2	B	401	GAL	C1-O5-C5	-4.05	106.02	113.66
3	B	402	HFk	C08-C07-C06	-3.66	117.62	121.75
2	E	401	GAL	O5-C1-C2	-3.61	103.84	110.28
3	A	402	HFk	C02-C07-C06	3.36	122.36	119.17
2	B	401	GAL	O5-C1-C2	-3.34	104.33	110.28
2	A	401	GAL	C1-O5-C5	-3.16	107.70	113.66
2	E	401	GAL	C1-C2-C3	-3.08	103.92	110.31
3	A	402	HFk	C15-N16-C06	-3.07	116.99	120.67
2	A	401	GAL	C1-C2-C3	-2.98	104.13	110.31
2	B	401	GAL	O5-C5-C6	2.97	113.82	106.44
3	A	402	HFk	C21-C20-N19	-2.97	101.15	108.04
2	A	401	GAL	O1-C1-C2	2.86	117.08	109.03
2	B	401	GAL	O2-C2-C3	2.84	116.91	110.35
3	E	402	HFk	C05-C06-N16	2.80	119.65	115.34
2	E	401	GAL	O4-C4-C5	-2.77	102.43	109.30
3	A	402	HFk	C05-C06-N16	2.76	119.59	115.34
3	B	402	HFk	C05-C06-C07	-2.70	119.41	122.97

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	402	HFK	C13-C12-C11	2.69	115.53	111.37
3	A	402	HFK	C26-C20-C21	2.52	124.97	120.53
2	B	401	GAL	O6-C6-C5	-2.40	103.06	111.29
4	B	403	WNP	O06-C05-N07	2.33	128.91	123.23
2	E	401	GAL	O3-C3-C4	2.32	115.72	110.35
4	D	401	WNP	O06-C05-N07	2.32	128.89	123.23
2	B	401	GAL	C4-C3-C2	-2.28	106.84	110.82
3	B	402	HFK	N17-C15-N14	2.22	121.49	117.81
3	A	402	HFK	C13-C12-C11	2.12	114.66	111.37
3	E	402	HFK	C18-N17-C15	-2.08	121.88	126.49

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	GAL	O5-C5-C6-O6
2	E	401	GAL	O5-C5-C6-O6
2	E	401	GAL	C4-C5-C6-O6
2	A	401	GAL	C4-C5-C6-O6
2	B	401	GAL	O5-C5-C6-O6
4	D	401	WNP	C14-C08-N07-C05
4	D	401	WNP	C09-C08-N07-C05
3	B	402	HFK	N14-C15-N17-C18
3	B	402	HFK	N16-C15-N17-C18
3	E	402	HFK	N14-C15-N17-C18
3	E	402	HFK	N16-C15-N17-C18

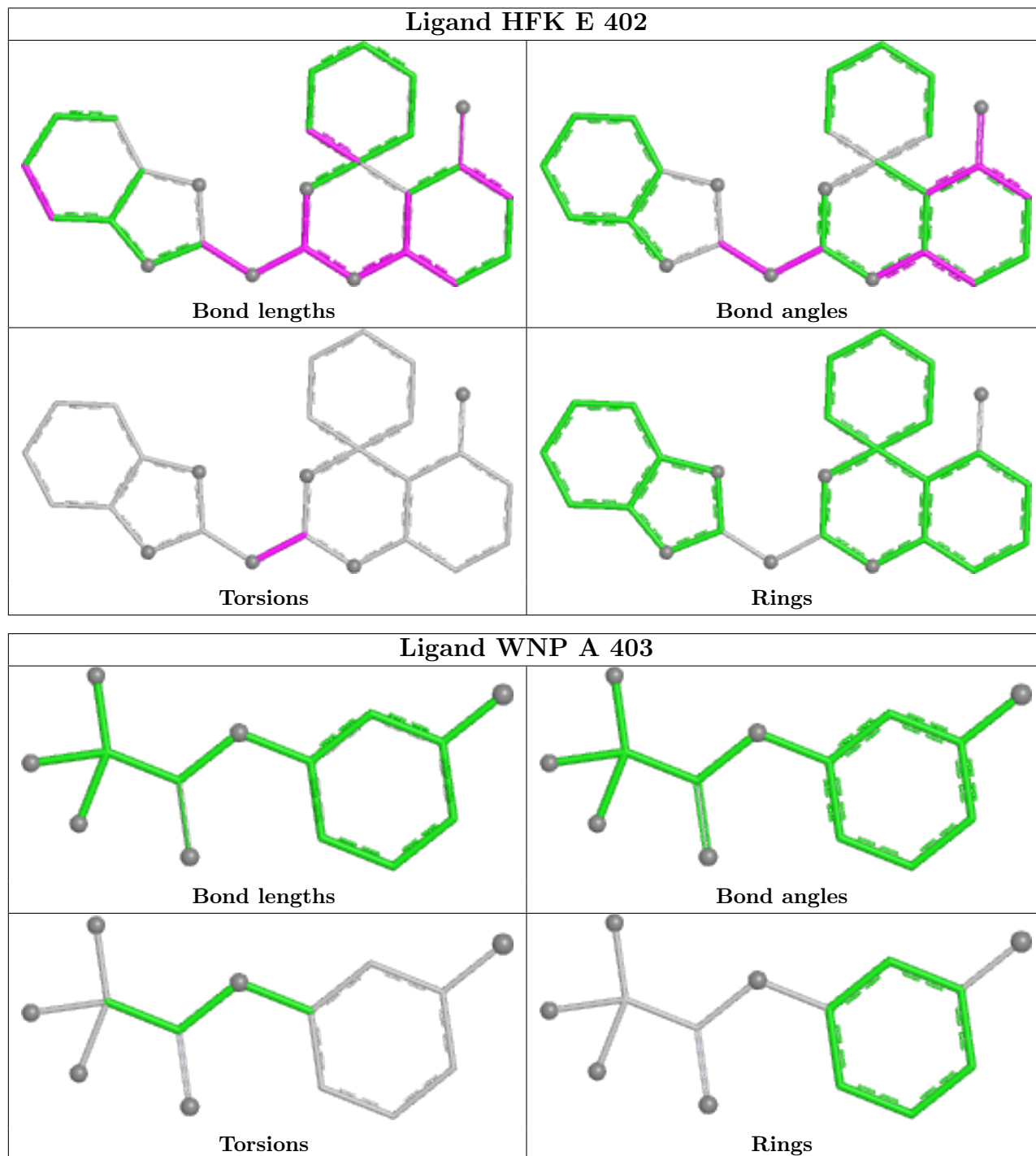
There are no ring outliers.

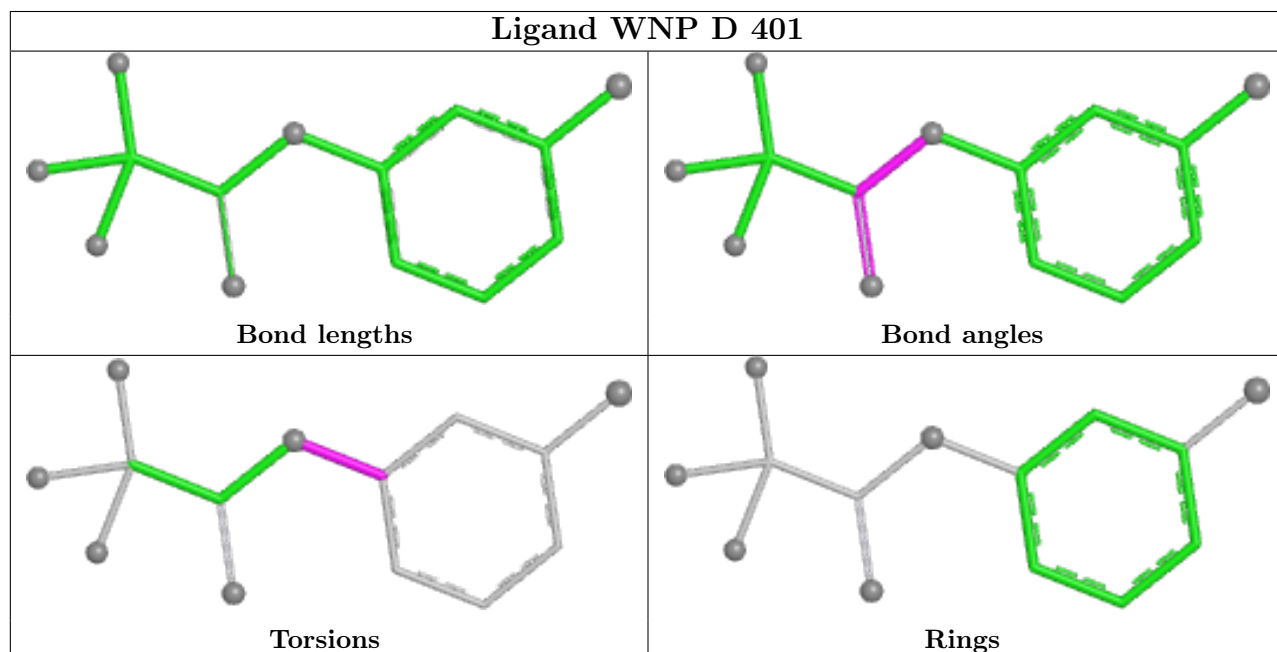
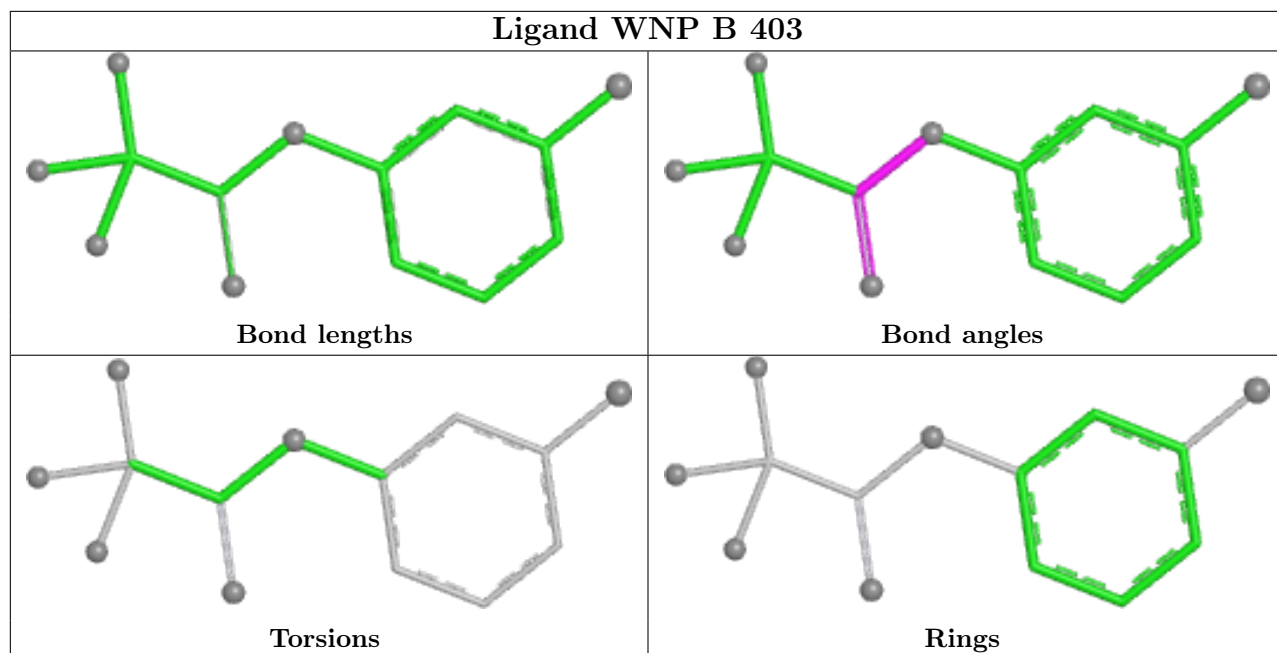
4 monomers are involved in 4 short contacts:

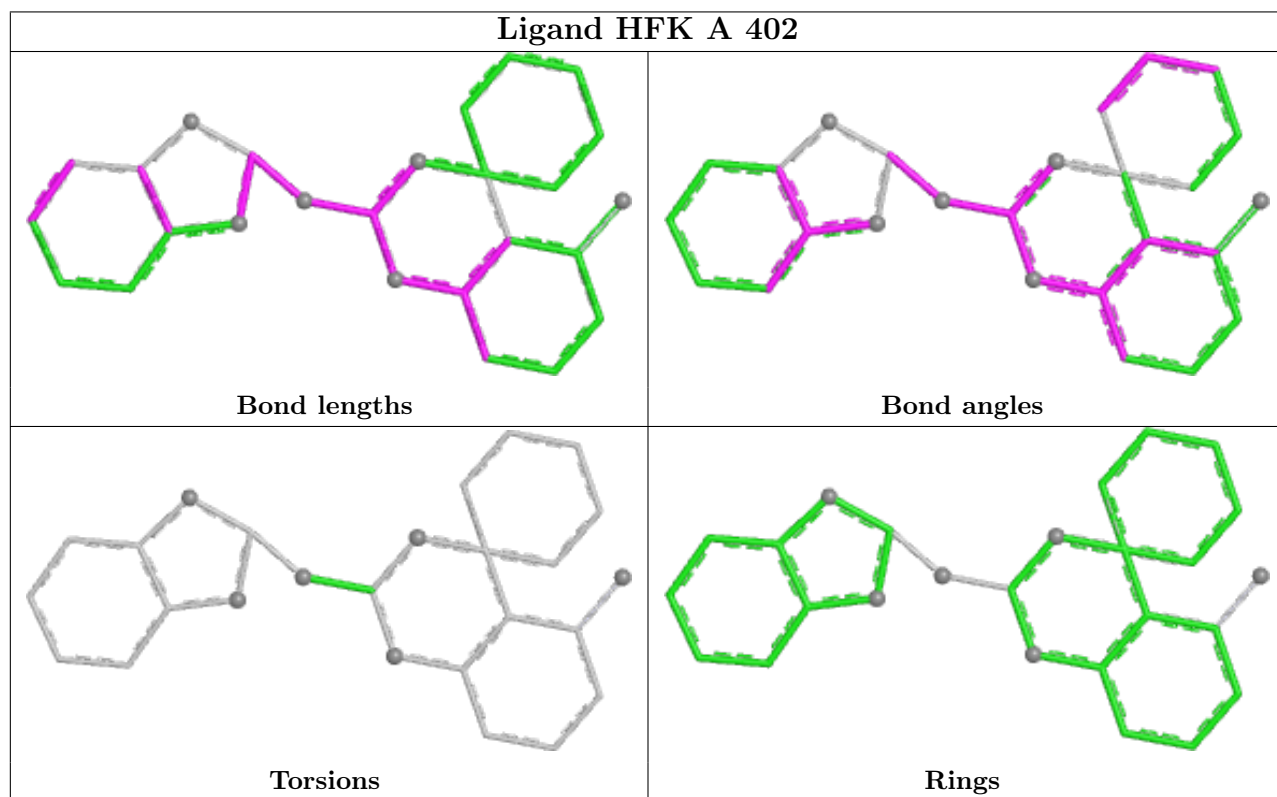
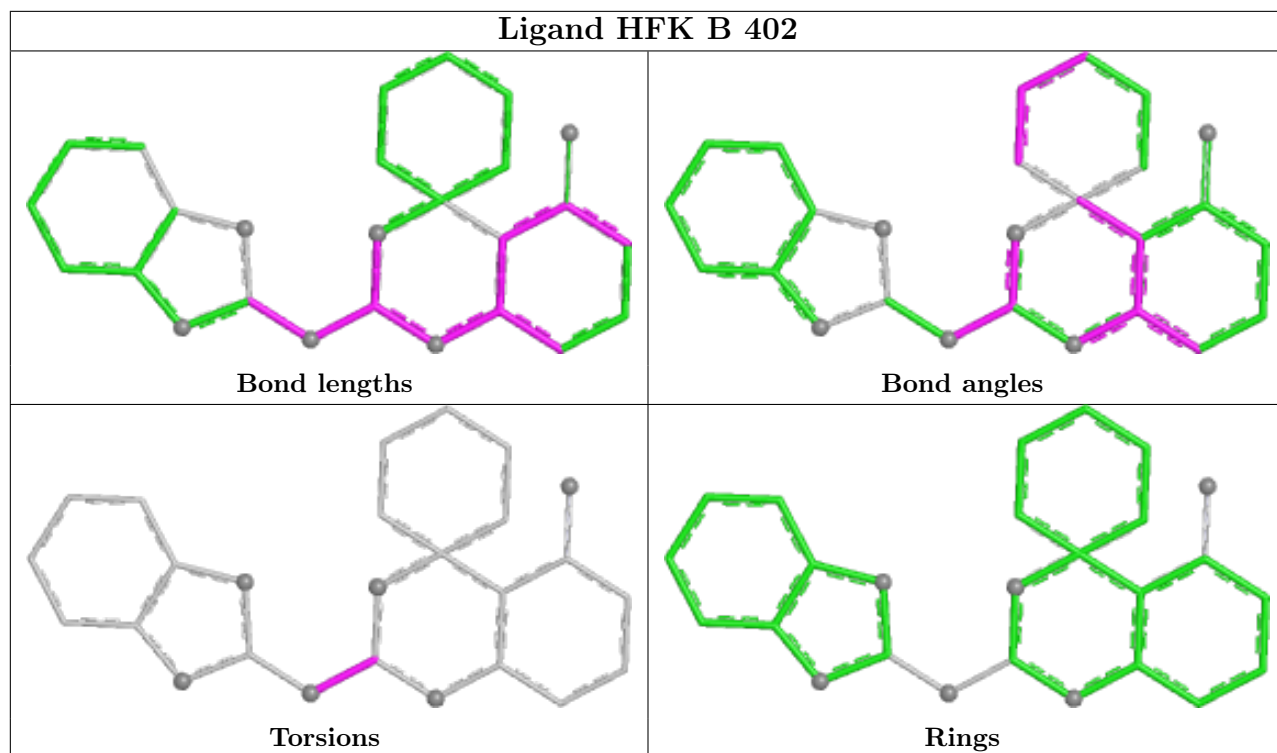
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	403	WNP	1	0
4	D	401	WNP	1	0
4	E	403	WNP	1	0
2	E	401	GAL	1	0

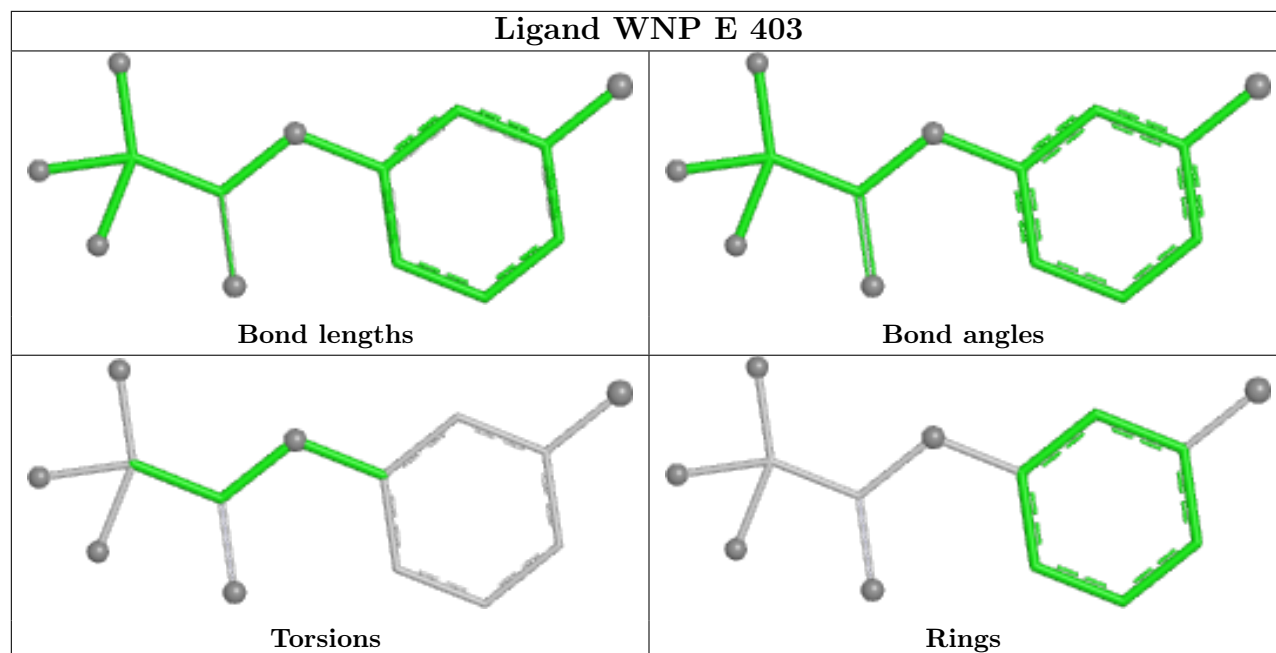
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

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	390/399 (97%)	0.27	13 (3%) 46 50	39, 61, 99, 115	0
1	B	390/399 (97%)	0.07	4 (1%) 82 84	38, 55, 86, 102	0
1	D	371/399 (92%)	0.20	9 (2%) 59 62	36, 60, 109, 141	0
1	E	391/399 (97%)	-0.05	0 100 100	33, 45, 64, 73	0
All	All	1542/1596 (96%)	0.12	26 (1%) 70 72	33, 54, 95, 141	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	373	GLY	4.6
1	D	161	GLY	4.4
1	B	231	LEU	3.5
1	D	96	GLN	3.3
1	A	219	ALA	3.3
1	D	253	ALA	3.3
1	D	95	ALA	3.2
1	A	282	VAL	3.2
1	A	337	GLY	3.1
1	A	334	ALA	3.1
1	A	270	VAL	3.1
1	A	305	ARG	2.6
1	A	330	GLU	2.6
1	B	214	SER	2.4
1	A	275	PHE	2.4
1	A	229	HIS	2.3
1	A	255	LEU	2.3
1	A	41	ILE	2.3
1	A	263	LEU	2.3
1	D	167	ALA	2.3
1	D	259	GLN	2.2

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Mol	Chain	Res	Type	RSRZ
1	D	47	TYR	2.1
1	B	230	SER	2.1
1	D	249	ALA	2.1
1	A	214	SER	2.1
1	B	26	ALA	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

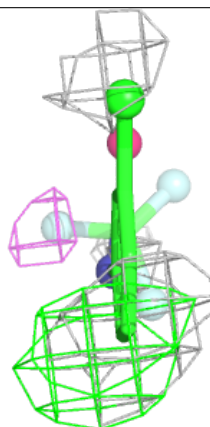
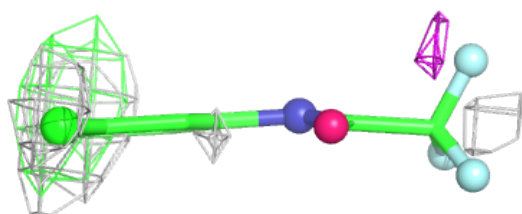
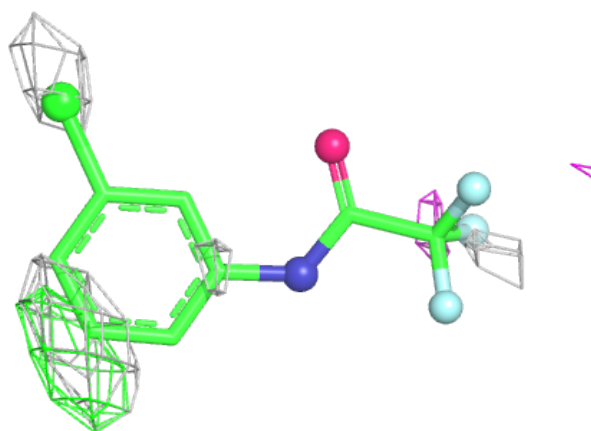
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	WNP	A	403	14/14	0.24	1.08	70,76,82,83	14
3	HFK	B	402	26/26	0.68	0.37	84,87,91,92	0
3	HFK	A	402	26/26	0.72	0.28	70,77,80,81	0
4	WNP	E	403	14/14	0.75	0.47	49,51,59,61	14
3	HFK	E	402	26/26	0.83	0.20	20,54,58,58	1
4	WNP	B	403	14/14	0.86	0.32	51,53,55,55	14
4	WNP	D	401	14/14	0.86	0.35	38,40,43,43	14
2	GAL	B	401	12/12	0.93	0.19	44,47,48,48	0
2	GAL	A	401	12/12	0.93	0.17	48,50,54,55	0
2	GAL	E	401	12/12	0.94	0.12	35,36,37,37	0

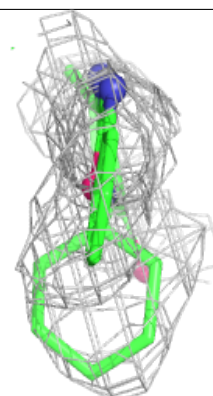
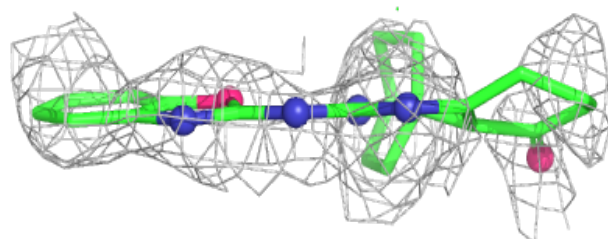
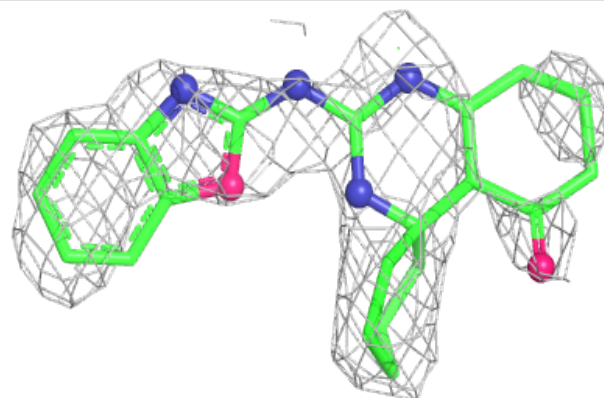
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around WNP A 403:

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

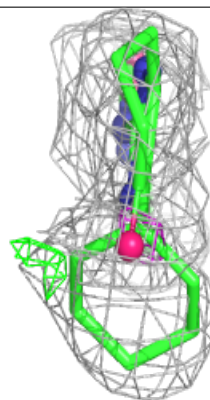
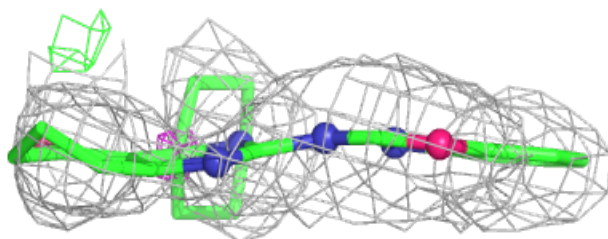
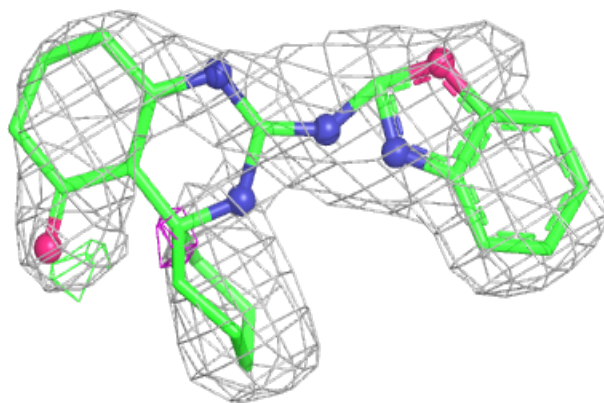
**Electron density around HFK B 402:**

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

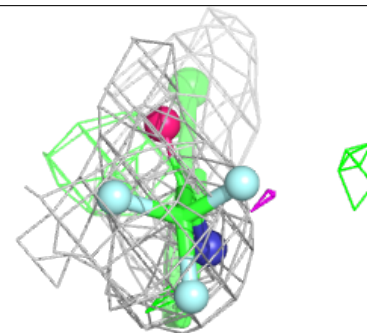
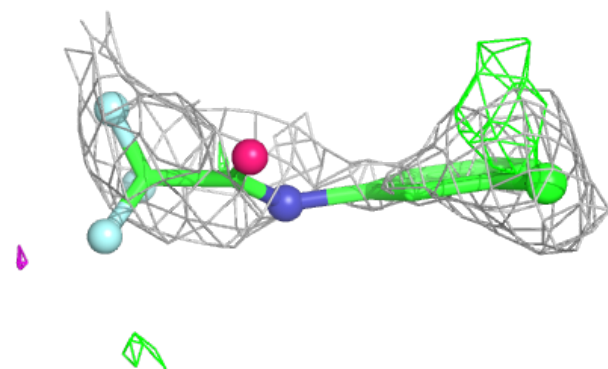
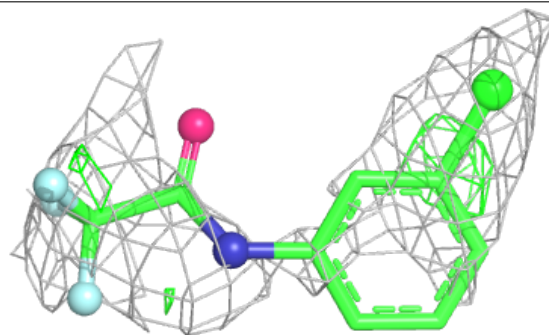


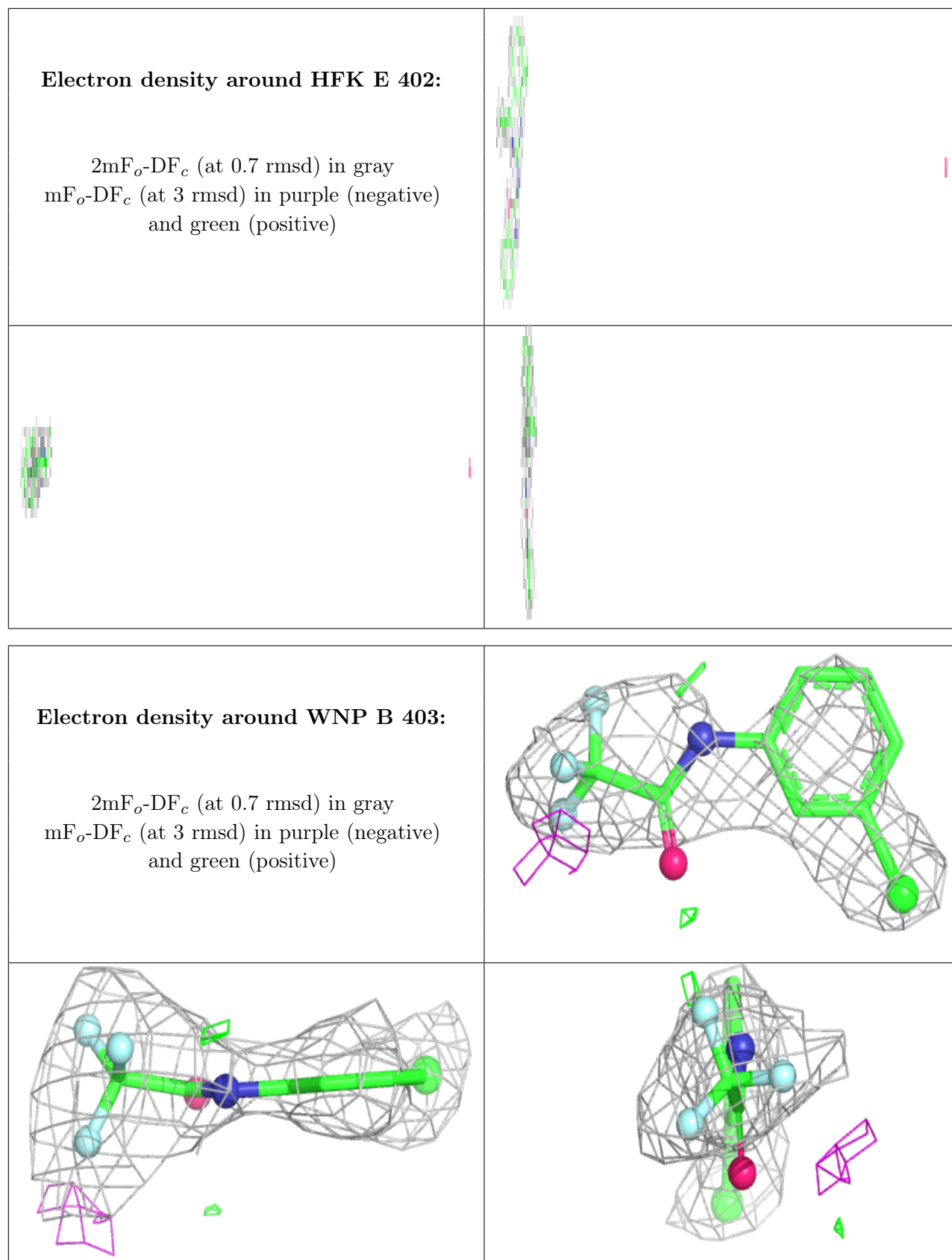
Electron density around HFK A 402:

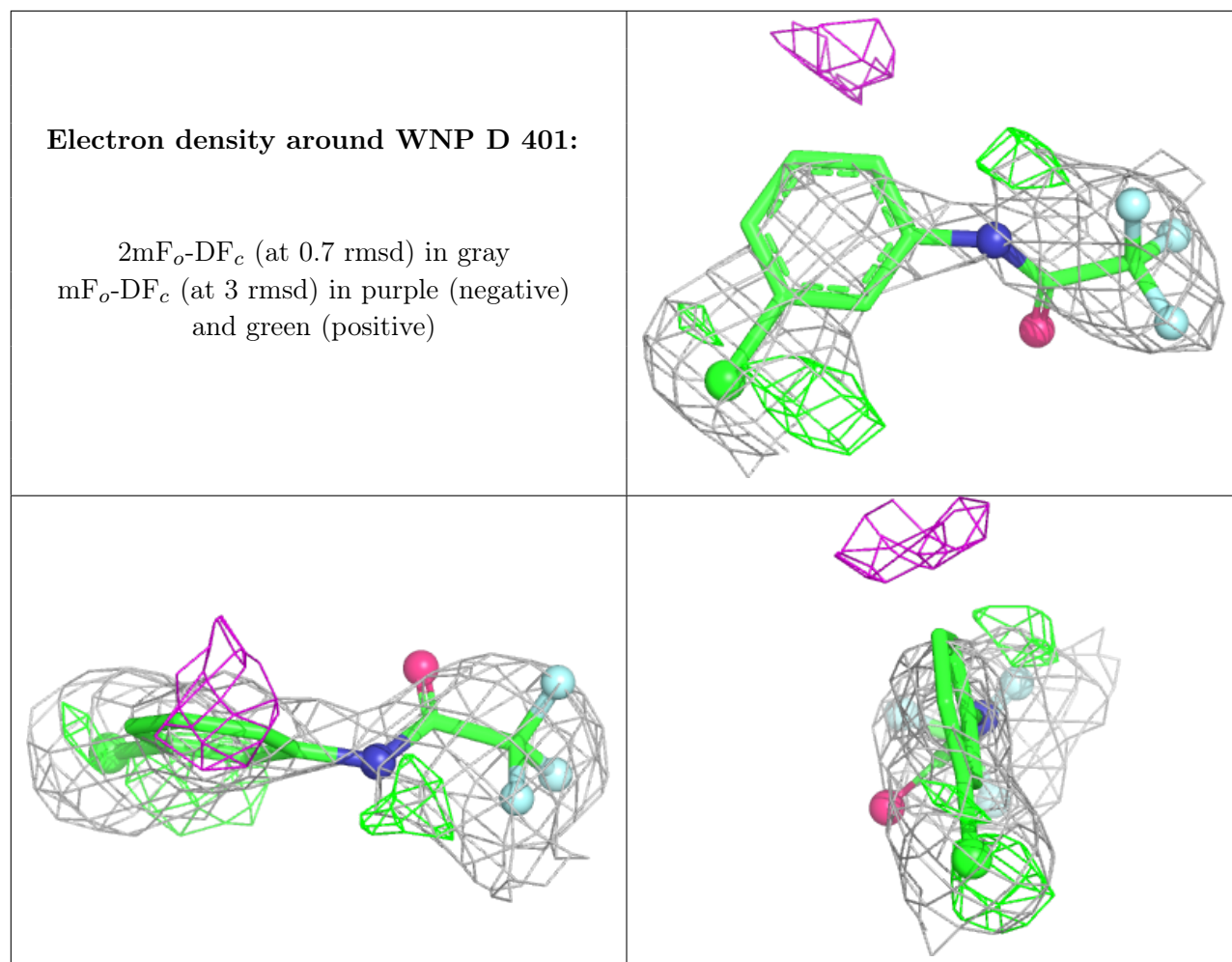
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

**Electron density around WNP E 403:**

$2mF_o-DF_c$ (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.