



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 08:41 AM UTC

PDB ID : 3SX4 / pdb_00003sx4
Title : Crystal structure of human dpp-iv in complex with sa-(+)-3-(aminomethyl)-4-(2,4-dichlorophenyl)-6-(2-methoxyphenyl)-2-methyl-5h-pyrrolo[3,4-b]pyridin-7(6h)-one
Authors : Klei, H.E.
Deposited on : 2011-07-14
Resolution : 2.60 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

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

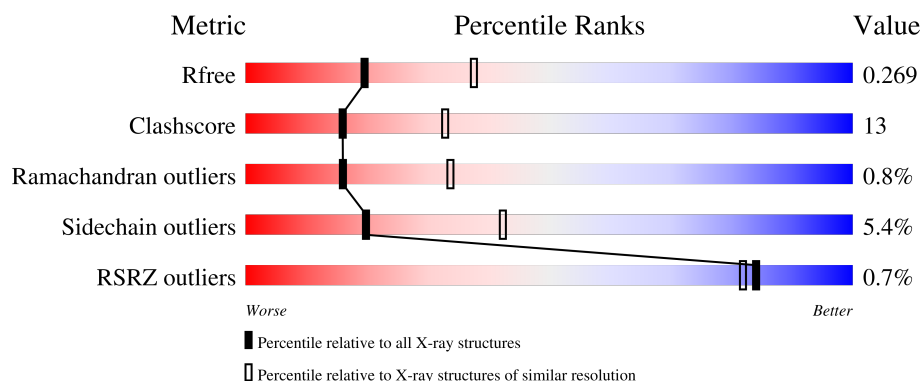
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	4008 (2.60-2.60)
Clashscore	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)
RSRZ outliers	180081	4008 (2.60-2.60)

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	753	68% 26% • •
1	B	753	65% 29% • •
2	C	2	100%
2	D	2	100%

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
3	NAG	B	1501	X	-	-	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 12108 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 Dipeptidyl peptidase 4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	727	Total	C	N	O	S	0	1	0
			5883	3785	959	1113	26			
1	B	727	Total	C	N	O	S	0	0	0
			5876	3778	957	1115	26			

There are 50 discrepancies between the modelled and reference sequences:

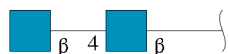
Chain	Residue	Modelled	Actual	Comment	Reference
A	37	GLU	-	expression tag	UNP P27487
A	38	PHE	-	expression tag	UNP P27487
A	767	PRO	-	expression tag	UNP P27487
A	768	LEU	-	expression tag	UNP P27487
A	769	GLU	-	expression tag	UNP P27487
A	770	GLN	-	expression tag	UNP P27487
A	771	LYS	-	expression tag	UNP P27487
A	772	LEU	-	expression tag	UNP P27487
A	773	ILE	-	expression tag	UNP P27487
A	774	SER	-	expression tag	UNP P27487
A	775	GLU	-	expression tag	UNP P27487
A	776	GLU	-	expression tag	UNP P27487
A	777	ASP	-	expression tag	UNP P27487
A	778	LEU	-	expression tag	UNP P27487
A	779	ASN	-	expression tag	UNP P27487
A	780	SER	-	expression tag	UNP P27487
A	781	ALA	-	expression tag	UNP P27487
A	782	VAL	-	expression tag	UNP P27487
A	783	ASP	-	expression tag	UNP P27487
A	784	HIS	-	expression tag	UNP P27487
A	785	HIS	-	expression tag	UNP P27487
A	786	HIS	-	expression tag	UNP P27487
A	787	HIS	-	expression tag	UNP P27487
A	788	HIS	-	expression tag	UNP P27487
A	789	HIS	-	expression tag	UNP P27487

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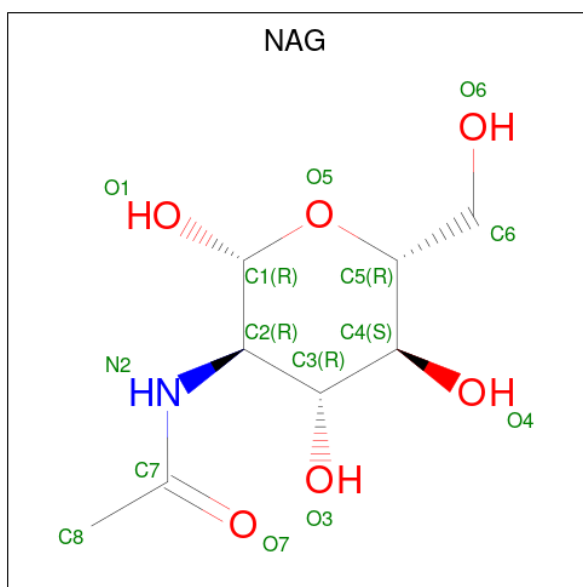
Chain	Residue	Modelled	Actual	Comment	Reference
B	37	GLU	-	expression tag	UNP P27487
B	38	PHE	-	expression tag	UNP P27487
B	767	PRO	-	expression tag	UNP P27487
B	768	LEU	-	expression tag	UNP P27487
B	769	GLU	-	expression tag	UNP P27487
B	770	GLN	-	expression tag	UNP P27487
B	771	LYS	-	expression tag	UNP P27487
B	772	LEU	-	expression tag	UNP P27487
B	773	ILE	-	expression tag	UNP P27487
B	774	SER	-	expression tag	UNP P27487
B	775	GLU	-	expression tag	UNP P27487
B	776	GLU	-	expression tag	UNP P27487
B	777	ASP	-	expression tag	UNP P27487
B	778	LEU	-	expression tag	UNP P27487
B	779	ASN	-	expression tag	UNP P27487
B	780	SER	-	expression tag	UNP P27487
B	781	ALA	-	expression tag	UNP P27487
B	782	VAL	-	expression tag	UNP P27487
B	783	ASP	-	expression tag	UNP P27487
B	784	HIS	-	expression tag	UNP P27487
B	785	HIS	-	expression tag	UNP P27487
B	786	HIS	-	expression tag	UNP P27487
B	787	HIS	-	expression tag	UNP P27487
B	788	HIS	-	expression tag	UNP P27487
B	789	HIS	-	expression tag	UNP P27487

- Molecule 2 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



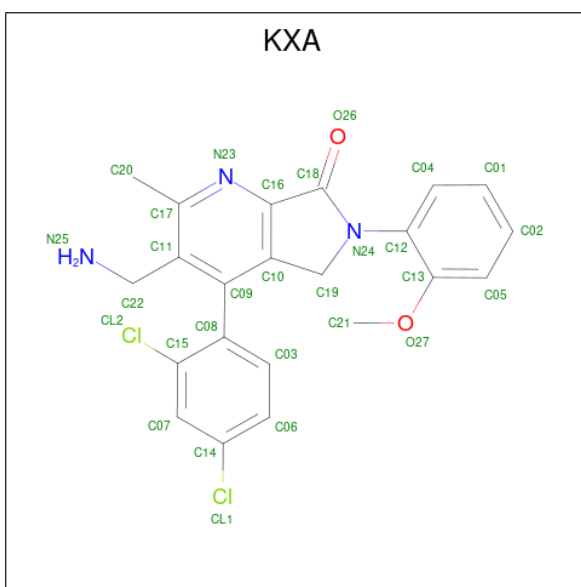
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	D	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	B	1	Total	C	N	O	0	0
			14	8	1	5		
3	B	1	Total	C	N	O	0	0
			14	8	1	5		
3	B	1	Total	C	N	O	0	0
			14	8	1	5		
3	B	1	Total	C	N	O	0	0
			14	8	1	5		
3	B	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 4 is 3-(aminomethyl)-4-(2,4-dichlorophenyl)-6-(2-methoxyphenyl)-2-methyl-5,6-dihydro-7H-pyrrolo[3,4-b]pyridin-7-one (CCD ID: KXA) (formula: $C_{22}H_{19}Cl_2N_3O_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	Cl	N	O	
			58	44	4	6	4	0
4	B	1	Total	C	Cl	N	O	
			58	44	4	6	4	0

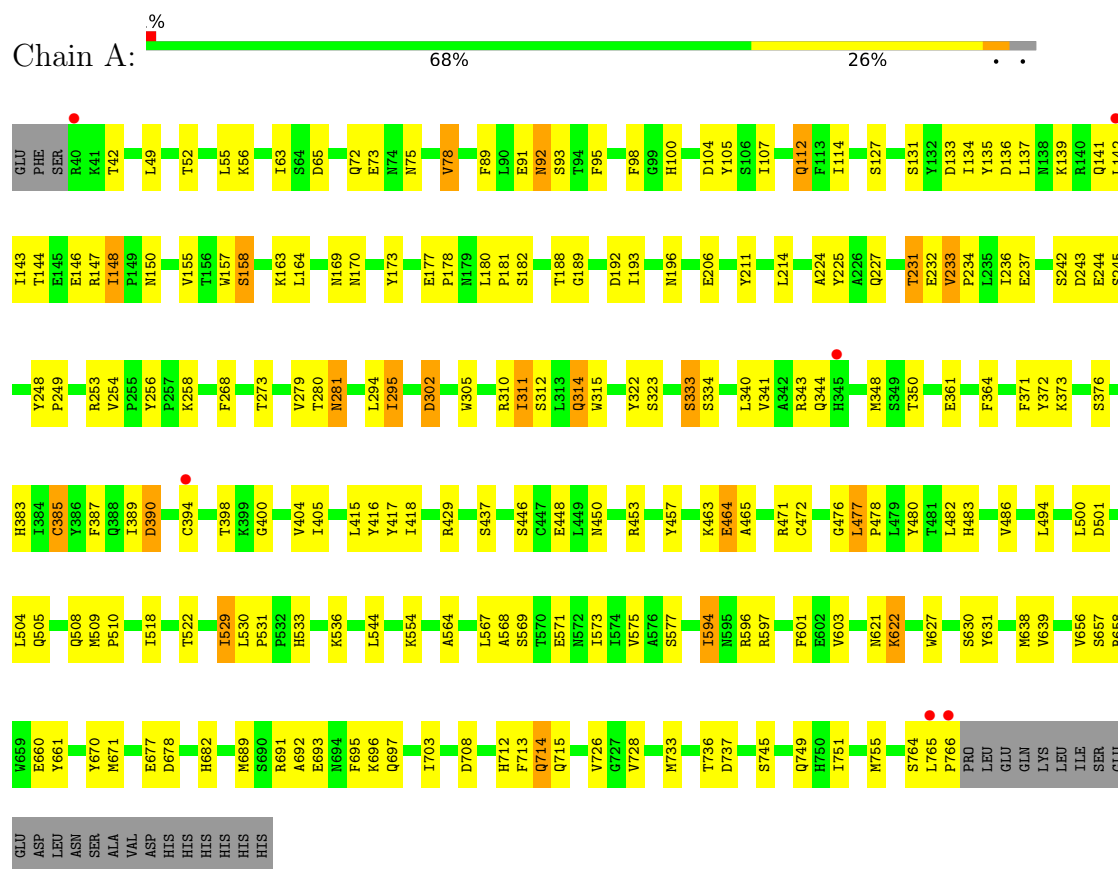
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	17	Total	O		
			17	17	0	0
5	B	6	Total	O		
			6	6	0	0

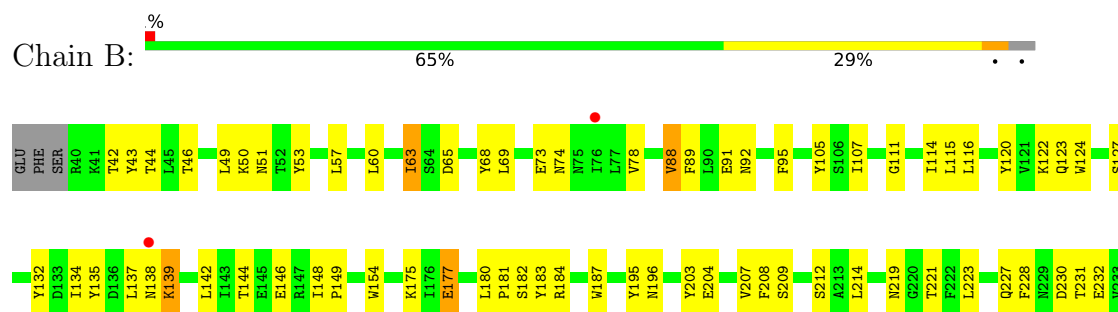
3 Residue-property plots [i](#)

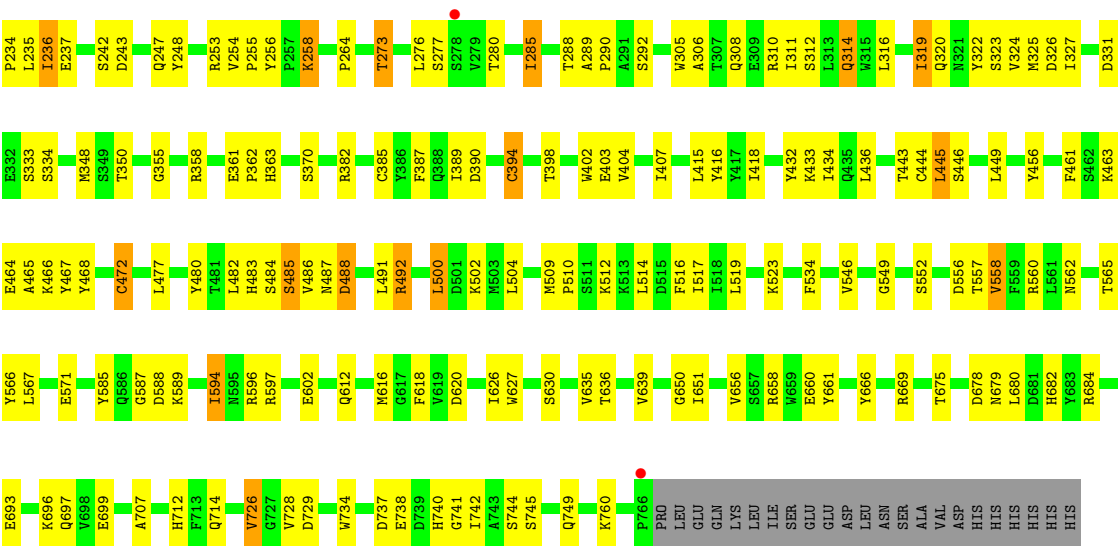
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Dipeptidyl peptidase 4



• Molecule 1: Dipeptidyl peptidase 4





● Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



● Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	65.91Å 67.85Å 422.10Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.10 – 2.60 48.10 – 2.60	Depositor EDS
% Data completeness (in resolution range)	96.2 (48.10-2.60) 96.5 (48.10-2.60)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.71 (at 2.61Å)	Xtriage
Refinement program	PHENIX dev_780	Depositor
R, R_{free}	0.203 , 0.275 0.197 , 0.269	Depositor DCC
R_{free} test set	2330 reflections (4.04%)	wwPDB-VP
Wilson B-factor (Å ²)	51.5	Xtriage
Anisotropy	0.367	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 34.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.056 for k,h,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	12108	wwPDB-VP
Average B, all atoms (Å ²)	55.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.68% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: KXA, NAG

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	0.54	0/6056	0.89	17/8250 (0.2%)
1	B	0.52	0/6048	0.89	7/8241 (0.1%)
All	All	0.53	0/12104	0.89	24/16491 (0.1%)

There are no bond length outliers.

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	177	GLU	CA-C-N	7.80	129.59	119.84
1	B	177	GLU	C-N-CA	7.80	129.59	119.84
1	A	450	ASN	CA-C-N	7.68	129.44	119.84
1	A	450	ASN	C-N-CA	7.68	129.44	119.84
1	A	254	VAL	CA-C-N	-6.84	112.45	119.83
1	A	254	VAL	C-N-CA	-6.84	112.45	119.83
1	A	400	GLY	N-CA-C	6.42	118.66	111.85
1	A	361	GLU	CA-C-N	6.05	128.41	120.25
1	A	361	GLU	C-N-CA	6.05	128.41	120.25
1	A	630	SER	CB-CA-C	-5.72	109.99	116.63
1	B	477	LEU	CA-C-N	5.67	125.60	119.76
1	B	477	LEU	C-N-CA	5.67	125.60	119.76
1	A	692	ALA	N-CA-C	5.58	117.37	111.28
1	B	254	VAL	CB-CA-C	-5.57	104.53	110.16
1	A	233	VAL	CA-C-N	5.57	125.56	120.21
1	A	233	VAL	C-N-CA	5.57	125.56	120.21
1	B	492	ARG	N-CA-C	5.51	116.52	108.14
1	A	148	ILE	CA-C-N	5.25	125.19	119.78
1	A	148	ILE	C-N-CA	5.25	125.19	119.78
1	B	319	ILE	CB-CA-C	-5.25	105.56	111.23
1	A	477	LEU	CA-C-N	5.17	125.17	119.90
1	A	477	LEU	C-N-CA	5.17	125.17	119.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	112	GLN	N-CA-C	5.10	116.92	111.36
1	A	302	ASP	N-CA-C	5.00	117.31	108.75

There are no chirality outliers.

There are no planarity outliers.

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	5883	0	5502	151	0
1	B	5876	0	5480	165	0
2	C	28	0	25	0	0
2	D	28	0	25	0	0
3	A	70	0	65	6	0
3	B	84	0	78	3	0
4	A	58	0	38	1	0
4	B	58	0	38	1	0
5	A	17	0	0	0	0
5	B	6	0	0	0	0
All	All	12108	0	11251	307	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 13.

All (307) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:63:ILE:HD13	1:B:69:LEU:HG	1.51	0.91
1:B:177:GLU:HB2	1:B:180:LEU:HG	1.58	0.86
1:B:509:MET:HE3	1:B:510:PRO:HD2	1.59	0.85
1:A:751:ILE:HG12	1:A:755:MET:HE2	1.57	0.84
1:B:237:GLU:HG2	1:B:253:ARG:HG2	1.60	0.83
1:B:88:VAL:HG21	1:B:91:GLU:HG2	1.58	0.82
1:B:596:ARG:NH2	1:B:678:ASP:OD1	2.14	0.80
1:A:471:ARG:HD2	1:A:480:TYR:CE2	2.17	0.80

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:104:ASP:OD1	1:A:105:TYR:N	2.14	0.79
1:B:446:SER:HA	1:B:449:LEU:HD12	1.64	0.79
1:B:312:SER:OG	1:B:325:MET:HE3	1.83	0.79
1:B:196:ASN:OD1	1:B:227:GLN:HG3	1.83	0.79
1:A:471:ARG:HD2	1:A:480:TYR:HE2	1.47	0.77
1:A:253:ARG:HH12	1:B:253:ARG:HH12	1.31	0.77
1:B:219:ASN:HB2	1:B:308:GLN:OE1	1.84	0.76
1:A:98:PHE:CD2	1:A:100:HIS:HB2	2.20	0.76
1:B:146:GLU:HB3	1:B:175:LYS:HZ1	1.51	0.74
1:A:596:ARG:NH2	1:A:678:ASP:OD1	2.19	0.74
1:A:73:GLU:OE1	1:A:92:ASN:ND2	2.21	0.74
1:A:281:ASN:HD21	3:A:2811:NAG:C1	2.02	0.73
1:B:519:LEU:HD23	3:B:5201:NAG:H82	1.71	0.73
1:A:508:GLN:OE1	1:A:533:HIS:NE2	2.22	0.72
1:B:219:ASN:HB2	1:B:308:GLN:CD	2.14	0.72
1:A:196:ASN:OD1	1:A:227:GLN:HG3	1.90	0.72
1:A:242:SER:OG	1:A:243:ASP:N	2.22	0.70
1:B:630:SER:HB2	1:B:740:HIS:NE2	2.06	0.70
1:B:446:SER:HA	1:B:449:LEU:CD1	2.21	0.70
1:A:133:ASP:OD1	1:A:147:ARG:NH2	2.24	0.69
1:A:745:SER:O	1:A:749:GLN:HG3	1.92	0.69
1:A:389:ILE:O	1:A:390:ASP:HB2	1.93	0.69
1:B:693:GLU:O	1:B:696:LYS:HG3	1.94	0.68
1:A:231:THR:HG22	1:A:232:GLU:HG3	1.76	0.67
1:B:331:ASP:HB3	1:B:334:SER:HB3	1.75	0.66
1:A:253:ARG:NH1	1:B:253:ARG:HH12	1.92	0.66
1:A:244:GLU:N	1:A:244:GLU:O	2.28	0.66
1:B:111:GLY:O	1:B:137:LEU:HD12	1.96	0.66
1:A:463:LYS:O	1:A:464:GLU:HB2	1.95	0.65
1:A:638:MET:O	1:A:691[A]:ARG:NH1	2.30	0.63
1:B:236:ILE:HD13	1:B:712:HIS:ND1	2.14	0.63
1:A:594:ILE:CD1	1:A:601:PHE:HB2	2.29	0.63
1:B:745:SER:O	1:B:749:GLN:HG3	1.99	0.63
1:B:175:LYS:CG	1:B:182:SER:HB3	2.29	0.62
1:B:88:VAL:CG2	1:B:91:GLU:HG2	2.27	0.62
1:A:281:ASN:ND2	3:A:2811:NAG:C1	2.63	0.62
1:B:566:TYR:CE2	1:B:567:LEU:HD23	2.35	0.61
1:B:658:ARG:NH2	1:B:684:ARG:HE	1.98	0.61
1:B:636:THR:HG21	1:B:651:ILE:O	2.00	0.61
1:B:726:VAL:HG12	1:B:728:VAL:HG23	1.84	0.60
1:A:671:MET:HE1	1:A:682:HIS:HD2	1.64	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:680:LEU:O	1:B:680:LEU:HD12	2.02	0.60
1:B:602:GLU:N	1:B:602:GLU:OE1	2.33	0.60
1:B:707:ALA:HB2	1:B:737:ASP:HA	1.84	0.59
1:A:243:ASP:O	1:A:245:SER:N	2.35	0.59
1:B:183:TYR:HD2	1:B:276:LEU:HD12	1.66	0.59
1:B:549:GLY:O	1:B:552:SER:HB3	2.02	0.59
1:B:146:GLU:HB3	1:B:175:LYS:NZ	2.19	0.58
1:A:49:LEU:HD22	1:A:749:GLN:HA	1.85	0.58
1:B:517:ILE:HD12	1:B:612:GLN:HG3	1.85	0.58
1:B:175:LYS:HG2	1:B:182:SER:HB3	1.86	0.58
1:B:389:ILE:O	1:B:390:ASP:HB2	2.03	0.58
1:B:626:ILE:HG23	1:B:636:THR:HG23	1.86	0.57
1:A:322:TYR:HE2	1:A:348:MET:HE3	1.68	0.57
1:A:144:THR:HG22	1:A:147:ARG:HH12	1.68	0.57
1:A:78:VAL:HG12	1:A:89:PHE:HB2	1.85	0.57
1:A:73:GLU:CD	1:A:92:ASN:ND2	2.63	0.57
1:B:456:TYR:O	1:B:472:CYS:HA	2.05	0.57
1:A:243:ASP:C	1:A:245:SER:H	2.14	0.56
1:B:516:PHE:CE2	1:B:523:LYS:HG2	2.40	0.56
1:A:214:LEU:HD23	1:A:225:TYR:HB3	1.87	0.56
1:B:69:LEU:HD21	1:B:78:VAL:HG22	1.87	0.56
1:A:244:GLU:N	1:A:244:GLU:CB	2.69	0.56
1:B:461:PHE:CD1	1:B:468:TYR:HB3	2.41	0.56
1:B:78:VAL:HG23	1:B:89:PHE:HB2	1.87	0.55
1:A:671:MET:HE1	1:A:682:HIS:CD2	2.40	0.55
1:B:594:ILE:HG23	1:B:594:ILE:O	2.06	0.55
1:A:693:GLU:HG2	1:A:726:VAL:HG21	1.89	0.55
1:A:695:PHE:C	1:A:697:GLN:H	2.14	0.55
1:B:122:LYS:HE2	1:B:124:TRP:O	2.06	0.55
1:A:146:GLU:HG3	1:A:181:PRO:N	2.21	0.55
1:B:142:LEU:O	1:B:144:THR:HG23	2.07	0.55
1:A:237:GLU:HG2	1:A:253:ARG:HG2	1.88	0.55
1:B:308:GLN:OE1	1:B:308:GLN:HA	2.07	0.54
1:B:466:LYS:O	1:B:485:SER:HB2	2.07	0.54
1:A:143:ILE:HD13	1:A:178:PRO:HB3	1.88	0.54
1:B:482:LEU:C	1:B:483:HIS:CD2	2.86	0.54
1:B:556:ASP:CG	1:B:558:VAL:HG13	2.33	0.54
1:A:134:ILE:HB	1:A:143:ILE:HD12	1.89	0.54
1:A:518:ILE:HA	1:A:522:THR:O	2.08	0.53
1:A:173:TYR:HB3	1:A:182:SER:OG	2.08	0.53
1:A:244:GLU:O	1:B:661:TYR:OH	2.26	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:55:LEU:HD23	1:A:500:LEU:CD2	2.39	0.53
1:A:504:LEU:HD22	1:A:509:MET:HE2	1.90	0.53
1:B:175:LYS:HG3	1:B:182:SER:HB3	1.91	0.53
1:B:463:LYS:C	1:B:465:ALA:H	2.17	0.53
1:B:333:SER:OG	1:B:334:SER:N	2.41	0.53
1:B:183:TYR:HD2	1:B:276:LEU:CD1	2.20	0.53
1:A:91:GLU:C	1:A:93:SER:H	2.17	0.53
1:A:281:ASN:OD1	3:A:2811:NAG:C1	2.56	0.52
1:B:467:TYR:HD1	1:B:484:SER:HA	1.72	0.52
1:B:482:LEU:HD23	1:B:492:ARG:NH1	2.24	0.52
1:A:510:PRO:HD3	1:A:569:SER:HB2	1.92	0.52
1:A:603:VAL:HG13	1:A:639:VAL:HG23	1.91	0.52
1:B:320:GLN:OE1	1:B:669:ARG:HD3	2.10	0.52
1:A:415:LEU:HD23	1:A:415:LEU:C	2.35	0.52
1:A:224:ALA:HB1	1:A:268:PHE:CZ	2.45	0.51
1:A:244:GLU:CB	1:A:244:GLU:C	2.83	0.51
1:B:516:PHE:CD2	1:B:523:LYS:HG2	2.45	0.51
1:B:741:GLY:O	1:B:742:ILE:C	2.53	0.51
1:A:310:ARG:HH11	1:A:389:ILE:HD12	1.76	0.51
1:A:322:TYR:CE2	1:A:348:MET:HE3	2.45	0.51
1:B:433:LYS:HG2	1:B:445:LEU:HD21	1.92	0.51
1:B:65:ASP:OD1	1:B:463:LYS:O	2.29	0.51
1:A:281:ASN:HD21	3:A:2811:NAG:C2	2.24	0.51
1:B:597:ARG:HA	1:B:682:HIS:CD2	2.45	0.51
1:A:177:GLU:HB2	1:A:180:LEU:HG	1.92	0.50
1:A:389:ILE:O	1:A:390:ASP:CB	2.59	0.50
1:B:221:THR:O	1:B:273:THR:HB	2.11	0.50
1:B:236:ILE:HG13	1:B:237:GLU:N	2.26	0.50
1:B:242:SER:OG	1:B:243:ASP:N	2.45	0.50
1:B:195:TYR:HB2	1:B:228:PHE:HB2	1.92	0.50
1:B:285:ILE:HD13	1:B:285:ILE:N	2.27	0.50
1:B:534:PHE:HZ	1:B:618:PHE:CD2	2.29	0.50
1:A:143:ILE:HD13	1:A:178:PRO:CB	2.41	0.50
1:B:277:SER:HB3	1:B:280:THR:H	1.77	0.50
1:A:464:GLU:O	1:A:465:ALA:HB3	2.11	0.50
1:B:486:VAL:HG13	1:B:487:ASN:N	2.27	0.50
1:B:726:VAL:HG13	1:B:726:VAL:O	2.10	0.50
1:B:42:THR:HG23	1:B:44:THR:HG22	1.93	0.50
1:B:484:SER:HB3	1:B:491:LEU:HD21	1.94	0.50
1:A:594:ILE:HG23	1:A:594:ILE:O	2.11	0.49
1:A:453:ARG:HG3	1:A:476:GLY:HA3	1.93	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:290:PRO:HG2	1:B:324:VAL:HG11	1.94	0.49
1:B:415:LEU:C	1:B:415:LEU:HD23	2.37	0.49
1:A:658:ARG:HG2	1:A:661:TYR:CD2	2.48	0.49
1:B:43:TYR:CD2	1:B:565:THR:HG22	2.47	0.49
1:B:146:GLU:O	1:B:175:LYS:HE3	2.12	0.49
1:A:596:ARG:N	1:A:670:TYR:O	2.44	0.49
1:B:208:PHE:O	1:B:209:SER:C	2.55	0.49
1:B:626:ILE:HG12	1:B:627:TRP:N	2.28	0.49
1:A:95:PHE:HB3	1:A:98:PHE:HB2	1.96	0.48
1:A:146:GLU:HG3	1:A:180:LEU:C	2.37	0.48
1:A:302:ASP:HB3	1:A:314:GLN:HG3	1.95	0.48
1:A:571:GLU:HB2	1:A:573:ILE:HD12	1.95	0.48
1:B:519:LEU:HB3	3:B:5201:NAG:H82	1.94	0.48
1:A:383:HIS:HB3	1:A:398:THR:OG1	2.12	0.48
1:A:736:THR:O	1:A:737:ASP:HB2	2.12	0.48
1:B:115:LEU:HD23	1:B:134:ILE:HG12	1.94	0.48
1:B:322:TYR:HE2	1:B:348:MET:HE2	1.77	0.48
1:A:72:GLN:O	1:A:75:ASN:HB2	2.13	0.48
1:A:248:TYR:CZ	1:B:258:LYS:HD2	2.48	0.48
1:A:594:ILE:HD11	1:A:601:PHE:HB2	1.95	0.48
1:B:305:TRP:CE2	1:B:311:ILE:HD12	2.48	0.48
1:B:738:GLU:OE2	1:B:744:SER:OG	2.22	0.48
1:A:415:LEU:HD23	1:A:416:TYR:N	2.29	0.48
1:B:467:TYR:CD1	1:B:484:SER:HA	2.49	0.47
1:A:248:TYR:CZ	1:B:234:PRO:HB2	2.49	0.47
1:A:501:ASP:O	1:A:505:GLN:HG3	2.15	0.47
1:A:622:LYS:HB2	1:A:622:LYS:NZ	2.29	0.47
1:B:306:ALA:HB3	1:B:310:ARG:HG2	1.96	0.47
1:B:355:GLY:HA3	1:B:358:ARG:O	2.14	0.47
1:B:382:ARG:H	1:B:403:GLU:HG2	1.79	0.47
1:B:571:GLU:CD	1:B:760:LYS:HD3	2.39	0.47
1:A:596:ARG:HA	1:A:670:TYR:O	2.15	0.47
1:A:696:LYS:HB3	1:A:728:VAL:HG22	1.96	0.47
1:A:192:ASP:C	1:A:193:ILE:HG13	2.39	0.47
1:A:315:TRP:O	1:A:323:SER:HB2	2.15	0.47
1:A:596:ARG:O	1:A:597:ARG:HD3	2.15	0.47
1:B:726:VAL:CG1	1:B:728:VAL:HG23	2.44	0.47
1:A:371:PHE:HE1	1:A:373:LYS:HD2	1.80	0.47
1:A:448:GLU:HA	1:A:448:GLU:OE1	2.15	0.47
1:A:139:LYS:HB3	1:A:141:GLN:NE2	2.29	0.47
1:B:107:ILE:HG12	1:B:114:ILE:HD12	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:230:ASP:OD1	1:B:264:PRO:HB3	2.13	0.47
1:B:95:PHE:CE1	1:B:116:LEU:HD11	2.50	0.46
1:A:404:VAL:HG13	1:A:417:TYR:CD2	2.50	0.46
1:A:472:CYS:O	1:A:478:PRO:HA	2.15	0.46
1:A:529:ILE:CD1	1:A:529:ILE:N	2.78	0.46
1:B:696:LYS:HG2	1:B:728:VAL:HG22	1.97	0.46
1:A:372:TYR:HA	1:A:385:CYS:O	2.15	0.46
1:B:214:LEU:HG	1:B:223:LEU:HD11	1.96	0.46
1:B:127:SER:HB3	1:B:204:GLU:OE1	2.15	0.46
1:A:163:LYS:HZ3	1:A:273:THR:HG22	1.81	0.46
1:A:302:ASP:HB3	1:A:314:GLN:HB2	1.98	0.46
1:A:105:TYR:HB2	1:A:114:ILE:HD11	1.97	0.46
1:B:57:LEU:HD22	1:B:480:TYR:OH	2.15	0.46
1:B:137:LEU:O	1:B:139:LYS:N	2.40	0.45
1:A:112:GLN:C	1:A:137:LEU:HD12	2.42	0.45
1:A:564:ALA:CB	1:A:575:VAL:HG11	2.46	0.45
1:B:148:ILE:HG23	1:B:149:PRO:HD2	1.99	0.45
1:B:219:ASN:HB2	1:B:308:GLN:NE2	2.31	0.45
1:B:487:ASN:O	1:B:488:ASP:C	2.59	0.45
1:A:233:VAL:HA	1:A:234:PRO:HD3	1.84	0.45
1:A:695:PHE:C	1:A:697:GLN:N	2.74	0.45
1:A:305:TRP:CZ3	1:A:311:ILE:HG12	2.52	0.45
1:A:98:PHE:CE2	1:A:100:HIS:HB2	2.52	0.45
1:B:596:ARG:O	1:B:597:ARG:HD3	2.17	0.45
1:B:436:LEU:HD23	1:B:436:LEU:HA	1.61	0.45
1:B:514:LEU:HD23	1:B:557:THR:HG22	1.99	0.45
1:B:558:VAL:HG22	1:B:560:ARG:CZ	2.47	0.45
1:A:157:TRP:HA	1:A:163:LYS:O	2.17	0.45
1:A:281:ASN:CG	3:A:2811:NAG:C1	2.90	0.45
1:B:402:TRP:HZ3	1:B:404:VAL:HG22	1.82	0.45
1:A:256:TYR:CD1	1:A:256:TYR:C	2.96	0.44
1:B:235:LEU:HD23	1:B:255:PRO:HA	1.99	0.44
1:B:288:THR:HG22	1:B:289:ALA:O	2.18	0.44
1:B:68:TYR:CD1	1:B:68:TYR:C	2.94	0.44
1:A:65:ASP:OD1	1:A:463:LYS:O	2.36	0.44
1:A:148:ILE:HD11	1:A:164:LEU:HD13	1.98	0.44
1:B:73:GLU:O	1:B:74:ASN:HB2	2.16	0.44
1:A:258:LYS:HG3	1:B:248:TYR:CZ	2.52	0.44
1:B:516:PHE:CZ	1:B:523:LYS:HE2	2.53	0.44
1:B:588:ASP:O	1:B:589:LYS:C	2.59	0.44
1:A:131:SER:OG	1:A:150:ASN:OD1	2.33	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:50:LYS:HA	1:B:50:LYS:HE2	1.99	0.44
1:A:158:SER:OG	1:A:163:LYS:HB2	2.18	0.44
1:B:60:LEU:C	1:B:60:LEU:HD12	2.43	0.44
1:B:416:TYR:CD2	1:B:433:LYS:HB3	2.53	0.44
1:A:713:PHE:O	1:A:714:GLN:C	2.60	0.44
1:B:49:LEU:HA	1:B:49:LEU:HD23	1.78	0.44
1:B:387:PHE:CE1	1:B:394:CYS:HB3	2.53	0.44
1:A:657:SER:HB2	1:A:689:MET:SD	2.58	0.43
1:A:765:LEU:HA	1:A:766:PRO:HD3	1.79	0.43
1:B:432:TYR:CE2	1:B:444:CYS:HB2	2.52	0.43
1:A:333:SER:OG	1:A:334:SER:N	2.49	0.43
1:B:74:ASN:O	1:B:92:ASN:HB3	2.18	0.43
1:A:169:ASN:O	1:A:170:ASN:HB2	2.19	0.43
1:A:206:GLU:OE1	1:A:206:GLU:HA	2.18	0.43
1:A:703:ILE:HA	1:A:733:MET:O	2.19	0.43
1:B:616:MET:HB3	1:B:618:PHE:CE1	2.53	0.43
1:A:98:PHE:HD2	1:A:100:HIS:HB2	1.76	0.43
1:A:127:SER:HB3	1:A:211:TYR:CD1	2.53	0.43
1:A:544:LEU:HD12	1:A:544:LEU:HA	1.84	0.43
1:B:666:TYR:CD1	1:B:666:TYR:C	2.96	0.43
1:A:312:SER:HB2	1:A:364:PHE:CZ	2.53	0.43
1:B:256:TYR:CD1	1:B:256:TYR:C	2.96	0.43
1:B:728:VAL:HG12	1:B:729:ASP:O	2.19	0.43
1:A:249:PRO:HD3	1:B:714:GLN:NE2	2.33	0.43
1:B:509:MET:CE	1:B:510:PRO:HD2	2.41	0.43
1:A:310:ARG:NH1	1:A:389:ILE:HD12	2.33	0.43
1:B:236:ILE:HD13	1:B:712:HIS:CE1	2.53	0.43
1:B:445:LEU:HD23	1:B:445:LEU:N	2.34	0.43
1:A:530:LEU:HA	1:A:531:PRO:HD3	1.92	0.43
1:A:631:TYR:HB2	4:A:1[B]:KXA:H06	2.00	0.43
1:B:203:TYR:HA	1:B:207:VAL:HG23	2.00	0.43
1:A:42:THR:HB	1:A:569:SER:OG	2.19	0.43
1:A:387:PHE:CE2	1:A:394:CYS:HB3	2.54	0.43
1:A:554:LYS:HB3	1:A:577:SER:HB3	2.01	0.43
1:B:358:ARG:HE	1:B:358:ARG:HB3	1.47	0.42
1:B:363:HIS:CD2	1:B:407:ILE:HB	2.54	0.42
1:B:403:GLU:OE2	1:B:587:GLY:HA2	2.19	0.42
1:A:244:GLU:N	1:A:244:GLU:C	2.77	0.42
1:A:340:LEU:HD23	1:A:340:LEU:HA	1.83	0.42
1:A:477:LEU:HD12	1:A:501:ASP:HB2	2.01	0.42
1:B:562:ASN:O	1:B:565:THR:HB	2.18	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:635:VAL:O	1:B:639:VAL:HG23	2.20	0.42
1:A:383:HIS:HA	1:A:404:VAL:HG23	2.01	0.42
1:B:446:SER:CA	1:B:449:LEU:HD12	2.43	0.42
1:A:114:ILE:CG2	1:A:135:TYR:HB3	2.50	0.42
1:A:236:ILE:HG12	1:A:712:HIS:CD2	2.54	0.42
1:A:482:LEU:HB2	1:A:494:LEU:HD11	2.00	0.42
1:B:219:ASN:OD1	3:B:2191:NAG:H82	2.19	0.42
1:A:243:ASP:C	1:A:245:SER:N	2.76	0.42
1:A:258:LYS:HB3	1:A:660:GLU:O	2.20	0.42
1:B:105:TYR:CD1	1:B:105:TYR:C	2.97	0.42
1:B:463:LYS:O	1:B:465:ALA:N	2.52	0.42
1:A:258:LYS:HD2	1:B:247:GLN:HG2	2.01	0.42
1:B:154:TRP:CE2	1:B:212:SER:HB2	2.55	0.42
1:B:135:TYR:HD2	1:B:137:LEU:HD23	1.85	0.42
1:A:188:THR:O	1:A:189:GLY:C	2.63	0.42
1:A:136:ASP:C	1:A:136:ASP:OD1	2.63	0.41
1:A:281:ASN:HD21	3:A:2811:NAG:H2	1.83	0.41
1:B:678:ASP:HB3	1:B:679:ASN:H	1.74	0.41
1:A:144:THR:HG22	1:A:147:ARG:NH1	2.35	0.41
1:A:280:THR:HG22	1:A:281:ASN:N	2.34	0.41
1:B:69:LEU:CD2	1:B:78:VAL:HG22	2.49	0.41
1:B:184:ARG:HD3	1:B:187:TRP:CE2	2.55	0.41
1:A:529:ILE:HG22	1:A:568:ALA:CB	2.50	0.41
1:A:567:LEU:HD22	1:A:573:ILE:HD13	2.01	0.41
1:A:597:ARG:HA	1:A:682:HIS:CD2	2.54	0.41
1:B:53:TYR:HB3	1:B:500:LEU:HD21	2.02	0.41
1:B:666:TYR:CZ	4:B:2[A]:KXA:H06	2.55	0.41
1:A:340:LEU:HB2	1:A:343:ARG:HG2	2.02	0.41
1:B:316:LEU:HD13	1:B:323:SER:HB3	2.02	0.41
1:B:382:ARG:NH2	1:B:588:ASP:OD1	2.46	0.41
1:A:73:GLU:CD	1:A:92:ASN:HD22	2.29	0.41
1:A:236:ILE:HG12	1:A:712:HIS:CE1	2.55	0.41
1:A:341:VAL:O	1:A:344:GLN:HG3	2.20	0.41
1:A:482:LEU:C	1:A:483:HIS:CD2	2.99	0.41
1:A:142:LEU:HD12	1:A:142:LEU:H	1.86	0.41
1:B:314:GLN:HE21	1:B:314:GLN:HB2	1.64	0.41
1:A:294:LEU:O	1:A:295:ILE:C	2.63	0.41
1:A:405:ILE:HG13	1:A:429:ARG:HD3	2.03	0.41
1:B:403:GLU:OE1	1:B:585:TYR:HA	2.21	0.41
1:B:658:ARG:HH21	1:B:684:ARG:HE	1.68	0.41
1:B:120:TYR:CD1	1:B:120:TYR:C	2.98	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:734:TRP:CD1	1:B:734:TRP:C	2.99	0.41
1:A:248:TYR:CE2	1:B:258:LYS:HD2	2.56	0.40
1:A:446:SER:HB2	1:A:457:TYR:CE1	2.56	0.40
1:B:116:LEU:O	1:B:132:TYR:HA	2.21	0.40
1:B:675:THR:C	1:B:680:LEU:HB2	2.46	0.40
1:B:123:GLN:HG2	1:B:124:TRP:CD1	2.57	0.40
1:B:135:TYR:HA	1:B:142:LEU:HD23	2.03	0.40
1:B:146:GLU:OE1	1:B:181:PRO:HA	2.22	0.40
1:B:316:LEU:HD21	1:B:320:GLN:HB3	2.02	0.40
1:B:626:ILE:O	1:B:650:GLY:HA2	2.21	0.40
1:A:343:ARG:HH11	1:A:343:ARG:HD2	1.77	0.40
1:B:361:GLU:HG3	1:B:362:PRO:HD2	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	725/753 (96%)	675 (93%)	44 (6%)	6 (1%)	16	34
1	B	725/753 (96%)	662 (91%)	58 (8%)	5 (1%)	18	38
All	All	1450/1506 (96%)	1337 (92%)	102 (7%)	11 (1%)	16	34

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	139	LYS
1	A	714	GLN
1	B	138	ASN
1	B	620	ASP
1	A	92	ASN
1	A	281	ASN

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Mol	Chain	Res	Type
1	A	390	ASP
1	B	464	GLU
1	A	708	ASP
1	B	488	ASP
1	A	486	VAL

5.3.2 Protein sidechains ⓘ

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	626/677 (92%)	597 (95%)	29 (5%)	24	49
1	B	625/677 (92%)	587 (94%)	38 (6%)	17	37
All	All	1251/1354 (92%)	1184 (95%)	67 (5%)	20	42

All (67) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	52	THR
1	A	56	LYS
1	A	63	ILE
1	A	78	VAL
1	A	107	ILE
1	A	155	VAL
1	A	158	SER
1	A	231	THR
1	A	279	VAL
1	A	295	ILE
1	A	311	ILE
1	A	314	GLN
1	A	333	SER
1	A	350	THR
1	A	376	SER
1	A	385	CYS
1	A	418	ILE
1	A	437	SER

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Mol	Chain	Res	Type
1	A	464	GLU
1	A	529	ILE
1	A	536	LYS
1	A	594	ILE
1	A	621	ASN
1	A	622	LYS
1	A	627	TRP
1	A	656	VAL
1	A	677	GLU
1	A	715	GLN
1	A	764	SER
1	B	46	THR
1	B	51	ASN
1	B	63	ILE
1	B	88	VAL
1	B	231	THR
1	B	232	GLU
1	B	236	ILE
1	B	258	LYS
1	B	273	THR
1	B	285	ILE
1	B	292	SER
1	B	314	GLN
1	B	319	ILE
1	B	326	ASP
1	B	327	ILE
1	B	350	THR
1	B	370	SER
1	B	385	CYS
1	B	394	CYS
1	B	398	THR
1	B	418	ILE
1	B	434	ILE
1	B	443	THR
1	B	445	LEU
1	B	472	CYS
1	B	485	SER
1	B	500	LEU
1	B	502	LYS
1	B	504	LEU
1	B	512	LYS
1	B	546	VAL

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Mol	Chain	Res	Type
1	B	558	VAL
1	B	594	ILE
1	B	656	VAL
1	B	660	GLU
1	B	697	GLN
1	B	699	GLU
1	B	726	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	74	ASN
1	A	123	GLN
1	A	247	GLN
1	A	314	GLN
1	A	344	GLN
1	A	430	ASN
1	A	450	ASN
1	B	103	ASN
1	B	123	GLN
1	B	586	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 ⓘ

4 monosaccharides 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	NAG	C	1	2,1	14,14,15	0.55	0	17,19,21	1.13	1 (5%)
2	NAG	C	2	2	14,14,15	0.61	0	17,19,21	1.70	3 (17%)
2	NAG	D	1	2,1	14,14,15	0.67	0	17,19,21	1.24	2 (11%)
2	NAG	D	2	2	14,14,15	0.68	0	17,19,21	1.15	1 (5%)

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	NAG	C	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	C	2	2	-	1/6/23/26	0/1/1/1
2	NAG	D	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	D	2	2	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	2	NAG	C1-O5-C5	4.80	118.61	112.19
2	C	2	NAG	O5-C1-C2	3.59	116.84	111.29
2	D	2	NAG	C3-C4-C5	3.10	115.86	110.23
2	C	1	NAG	C1-O5-C5	2.90	116.07	112.19
2	D	1	NAG	O5-C1-C2	-2.77	107.01	111.29
2	C	2	NAG	C2-N2-C7	-2.39	119.69	122.90
2	D	1	NAG	C2-N2-C7	-2.04	120.17	122.90

There are no chirality outliers.

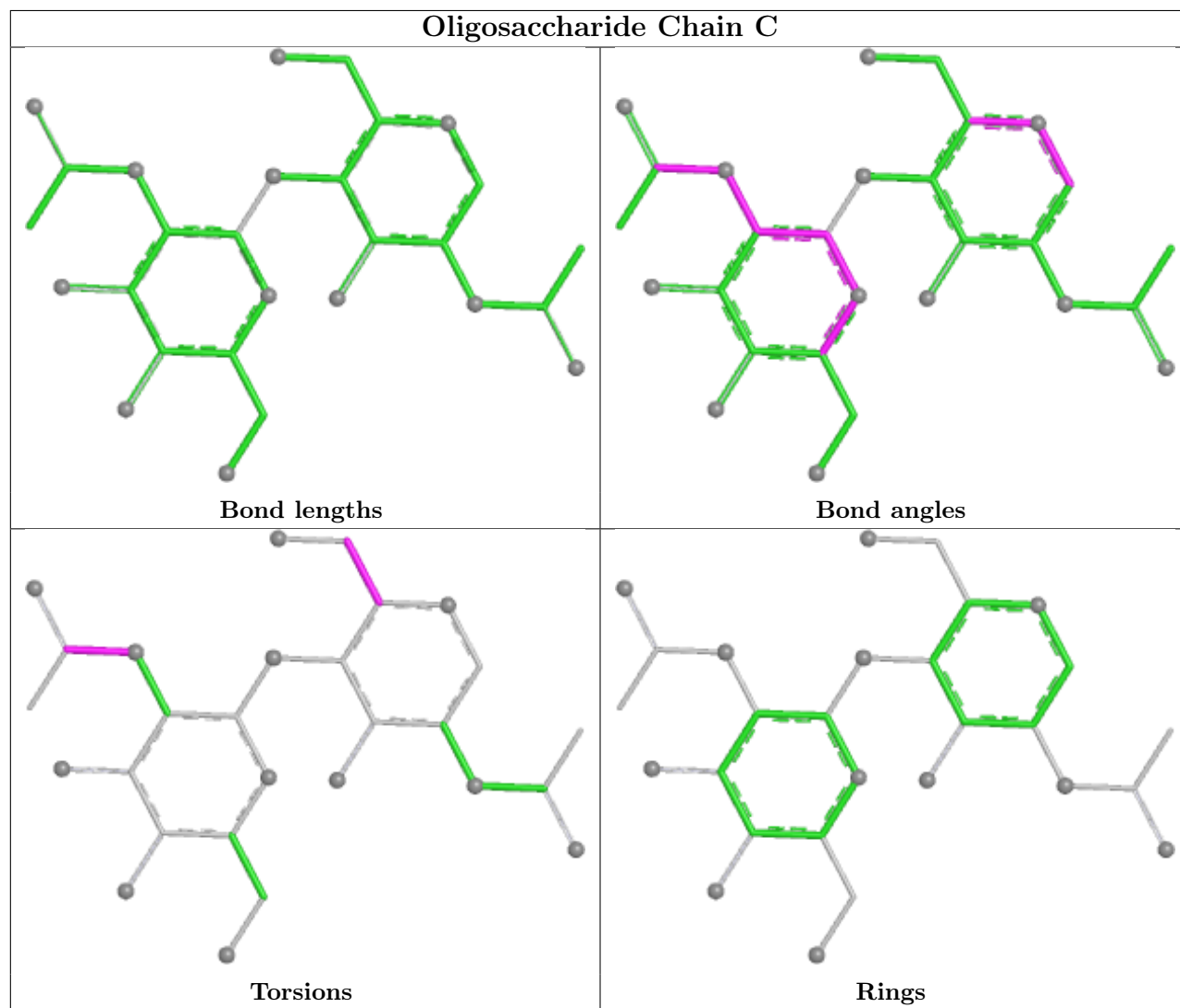
All (5) torsion outliers are listed below:

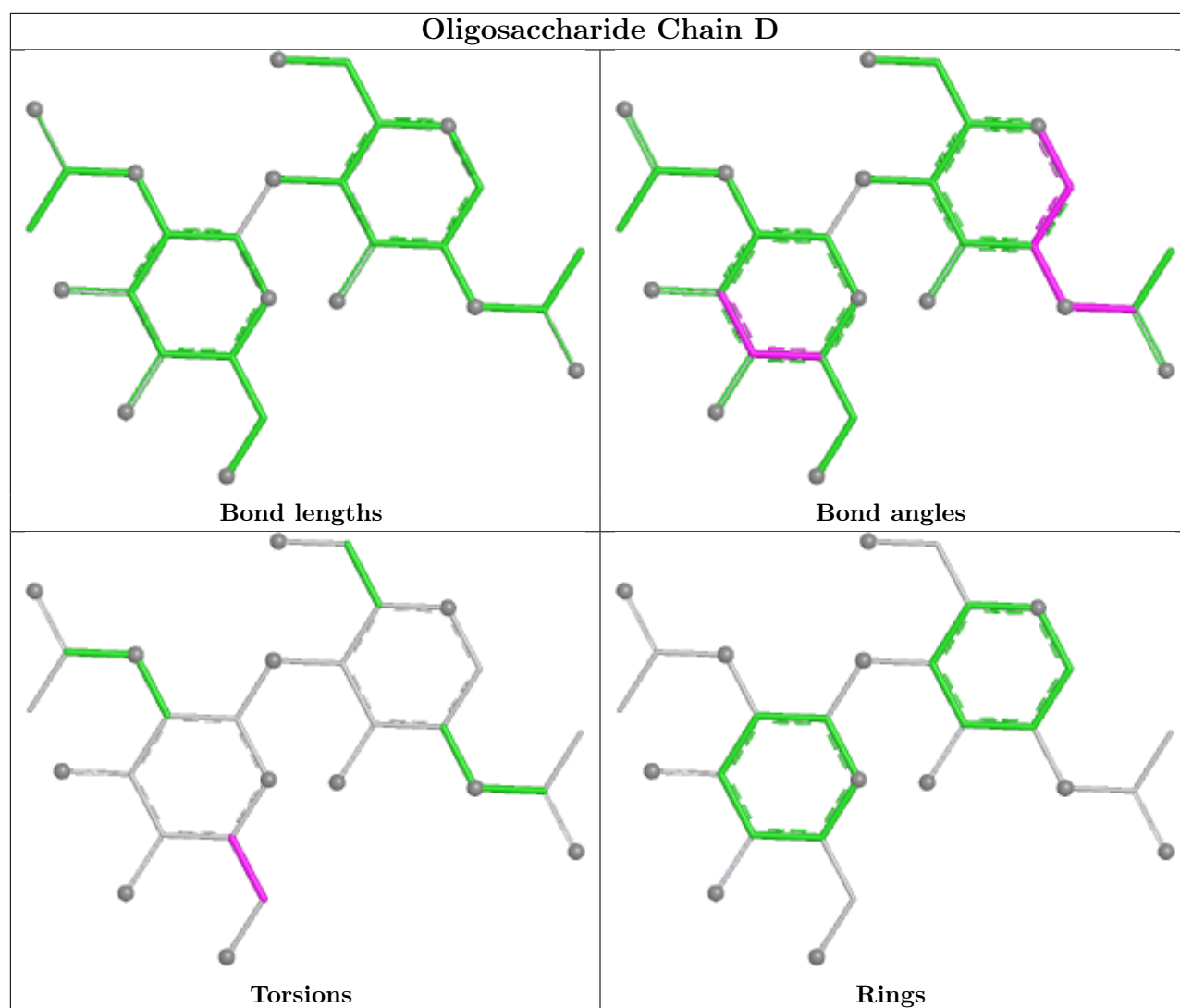
Mol	Chain	Res	Type	Atoms
2	C	1	NAG	O5-C5-C6-O6
2	D	2	NAG	C4-C5-C6-O6
2	D	2	NAG	O5-C5-C6-O6
2	C	1	NAG	C4-C5-C6-O6
2	C	2	NAG	C8-C7-N2-C2

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.





5.6 Ligand geometry [i](#)

15 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	NAG	A	1501	1	14,14,15	0.46	0	17,19,21	1.58	3 (17%)
3	NAG	A	5201	1	14,14,15	0.43	0	17,19,21	1.49	4 (23%)
3	NAG	B	1501	1	14,14,15	0.87	0	17,19,21	1.55	4 (23%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	B	2811	1	14,14,15	0.74	0	17,19,21	1.17	2 (11%)
3	NAG	B	851	1	14,14,15	0.41	0	17,19,21	1.55	1 (5%)
3	NAG	B	2191	1	14,14,15	0.63	0	17,19,21	1.10	1 (5%)
4	KXA	A	1[B]	-	32,32,32	2.34	7 (21%)	43,47,47	1.78	12 (27%)
4	KXA	B	2[A]	-	32,32,32	1.62	4 (12%)	43,47,47	1.53	9 (20%)
3	NAG	A	851	1	14,14,15	0.61	0	17,19,21	1.19	2 (11%)
3	NAG	B	921	1	14,14,15	0.59	0	17,19,21	1.55	2 (11%)
4	KXA	A	1[A]	-	32,32,32	1.88	7 (21%)	43,47,47	1.51	9 (20%)
4	KXA	B	2[B]	-	32,32,32	1.66	4 (12%)	43,47,47	1.54	9 (20%)
3	NAG	A	2191	1	14,14,15	0.72	0	17,19,21	1.25	1 (5%)
3	NAG	A	2811	-	14,14,15	0.78	1 (7%)	17,19,21	1.69	3 (17%)
3	NAG	B	5201	1	14,14,15	0.54	0	17,19,21	0.61	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	A	1501	1	-	3/6/23/26	0/1/1/1
3	NAG	A	5201	1	-	1/6/23/26	0/1/1/1
4	KXA	A	1[B]	-	-	0/11/24/24	0/4/4/4
3	NAG	B	2811	1	-	4/6/23/26	0/1/1/1
3	NAG	B	851	1	-	0/6/23/26	0/1/1/1
3	NAG	B	2191	1	-	4/6/23/26	0/1/1/1
4	KXA	B	2[A]	-	-	2/11/24/24	0/4/4/4
3	NAG	A	851	1	-	0/6/23/26	0/1/1/1
3	NAG	B	921	1	-	2/6/23/26	0/1/1/1
4	KXA	A	1[A]	-	-	1/11/24/24	0/4/4/4
4	KXA	B	2[B]	-	-	0/11/24/24	0/4/4/4
3	NAG	A	2191	1	-	1/6/23/26	0/1/1/1
3	NAG	B	1501	1	1/1/5/7	4/6/23/26	0/1/1/1
3	NAG	B	5201	1	-	4/6/23/26	0/1/1/1
3	NAG	A	2811	-	-	0/6/23/26	0/1/1/1

All (23) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	1[B]	KXA	C12-N24	-8.05	1.33	1.44
4	A	1[A]	KXA	C12-N24	-5.85	1.36	1.44
4	A	1[B]	KXA	C08-C09	-5.41	1.43	1.50
4	A	1[A]	KXA	C08-C09	-5.21	1.44	1.50
4	B	2[B]	KXA	C08-C09	-5.13	1.44	1.50
4	B	2[A]	KXA	C08-C09	-4.76	1.44	1.50
4	A	1[B]	KXA	C19-N24	-4.58	1.42	1.47
4	B	2[A]	KXA	C19-C10	-4.30	1.45	1.50
4	B	2[B]	KXA	C19-C10	-4.19	1.45	1.50
4	A	1[B]	KXA	C19-C10	-4.14	1.45	1.50
4	B	2[B]	KXA	C12-N24	-3.62	1.39	1.44
4	B	2[A]	KXA	C12-N24	-3.47	1.39	1.44
4	A	1[A]	KXA	C19-C10	-3.15	1.47	1.50
4	A	1[B]	KXA	C09-C10	-3.09	1.35	1.40
4	A	1[B]	KXA	C14-CL1	-3.02	1.67	1.74
4	A	1[A]	KXA	C14-CL1	-2.89	1.67	1.74
4	A	1[A]	KXA	C19-N24	-2.78	1.44	1.47
4	B	2[B]	KXA	C09-C10	-2.62	1.36	1.40
4	B	2[A]	KXA	C09-C10	-2.58	1.36	1.40
4	A	1[A]	KXA	C17-N23	2.38	1.37	1.34
4	A	1[A]	KXA	C09-C10	-2.37	1.36	1.40
3	A	2811	NAG	O5-C1	-2.11	1.40	1.43
4	A	1[B]	KXA	C16-C10	-2.02	1.37	1.41

All (62) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	851	NAG	C1-O5-C5	5.19	119.14	112.19
4	A	1[B]	KXA	C13-C12-N24	-4.76	115.17	119.89
3	A	2191	NAG	C1-O5-C5	4.11	117.69	112.19
3	A	5201	NAG	C1-O5-C5	4.07	117.64	112.19
3	A	1501	NAG	C1-O5-C5	3.92	117.44	112.19
3	A	2811	NAG	C3-C4-C5	3.76	117.05	110.23
3	A	2811	NAG	O5-C1-C2	-3.68	105.60	111.29
4	A	1[B]	KXA	C08-C09-C11	3.59	126.28	120.61
4	A	1[B]	KXA	C19-N24-C18	3.52	115.36	112.39
4	A	1[B]	KXA	C16-N23-C17	-3.49	112.06	117.67
3	B	2191	NAG	C1-O5-C5	3.41	116.76	112.19
3	B	2811	NAG	C4-C3-C2	3.32	115.88	111.02
3	A	1501	NAG	C2-N2-C7	-3.30	118.47	122.90
4	A	1[A]	KXA	C08-C09-C11	3.29	125.81	120.61
4	B	2[A]	KXA	C21-O27-C13	-3.29	112.69	117.51
4	B	2[B]	KXA	C08-C09-C11	3.25	125.74	120.61

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	2[A]	KXA	C08-C09-C11	3.23	125.72	120.61
4	B	2[B]	KXA	C16-N23-C17	-3.21	112.52	117.67
4	A	1[A]	KXA	C16-N23-C17	-3.20	112.52	117.67
4	B	2[A]	KXA	C16-N23-C17	-3.20	112.53	117.67
3	A	2811	NAG	C1-O5-C5	-3.13	107.99	112.19
3	B	921	NAG	C4-C3-C2	-3.13	106.44	111.02
3	B	1501	NAG	C1-O5-C5	-3.05	108.10	112.19
4	A	1[A]	KXA	C19-N24-C18	3.04	114.96	112.39
4	B	2[B]	KXA	C03-C08-C15	3.02	121.01	117.60
4	A	1[B]	KXA	C03-C08-C15	2.99	120.97	117.60
3	B	921	NAG	C1-O5-C5	2.98	116.19	112.19
4	B	2[B]	KXA	C21-O27-C13	-2.95	113.18	117.51
4	A	1[A]	KXA	C03-C08-C15	2.95	120.93	117.60
4	B	2[A]	KXA	C03-C08-C15	2.95	120.92	117.60
4	A	1[A]	KXA	C21-O27-C13	-2.73	113.51	117.51
3	A	851	NAG	C1-O5-C5	2.71	115.82	112.19
4	B	2[A]	KXA	C19-N24-C18	2.70	114.67	112.39
3	B	1501	NAG	O5-C5-C4	-2.66	104.35	110.83
4	B	2[B]	KXA	C13-C12-N24	-2.57	117.34	119.89
4	A	1[B]	KXA	C11-C17-N23	2.56	125.00	122.09
3	A	1501	NAG	C4-C3-C2	-2.56	107.27	111.02
3	A	5201	NAG	C2-N2-C7	-2.51	119.54	122.90
4	A	1[A]	KXA	C12-N24-C18	-2.48	121.58	124.16
4	A	1[A]	KXA	C11-C17-N23	2.48	124.91	122.09
4	B	2[A]	KXA	C11-C17-N23	2.47	124.89	122.09
4	B	2[B]	KXA	C11-C17-N23	2.41	124.83	122.09
4	B	2[B]	KXA	C19-N24-C18	2.40	114.42	112.39
3	B	1501	NAG	C4-C3-C2	2.40	114.53	111.02
4	B	2[B]	KXA	C19-C10-C16	2.38	111.32	109.56
3	A	5201	NAG	C6-C5-C4	-2.37	107.20	113.02
4	A	1[B]	KXA	C04-C12-N24	2.34	123.26	119.12
4	A	1[B]	KXA	C21-O27-C13	-2.33	114.10	117.51
3	B	1501	NAG	C3-C4-C5	-2.32	106.03	110.23
4	A	1[B]	KXA	C09-C08-C15	-2.30	119.67	122.31
4	B	2[A]	KXA	C09-C08-C15	-2.29	119.68	122.31
3	B	2811	NAG	C2-N2-C7	-2.22	119.92	122.90
3	A	851	NAG	C6-C5-C4	-2.22	107.56	113.02
4	A	1[B]	KXA	C08-C09-C10	-2.21	117.12	120.61
4	B	2[A]	KXA	C19-C10-C16	2.17	111.17	109.56
4	B	2[A]	KXA	C20-C17-N23	-2.17	113.16	116.53
4	A	1[B]	KXA	C19-C10-C16	2.13	111.14	109.56
4	B	2[B]	KXA	C20-C17-N23	-2.13	113.24	116.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1[A]	KXA	C09-C08-C15	-2.05	119.96	122.31
4	A	1[A]	KXA	C08-C09-C10	-2.04	117.40	120.61
4	A	1[B]	KXA	C20-C17-N23	-2.02	113.39	116.53
3	A	5201	NAG	C3-C4-C5	2.02	113.89	110.23

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	B	1501	NAG	C1

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	921	NAG	C8-C7-N2-C2
3	B	921	NAG	O7-C7-N2-C2
3	B	2191	NAG	C8-C7-N2-C2
3	B	2191	NAG	O7-C7-N2-C2
3	B	2811	NAG	C8-C7-N2-C2
3	B	2811	NAG	O7-C7-N2-C2
4	A	1[A]	KXA	C09-C11-C22-N25
3	B	2191	NAG	C4-C5-C6-O6
3	B	2191	NAG	O5-C5-C6-O6
4	B	2[A]	KXA	C12-C13-O27-C21
3	B	1501	NAG	C4-C5-C6-O6
3	B	1501	NAG	O5-C5-C6-O6
3	A	1501	NAG	O5-C5-C6-O6
4	B	2[A]	KXA	C05-C13-O27-C21
3	A	2191	NAG	O5-C5-C6-O6
3	B	1501	NAG	C8-C7-N2-C2
3	A	5201	NAG	O5-C5-C6-O6
3	B	1501	NAG	O7-C7-N2-C2
3	B	5201	NAG	C8-C7-N2-C2
3	B	2811	NAG	O5-C5-C6-O6
3	B	5201	NAG	O7-C7-N2-C2
3	A	1501	NAG	C8-C7-N2-C2
3	B	5201	NAG	C4-C5-C6-O6
3	B	2811	NAG	C4-C5-C6-O6
3	A	1501	NAG	O7-C7-N2-C2
3	B	5201	NAG	O5-C5-C6-O6

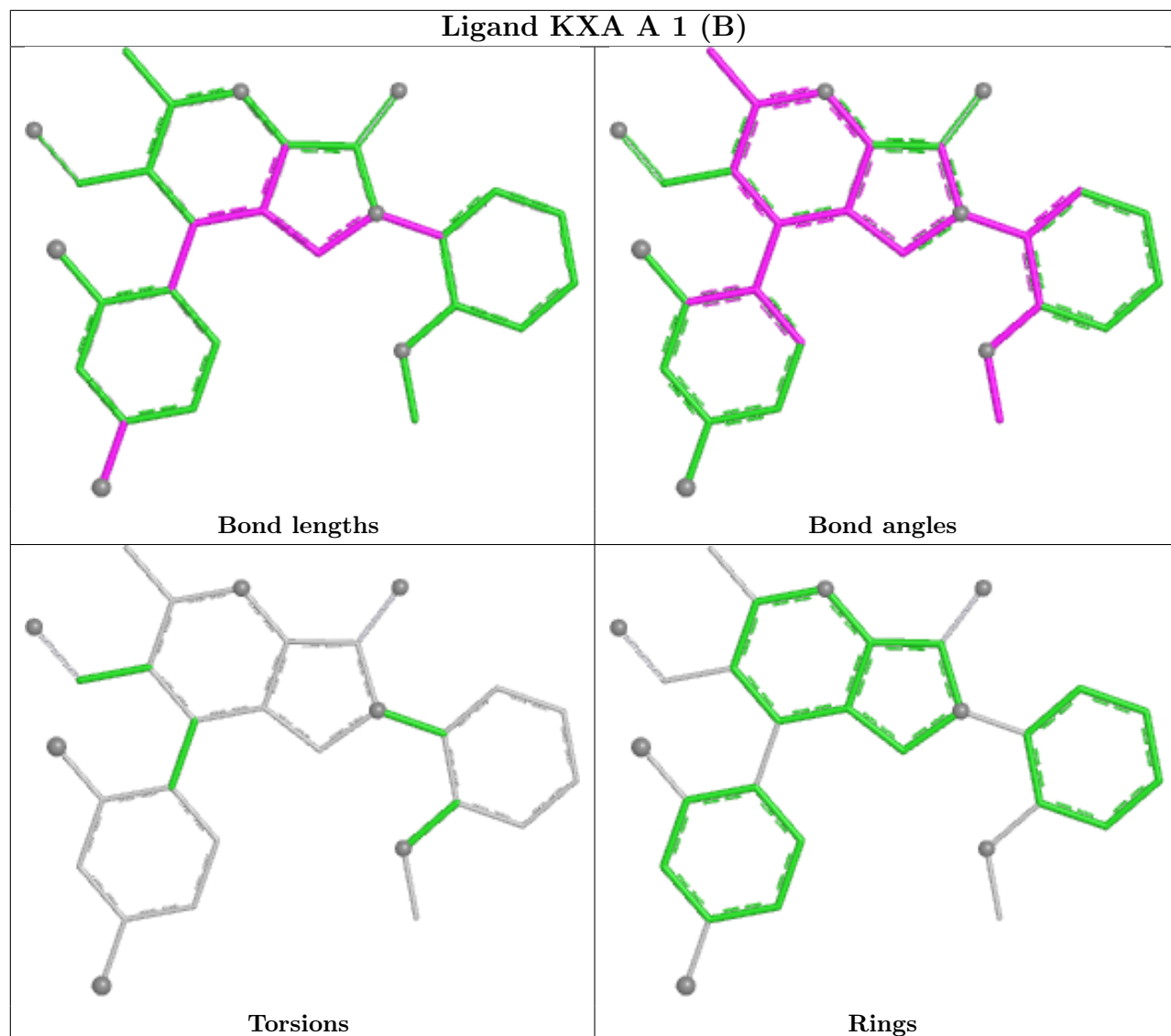
There are no ring outliers.

5 monomers are involved in 11 short contacts:

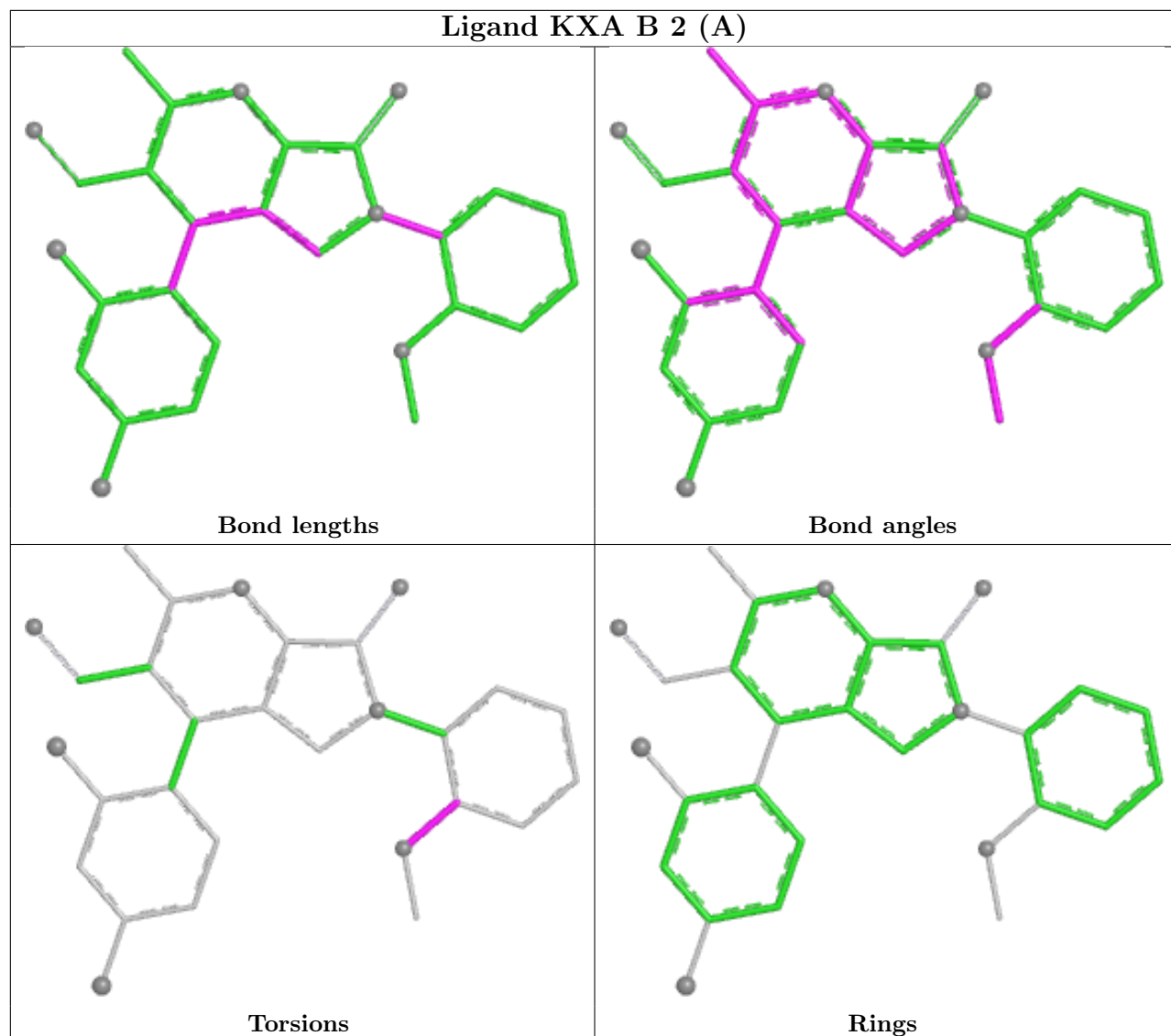
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	2191	NAG	1	0
4	A	1[B]	KXA	1	0
4	B	2[A]	KXA	1	0
3	A	2811	NAG	6	0
3	B	5201	NAG	2	0

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 than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

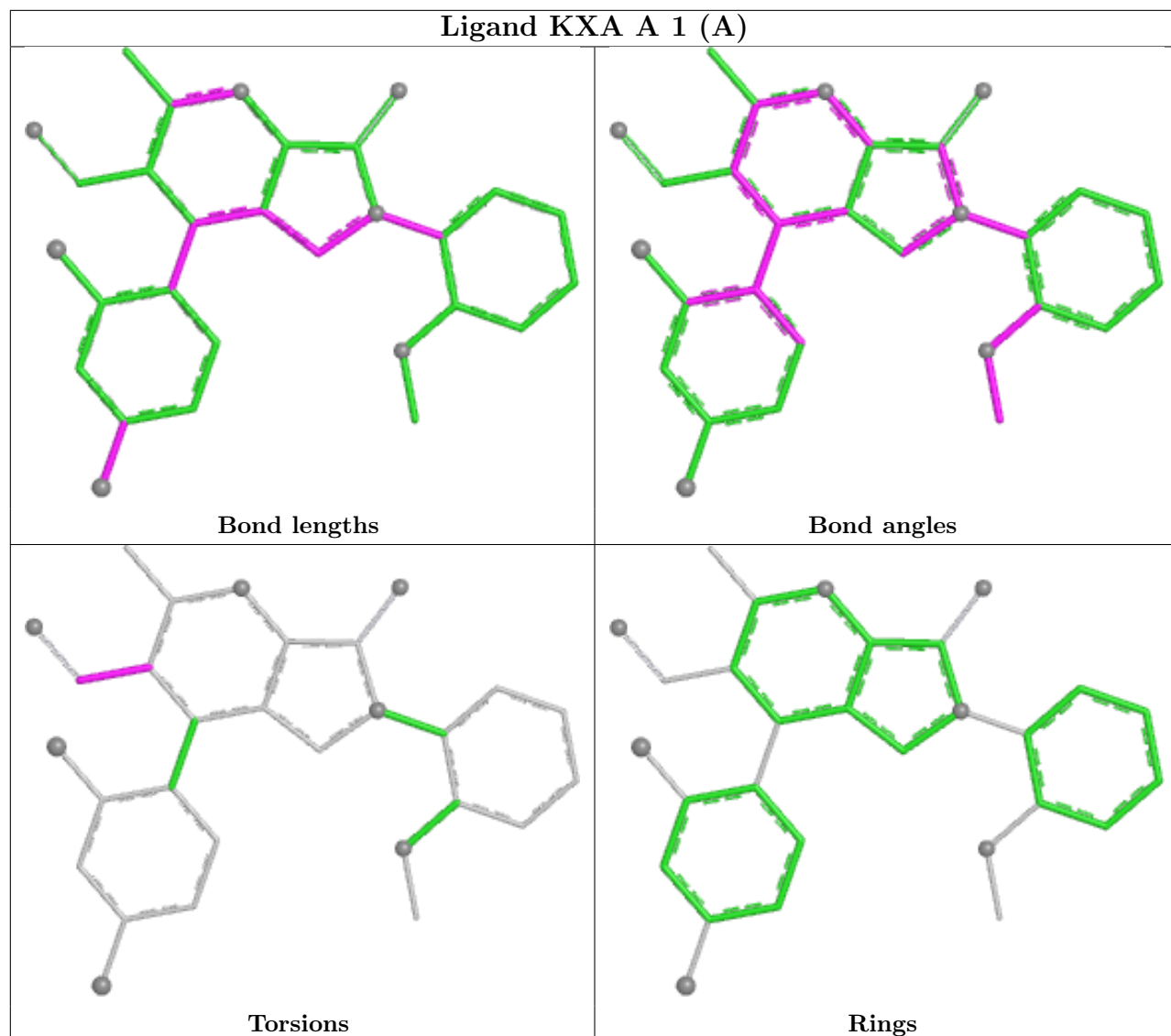
Ligand KXA A 1 (B)

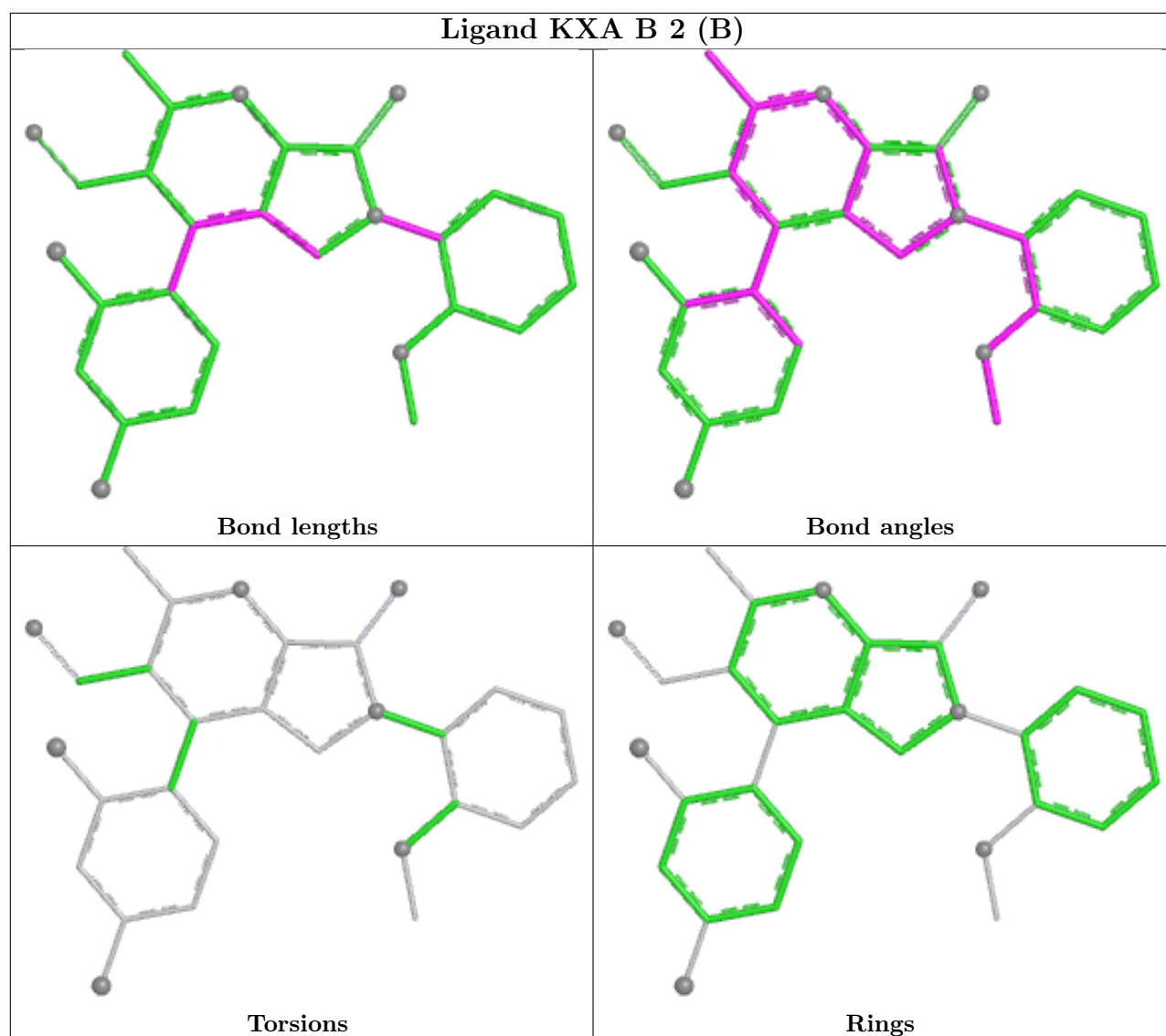


Ligand KXA B 2 (A)



Ligand KXA A 1 (A)





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	727/753 (96%)	-0.36	6 (0%) 82 80	27, 50, 74, 105	1 (0%)
1	B	727/753 (96%)	-0.22	4 (0%) 85 83	35, 56, 79, 106	0
All	All	1454/1506 (96%)	-0.29	10 (0%) 84 82	27, 54, 77, 106	1 (0%)

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	766	PRO	3.7
1	A	345	HIS	3.2
1	A	40	ARG	2.9
1	B	766	PRO	2.8
1	A	394	CYS	2.8
1	B	278	SER	2.6
1	B	138	ASN	2.4
1	A	765	LEU	2.3
1	A	142	LEU	2.2
1	B	76	ILE	2.0

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

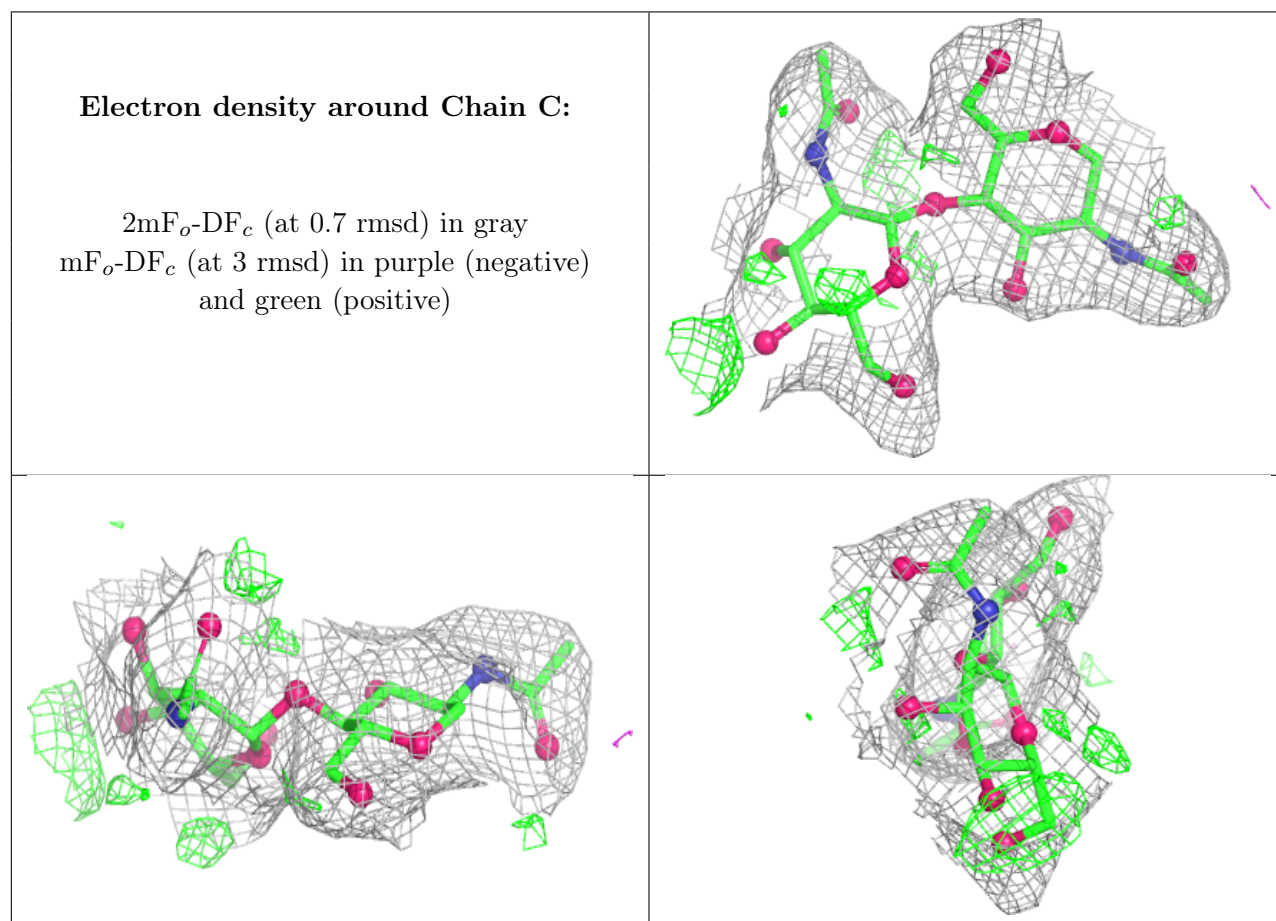
There are no non-standard protein/DNA/RNA residues in this entry.

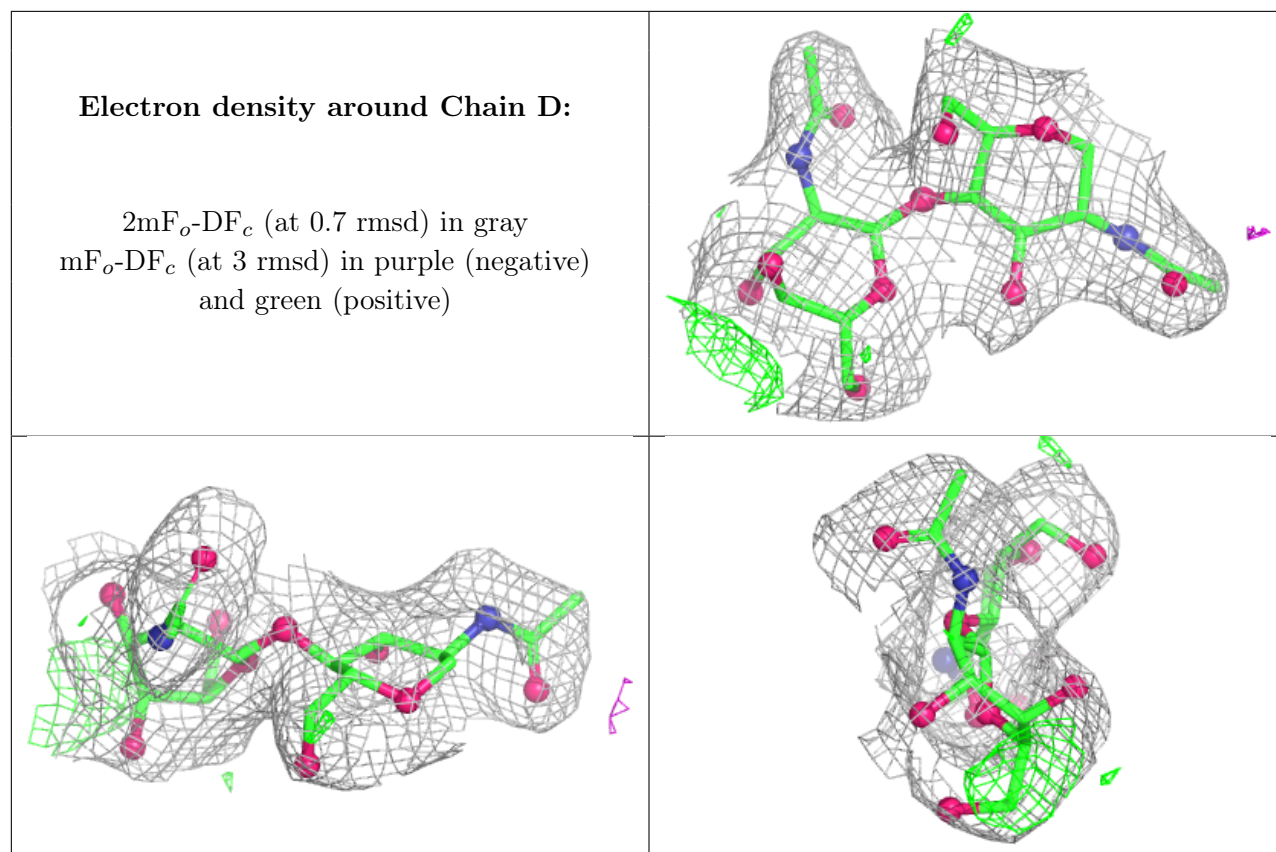
6.3 Carbohydrates [i](#)

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($\text{\AA}^2$)	Q<0.9
2	NAG	D	2	14/15	0.72	0.11	62,88,94,94	0
2	NAG	C	2	14/15	0.73	0.11	73,85,93,96	0
2	NAG	C	1	14/15	0.90	0.08	45,69,77,82	0
2	NAG	D	1	14/15	0.92	0.08	49,64,76,76	0

The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.





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.

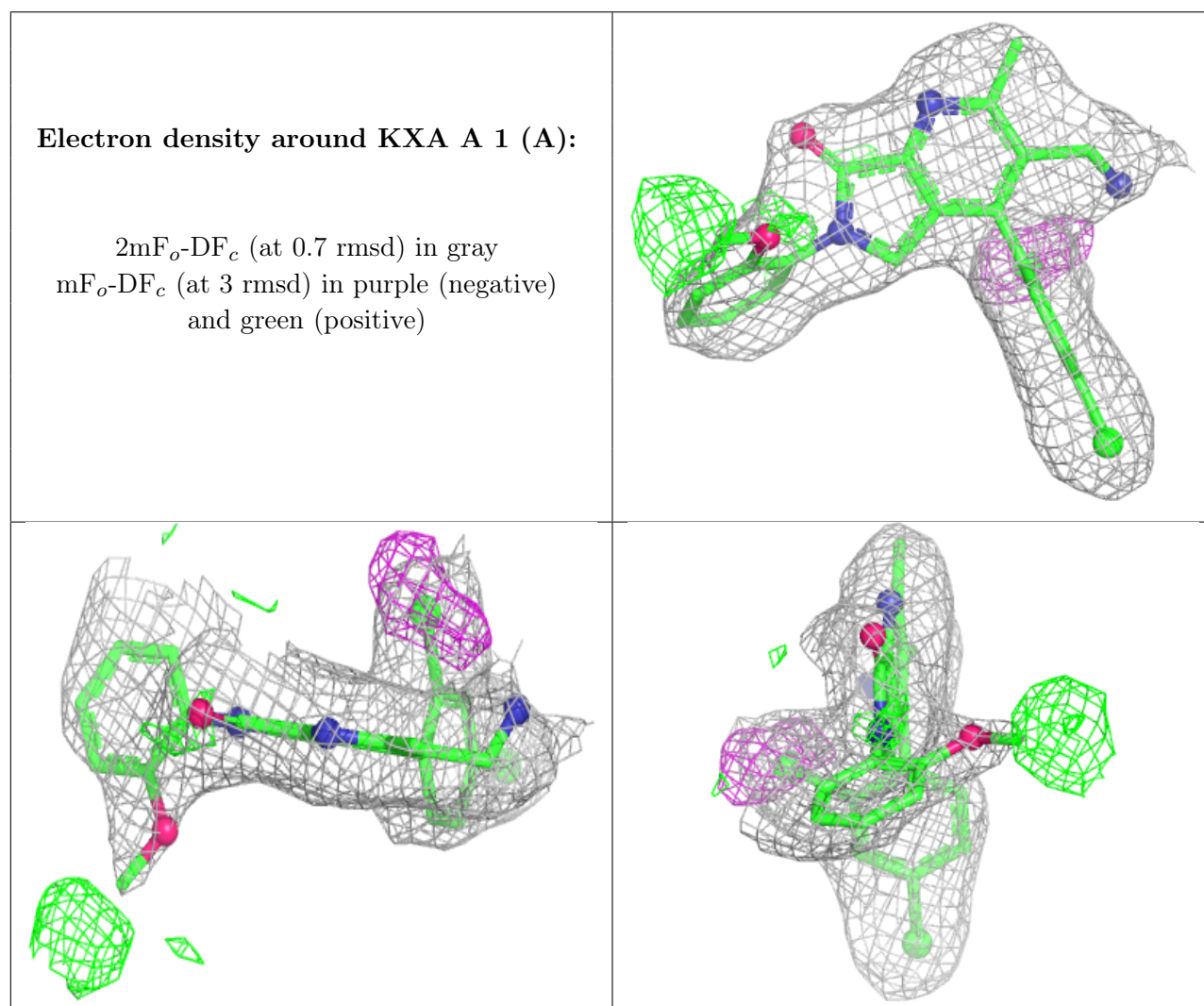
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	NAG	B	2191	14/15	0.54	0.15	73,89,98,98	0
3	NAG	B	921	14/15	0.56	0.13	71,89,93,95	0
3	NAG	A	2191	14/15	0.58	0.14	75,88,97,98	0
3	NAG	B	5201	14/15	0.72	0.12	77,97,102,104	0
3	NAG	B	2811	14/15	0.79	0.11	88,97,100,104	0
3	NAG	A	2811	14/15	0.80	0.11	68,80,85,91	0
3	NAG	B	1501	14/15	0.82	0.12	72,92,101,102	0
3	NAG	A	1501	14/15	0.82	0.11	67,87,98,102	0
3	NAG	A	5201	14/15	0.85	0.10	66,78,91,94	0
4	KXA	A	1[A]	29/29	0.87	0.15	36,43,46,51	29
4	KXA	A	1[B]	29/29	0.87	0.15	35,43,47,51	29
4	KXA	B	2[A]	29/29	0.91	0.12	42,46,47,48	29
4	KXA	B	2[B]	29/29	0.91	0.12	41,46,47,48	29
3	NAG	B	851	14/15	0.93	0.08	56,61,67,69	0

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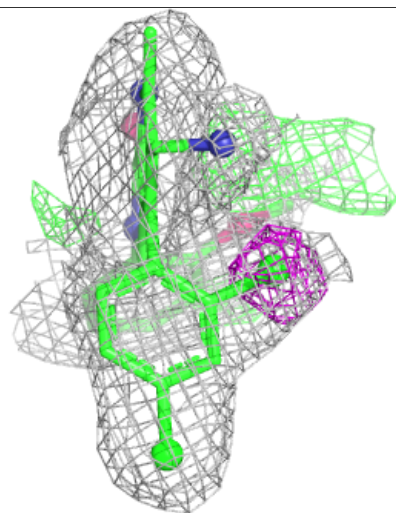
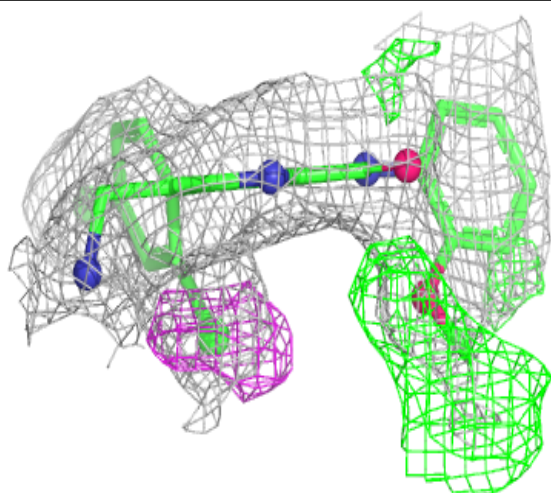
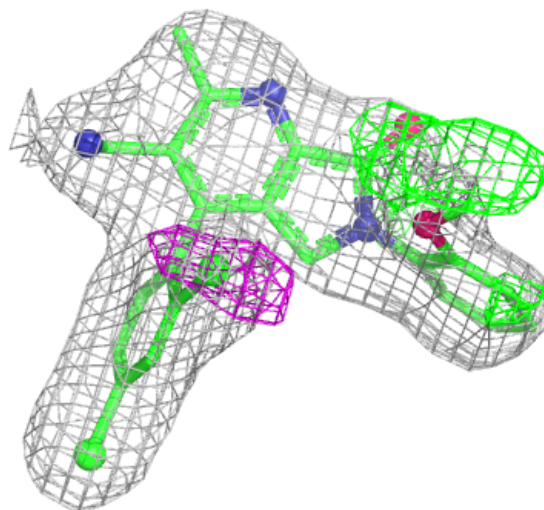
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	NAG	A	851	14/15	0.94	0.07	48,52,55,56	0

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.



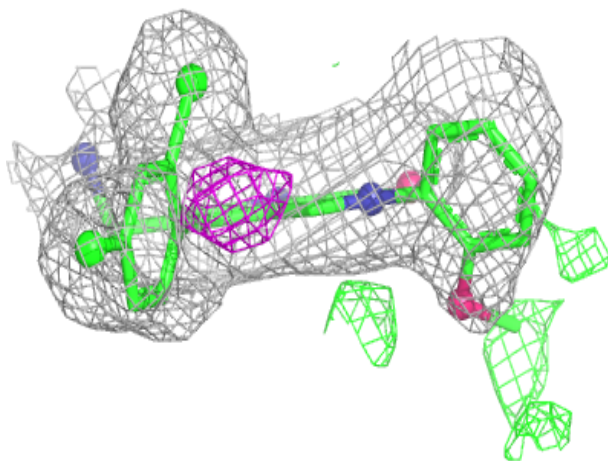
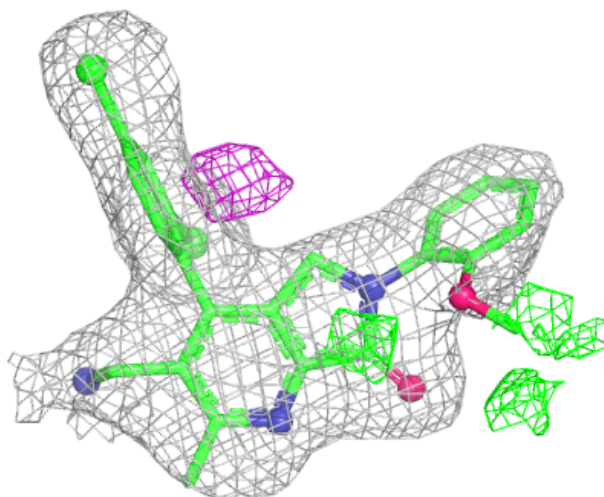
Electron density around KXA A 1 (B):

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



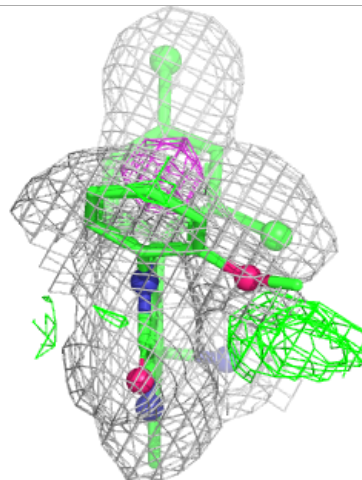
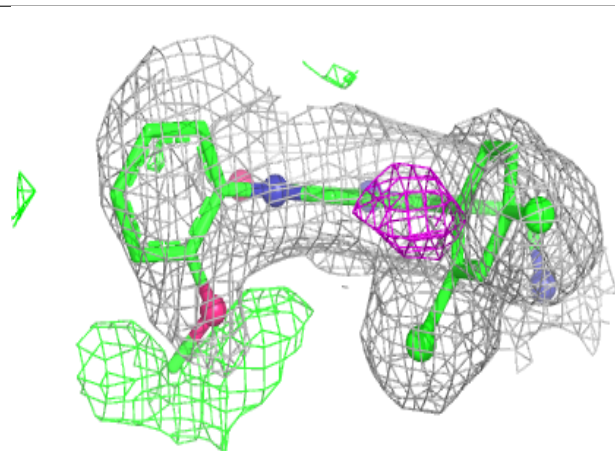
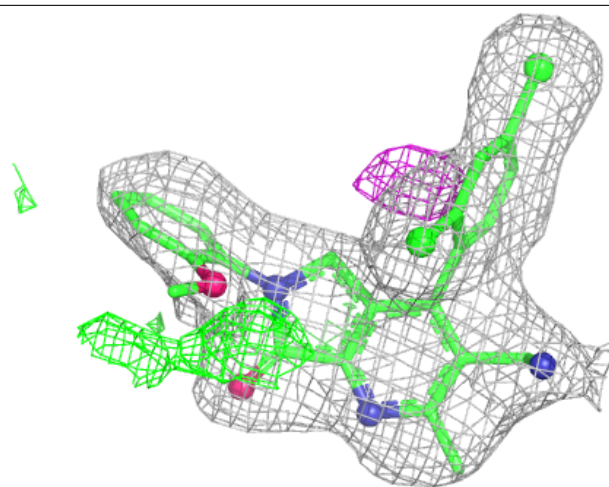
Electron density around KXA B 2 (A):

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



Electron density around KXA B 2 (B):

$2mF_o-DF_c$ (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.