Full wwPDB X-ray Structure Validation Report ⓘ

Oct 21, 2023 – 02:05 PM EDT

|		
PDB ID	:	8GB1
Title	:	Crystal structure of SAMHD1 dimer bound to deoxyguanosine linked inhibitor
Authors	:	Egleston, M.; Dong, L.; Howlader, A.H.; Bhat, S.; Orris, B.; Bianchet, M.A.; Greenberg, M.M.; Stivers, J.T.
Deposited on	:	2023-02-24
Resolution	:	2.46 Å(reported)

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION
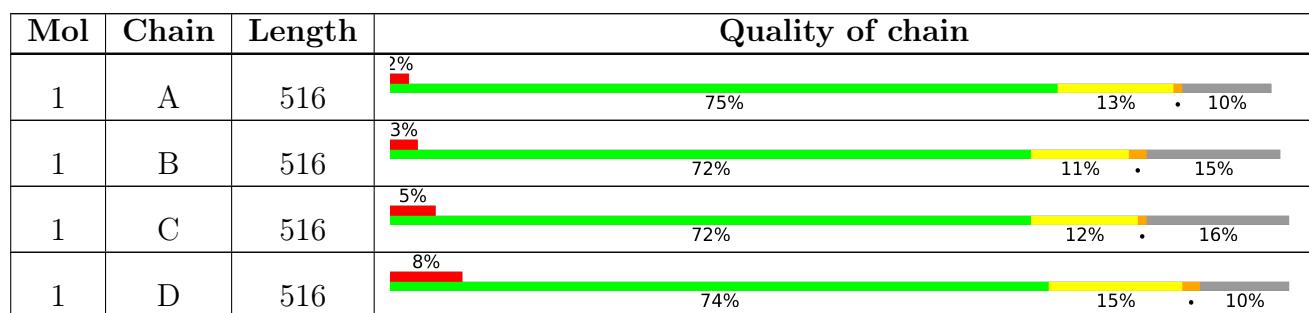
The reported resolution of this entry is 2.46 Å.

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	Percentile Ranks	Value
Rfree		0.243
Clashscore		7
Ramachandran outliers		0.4%
Sidechain outliers		3.6%
RSRZ outliers		5.5%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1544 (2.48-2.44)
Clashscore	141614	1613 (2.48-2.44)
Ramachandran outliers	138981	1598 (2.48-2.44)
Sidechain outliers	138945	1598 (2.48-2.44)
RSRZ outliers	127900	1523 (2.48-2.44)

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

Mol	Chain	Length	Quality of chain
1	A	516	2% — 75% 13% · 10%
1	B	516	3% — 72% 11% · 15%
1	C	516	5% — 72% 12% · 16%
1	D	516	8% — 74% 15% · 10%

WORLDWIDE PDB
PROTEIN DATA BANK

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 30190 atoms, of which 14687 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.
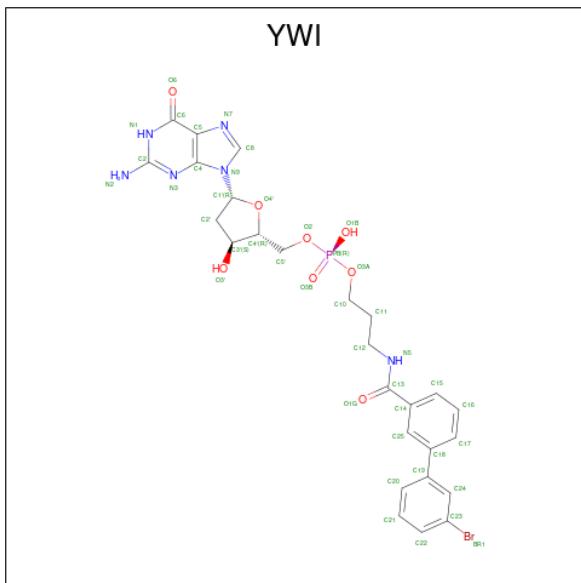
- Molecule 1 is a protein called Deoxynucleoside triphosphate triphosphohydrolase SAMHD1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	462	Total	C	H	N	O	S	0	1	0
			7526	2418	3746	656	687	19			
1	B	439	Total	C	H	N	O	S	0	0	0
			7146	2299	3556	621	652	18			
1	C	434	Total	C	H	N	O	S	0	0	0
			7045	2262	3505	613	646	19			
1	D	466	Total	C	H	N	O	S	0	0	0
			7573	2429	3772	661	692	19			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	111	SER	-	expression tag	UNP Q9Y3Z3
A	112	MET	-	expression tag	UNP Q9Y3Z3
B	111	SER	-	expression tag	UNP Q9Y3Z3
B	112	MET	-	expression tag	UNP Q9Y3Z3
C	111	SER	-	expression tag	UNP Q9Y3Z3
C	112	MET	-	expression tag	UNP Q9Y3Z3
D	111	SER	-	expression tag	UNP Q9Y3Z3
D	112	MET	-	expression tag	UNP Q9Y3Z3

- Molecule 2 is 5'-O-[(R)-(3-{[(1M)-3'-bromo[1,1'-biphenyl]-3-carbonyl]amino}propoxy)(hydroxy)phosphoryl]-2'-deoxyguanosine (three-letter code: YWI) (formula: $C_{26}H_{28}BrN_6O_8P$).

WORLDWIDE wwPDB PROTEIN DATA BANK

Mol	Chain	Residues	Atoms							ZeroOcc	AltConf
2	A	1	Total	Br	C	H	N	O	P	0	0
			69	1	26	27	6	8	1		
2	B	1	Total	Br	C	H	N	O	P	0	0
			69	1	26	27	6	8	1		
2	C	1	Total	Br	C	H	N	O	P	0	0
			69	1	26	27	6	8	1		
2	D	1	Total	Br	C	H	N	O	P	0	0
			69	1	26	27	6	8	1		

- Molecule 3 is FE (III) ION (three-letter code: FE) (formula: Fe).

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

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	206	Total	O	0	0
			206	206		

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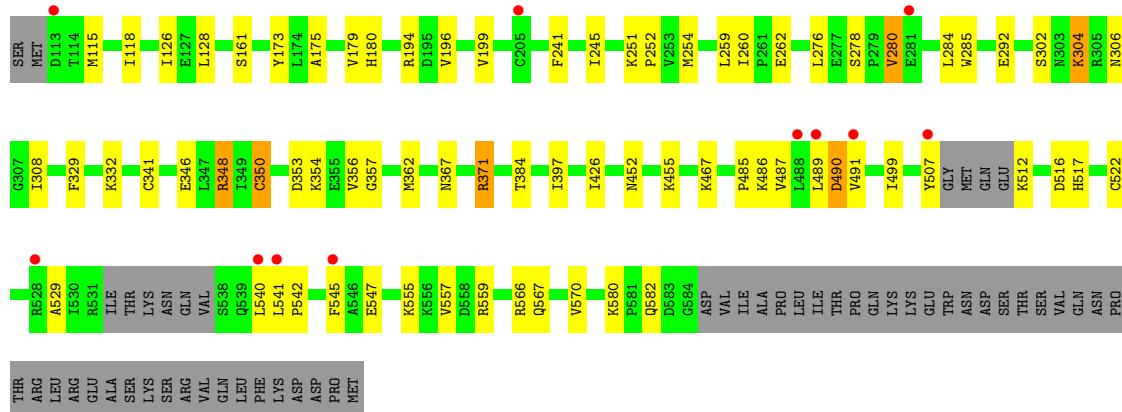
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| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	164	Total 164	O 164	0	0
4	C	124	Total 124	O 124	0	0
4	D	126	Total 126	O 126	0	0
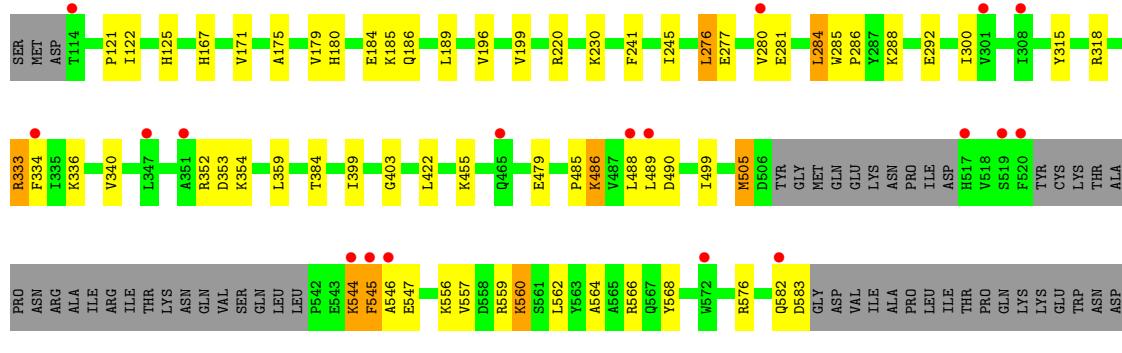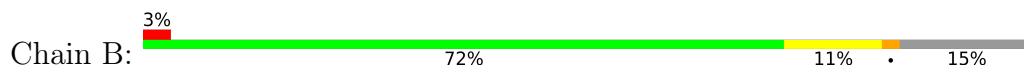
3 Residue-property plots ⓘ

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: Deoxynucleoside triphosphate triphosphohydrolase SAMHD1
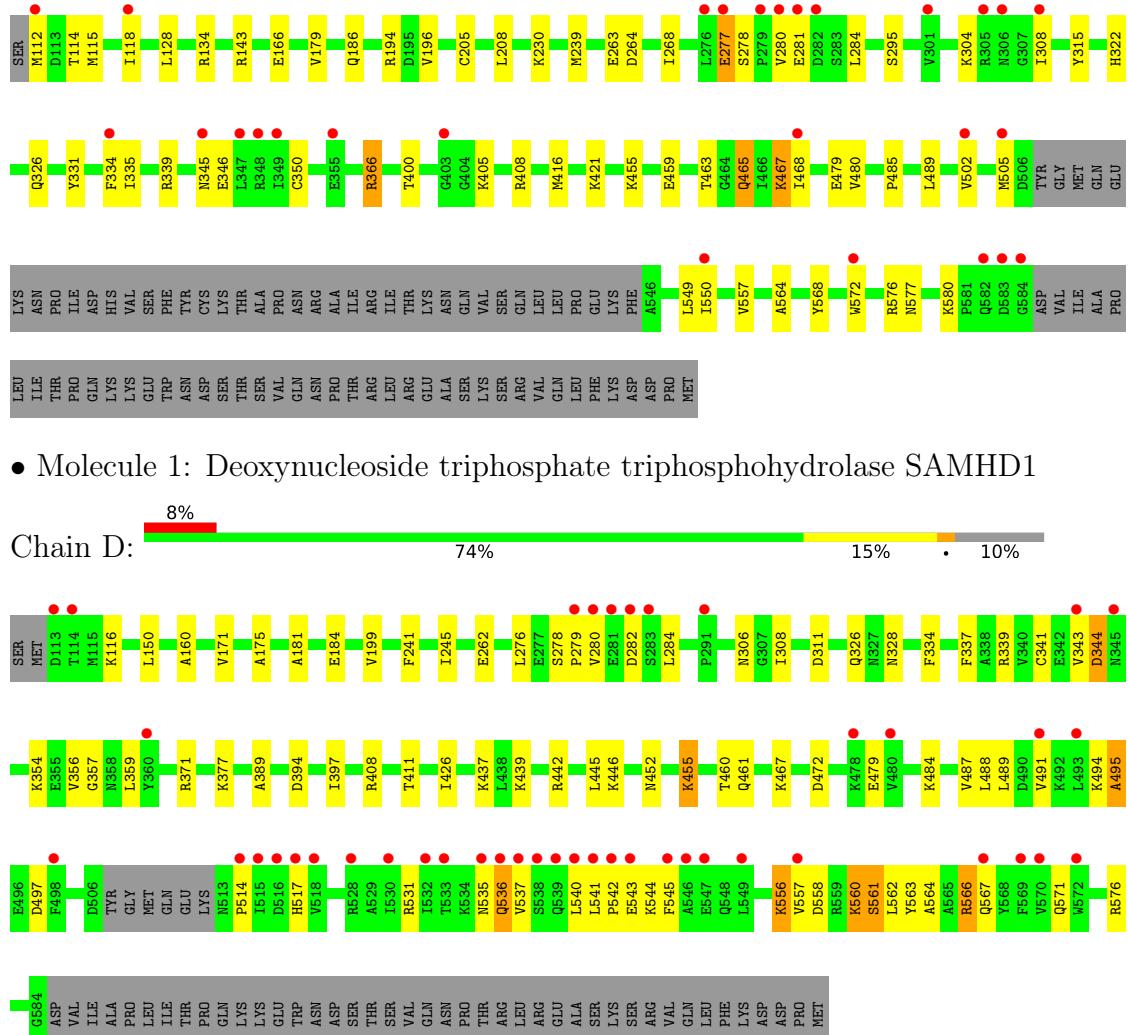
Chain A:

• Molecule 1: Deoxynucleoside triphosphate triphosphohydrolase SAMHD1

Chain B:

• Molecule 1: Deoxynucleoside triphosphate triphosphohydrolase SAMHD1

Chain C:

• Molecule 1: Deoxynucleoside triphosphate triphosphohydrolase SAMHD1

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	81.78Å 144.04Å 200.32Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	27.17 – 2.46 116.95 – 2.46	Depositor EDS
% Data completeness (in resolution range)	96.4 (27.17-2.46) 96.4 (116.95-2.46)	Depositor EDS
R_{merge}	0.19	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.53 (at 2.45Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.192 , 0.236 0.200 , 0.243	Depositor DCC
R_{free} test set	2287 reflections (2.75%)	wwPDB-VP
Wilson B-factor (Å^2)	56.7	Xtriage
Anisotropy	0.189	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 62.7	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	30190	wwPDB-VP
Average B, all atoms (Å^2)	83.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.96% of the height of the origin peak. No significant pseudotranslation is detected.*

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

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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

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	0.27	0/3872	0.52	0/5225
1	B	0.26	0/3675	0.51	0/4957
1	C	0.26	0/3622	0.53	0/4887
1	D	0.26	0/3890	0.52	0/5252
All	All	0.26	0/15059	0.52	0/20321

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	C	0	1
1	D	0	1
All	All	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	366	ARG	Sidechain
1	D	531	ARG	Sidechain

5.2　Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3780	3746	3746	54	0
1	B	3590	3556	3553	56	1
1	C	3540	3505	3504	41	1
1	D	3801	3772	3771	66	0
2	A	42	27	0	2	0
2	B	42	27	0	0	0
2	C	42	27	0	3	0
2	D	42	27	0	2	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
4	A	206	0	0	8	0
4	B	164	0	0	12	0
4	C	124	0	0	5	0
4	D	126	0	0	10	0
All	All	15503	14687	14574	213	1

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 7.

All (213) 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:286:PRO:O	4:B:801:HOH:O	1.90	0.88
1:D:537:VAL:HG21	1:D:541:LEU:HD11	1.58	0.86
1:C:557:VAL:HG11	2:C:701:YWI:BR1	2.31	0.85
1:C:366:ARG:NH1	4:C:801:HOH:O	2.08	0.85
2:C:701:YWI:O1B	1:D:116:LYS:NZ	2.10	0.84
1:A:384:THR:HG21	1:A:499:ILE:HG21	1.58	0.83
1:A:350:CYS:SG	4:A:998:HOH:O	2.36	0.83
1:B:384:THR:HG21	1:B:499:ILE:HG21	1.60	0.83
1:D:557:VAL:HG11	2:D:701:YWI:BR1	2.34	0.82
1:D:479:GLU:OE1	4:D:801:HOH:O	1.97	0.82
1:D:558:ASP:OD1	1:D:561:SER:OG	1.99	0.80

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:230:LYS:NZ	4:B:802:HOH:O	2.14	0.79
1:D:497:ASP:OD2	4:D:802:HOH:O	2.03	0.76
1:B:185:LYS:NZ	4:B:803:HOH:O	2.18	0.76
1:B:353:ASP:OD1	1:B:354:LYS:N	2.19	0.76
1:A:356:VAL:HG11	1:D:540:LEU:HD11	1.67	0.76
1:B:189:LEU:HD21	1:B:340:VAL:HG11	1.68	0.76
1:A:276:LEU:O	1:A:276:LEU:HD13	1.88	0.74
1:C:322:HIS:HE1	4:C:882:HOH:O	1.72	0.73
1:C:485:PRO:HG2	1:C:489:LEU:HD21	1.70	0.73
1:C:278:SER:O	1:C:280:VAL:N	2.22	0.72
1:D:439:LYS:NZ	4:D:805:HOH:O	2.20	0.72
1:B:560:LYS:HD2	1:B:560:LYS:H	1.55	0.71
1:A:161:SER:OG	4:A:801:HOH:O	2.09	0.70
1:A:557:VAL:HG21	2:A:701:YWI:BR1	2.46	0.70
1:C:322:HIS:CE1	4:C:882:HOH:O	2.44	0.69
1:C:166:GLU:OE2	4:C:802:HOH:O	2.09	0.69
1:C:118:ILE:HD11	1:C:128:LEU:HD12	1.77	0.67
1:B:384:THR:CG2	1:B:499:ILE:HG21	2.24	0.67
1:A:384:THR:CG2	1:A:499:ILE:HG21	2.23	0.67
1:A:118:ILE:HD12	1:A:128:LEU:CD1	2.26	0.66
1:B:284:LEU:O	1:B:286:PRO:HD3	1.95	0.66
1:D:567:GLN:N	1:D:567:GLN:OE1	2.30	0.64
1:D:377:LYS:HD2	1:D:377:LYS:H	1.61	0.64
1:D:472:ASP:OD1	4:D:803:HOH:O	2.15	0.62
1:D:280:VAL:HG12	1:D:282:ASP:H	1.64	0.62
1:D:556:LYS:HD3	1:D:561:SER:OG	1.99	0.62
1:D:537:VAL:CG2	1:D:541:LEU:HD11	2.28	0.62
1:A:304:LYS:H	1:A:304:LYS:CD	2.13	0.62
1:A:522:CYS:SG	4:A:1003:HOH:O	2.56	0.61
1:A:489:LEU:O	1:A:490:ASP:OD2	2.19	0.61
1:A:118:ILE:HD12	1:A:128:LEU:HD11	1.83	0.60
1:B:560:LYS:NZ	4:B:807:HOH:O	2.34	0.60
1:B:189:LEU:CD2	1:B:340:VAL:HG11	2.30	0.60
1:D:556:LYS:HD3	1:D:561:SER:CB	2.32	0.59
1:C:463:THR:HG23	1:C:577:ASN:O	2.01	0.59
1:B:559:ARG:NH1	4:B:806:HOH:O	2.32	0.59
1:B:488:LEU:HD12	1:B:489:LEU:N	2.17	0.59
1:A:241:PHE:CE2	1:A:245:ILE:HD11	2.38	0.58
1:A:489:LEU:O	1:A:491:VAL:N	2.36	0.58
4:B:809:HOH:O	1:C:326:GLN:HG2	2.02	0.58
1:D:397:ILE:HG21	1:D:426:ILE:HD11	1.86	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:491:VAL:HG13	1:D:564:ALA:HB2	1.85	0.57
1:B:186:GLN:CD	1:B:340:VAL:HG12	2.24	0.57
1:B:186:GLN:OE1	1:B:340:VAL:HG12	2.04	0.57
1:D:514:PRO:HG3	1:D:541:LEU:HD13	1.87	0.57
1:C:194:ARG:NH2	1:C:263:GLU:OE1	2.38	0.56
1:C:489:LEU:N	1:C:489:LEU:HD22	2.20	0.56
1:D:280:VAL:HG11	1:D:284:LEU:HB3	1.87	0.56
1:C:179:VAL:HG13	1:C:196:VAL:HG22	1.87	0.56
1:D:241:PHE:CZ	1:D:245:ILE:HD11	2.41	0.56
1:C:264:ASP:O	1:C:268:ILE:HD12	2.05	0.55
1:B:286:PRO:HG2	4:B:889:HOH:O	2.05	0.55
1:B:333:ARG:NH2	4:B:808:HOH:O	2.36	0.55
1:A:180:HIS:ND1	4:A:807:HOH:O	2.33	0.55
1:A:555:LYS:NZ	4:A:804:HOH:O	2.39	0.55
1:D:175:ALA:HB1	1:D:199:VAL:HG12	1.87	0.55
1:D:455:LYS:HE2	1:D:557:VAL:HB	1.89	0.55
1:A:356:VAL:CG1	1:D:540:LEU:HD11	2.34	0.55
1:A:467:LYS:HE3	1:A:547:GLU:OE2	2.06	0.54
1:D:494:LYS:O	1:D:495:ALA:HB2	2.06	0.54
1:A:371:ARG:NH1	4:A:810:HOH:O	2.41	0.54
1:A:278:SER:O	1:A:280:VAL:HG23	2.08	0.54
1:D:536:GLN:HG3	1:D:536:GLN:O	2.08	0.54
1:B:352:ARG:HE	1:B:353:ASP:H	1.55	0.54
1:A:126:ILE:HG22	1:A:173:TYR:CD1	2.43	0.54
1:A:179:VAL:HG13	1:A:196:VAL:HG22	1.90	0.54
1:D:562:LEU:HD23	1:D:562:LEU:O	2.08	0.53
1:C:239:MET:HB2	1:C:416:MET:HE3	1.90	0.53
1:D:517:HIS:N	4:D:808:HOH:O	2.41	0.53
1:B:179:VAL:HG12	1:B:196:VAL:HG22	1.90	0.53
1:D:455:LYS:HE2	1:D:557:VAL:CB	2.38	0.53
1:D:487:VAL:HG22	1:D:488:LEU:N	2.24	0.53
1:C:455:LYS:HG2	1:C:557:VAL:HG12	1.91	0.52
1:D:354:LYS:O	4:D:804:HOH:O	2.19	0.52
1:D:566:ARG:NH1	4:D:809:HOH:O	2.43	0.52
1:A:241:PHE:CZ	1:A:245:ILE:HD11	2.44	0.52
1:A:397:ILE:HG21	1:A:426:ILE:HD11	1.92	0.52
1:B:582:GLN:HG3	1:B:583:ASP:N	2.25	0.51
1:D:326:GLN:OE1	1:D:328:ASN:ND2	2.43	0.51
1:D:563:TYR:O	1:D:567:GLN:OE1	2.28	0.51
1:B:505:MET:SD	1:B:546:ALA:O	2.68	0.51
1:A:455:LYS:HG2	1:A:557:VAL:HG22	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:353:ASP:OD1	1:A:354:LYS:N	2.44	0.51
1:A:304:LYS:H	1:A:304:LYS:HD3	1.76	0.51
1:C:280:VAL:HG12	1:C:281:GLU:N	2.27	0.50
1:D:276:LEU:O	1:D:279:PRO:HG2	2.11	0.50
1:D:489:LEU:HD12	4:D:854:HOH:O	2.11	0.50
1:B:241:PHE:O	1:B:245:ILE:HG12	2.12	0.50
1:A:371:ARG:NH2	4:A:809:HOH:O	2.37	0.50
1:B:490:ASP:OD1	1:B:490:ASP:N	2.44	0.50
1:B:175:ALA:HB1	1:B:199:VAL:HG12	1.92	0.49
1:A:566:ARG:O	1:A:570:VAL:HG23	2.13	0.49
1:B:121:PRO:O	4:B:804:HOH:O	2.19	0.49
1:A:452:ASN:HA	2:A:701:YWI:C24	2.43	0.49
1:C:459:GLU:CD	1:C:549:LEU:HD22	2.33	0.49
1:C:463:THR:CG2	1:C:577:ASN:O	2.60	0.49
1:C:465:GLN:N	1:C:465:GLN:OE1	2.46	0.49
1:D:408:ARG:H	1:D:411:THR:HG1	1.60	0.49
1:A:455:LYS:CG	1:A:557:VAL:HG22	2.43	0.49
1:A:180:HIS:CD2	1:A:196:VAL:HG11	2.48	0.48
1:B:276:LEU:H	1:B:276:LEU:HD23	1.78	0.48
1:C:467:LYS:H	1:C:467:LYS:HD2	1.79	0.48
1:B:189:LEU:HD21	1:B:340:VAL:CG1	2.41	0.48
1:A:308:ILE:HD12	1:A:308:ILE:N	2.29	0.47
1:B:285:TRP:CE3	1:B:292:GLU:HG3	2.49	0.47
1:A:540:LEU:HD13	1:D:356:VAL:CG2	2.43	0.47
1:B:582:GLN:HG3	1:B:583:ASP:H	1.78	0.47
1:C:479:GLU:OE1	1:C:576:ARG:NH1	2.48	0.47
1:B:280:VAL:HG22	1:B:281:GLU:H	1.79	0.47
1:C:400:THR:O	1:C:421:LYS:NZ	2.40	0.47
1:A:194:ARG:NH1	1:A:260:ILE:HD12	2.30	0.47
1:B:564:ALA:O	1:B:568:TYR:HD1	1.98	0.47
1:A:175:ALA:HB1	1:A:199:VAL:HG12	1.97	0.47
1:A:329:PHE:CG	1:A:362:MET:HG3	2.50	0.47
1:D:455:LYS:HE2	1:D:557:VAL:HG12	1.96	0.47
1:C:304:LYS:O	1:C:304:LYS:CG	2.63	0.47
1:D:460:THR:HG22	1:D:461:GLN:H	1.80	0.46
1:B:505:MET:SD	1:B:505:MET:N	2.88	0.46
1:D:394:ASP:O	1:D:408:ARG:HD2	2.14	0.46
1:D:491:VAL:HG13	1:D:491:VAL:O	2.15	0.46
1:B:220:ARG:NH2	1:B:499:ILE:HG23	2.30	0.46
1:B:179:VAL:HG22	1:B:300:ILE:HD12	1.96	0.46
1:D:576:ARG:NE	4:D:801:HOH:O	2.45	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:118:ILE:HD12	1:A:128:LEU:HD12	1.98	0.46
1:A:541:LEU:HD12	1:A:542:PRO:O	2.17	0.46
1:D:460:THR:HG22	1:D:461:GLN:N	2.31	0.46
1:B:479:GLU:OE1	1:B:576:ARG:NH1	2.49	0.45
1:C:114:THR:O	1:C:115:MET:C	2.55	0.45
1:D:334:PHE:CE1	1:D:359:LEU:HD21	2.51	0.45
1:A:356:VAL:HG13	1:A:357:GLY:N	2.32	0.45
1:A:254:MET:HG2	1:A:259:LEU:HD22	1.97	0.45
1:B:122:ILE:CD1	1:B:318:ARG:HA	2.47	0.45
1:A:529:ALA:HB2	4:A:998:HOH:O	2.17	0.45
1:C:468:ILE:HD13	1:C:468:ILE:N	2.32	0.45
1:A:306:ASN:CG	1:A:308:ILE:HD13	2.38	0.44
1:A:346:GLU:OE1	1:A:348:ARG:NH2	2.49	0.44
1:D:181:ALA:O	1:D:184:GLU:HG2	2.17	0.44
1:D:437:LYS:HD3	1:D:437:LYS:HA	1.84	0.44
1:D:487:VAL:HG22	1:D:488:LEU:H	1.82	0.44
1:D:150:LEU:HD12	1:D:160:ALA:HB1	1.99	0.44
1:D:343:VAL:HG12	1:D:344:ASP:OD2	2.18	0.44
1:B:485:PRO:O	1:B:486:LYS:CB	2.65	0.44
1:D:171:VAL:HG22	1:D:311:ASP:HA	2.00	0.44
1:D:484:LYS:HE2	1:D:489:LEU:HG	1.99	0.44
1:B:485:PRO:O	1:B:486:LYS:HB2	2.18	0.44
1:C:230:LYS:NZ	4:C:813:HOH:O	2.50	0.44
1:C:304:LYS:O	1:C:304:LYS:HG3	2.18	0.44
1:C:480:VAL:HG22	1:C:572:TRP:CD2	2.53	0.44
1:B:566:ARG:NH2	1:B:582:GLN:O	2.51	0.43
1:C:186:GLN:OE1	1:C:339:ARG:HG2	2.18	0.43
1:C:239:MET:CB	1:C:416:MET:HE3	2.48	0.43
1:B:556:LYS:O	1:B:562:LEU:CD1	2.66	0.43
1:D:560:LYS:O	1:D:563:TYR:HB3	2.18	0.43
1:D:542:PRO:O	1:D:544:LYS:HG3	2.18	0.43
1:C:455:LYS:CG	1:C:557:VAL:HG12	2.48	0.43
1:D:455:LYS:HE2	1:D:557:VAL:CG1	2.49	0.43
1:B:544:LYS:O	1:B:545:PHE:O	2.36	0.43
1:A:284:LEU:HD23	1:A:284:LEU:N	2.33	0.43
1:D:389:ALA:CB	1:D:445:LEU:HD21	2.49	0.43
1:D:484:LYS:N	1:D:571:GLN:OE1	2.51	0.43
1:B:167:HIS:O	1:B:171:VAL:HG23	2.19	0.42
1:C:331:TYR:O	1:C:335:ILE:HG13	2.19	0.42
1:B:277:GLU:HG2	4:B:801:HOH:O	2.19	0.42
1:C:502:VAL:HG22	1:C:550:ILE:HD13	2.00	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:486:LYS:O	1:A:487:VAL:HG13	2.20	0.42
1:C:277:GLU:HG3	1:C:278:SER:N	2.34	0.42
1:D:334:PHE:HE1	1:D:359:LEU:HD21	1.84	0.42
1:D:446:LYS:NZ	4:D:818:HOH:O	2.53	0.42
1:A:241:PHE:O	1:A:245:ILE:HD12	2.19	0.42
1:D:452:ASN:HB3	2:D:701:YWI:BR1	2.74	0.42
1:B:288:LYS:HG2	4:B:801:HOH:O	2.19	0.42
1:B:559:ARG:NH2	4:B:807:HOH:O	2.51	0.42
1:C:205:CYS:HB3	1:C:208:LEU:HD12	2.02	0.42
1:B:455:LYS:HD3	1:B:557:VAL:HG23	2.02	0.42
1:D:540:LEU:C	1:D:540:LEU:HD12	2.40	0.42
1:B:485:PRO:HG3	1:B:489:LEU:HD12	2.01	0.41
1:B:122:ILE:HD13	1:B:318:ARG:HA	2.02	0.41
1:A:485:PRO:HG2	1:A:489:LEU:HD12	2.01	0.41
1:B:556:LYS:O	1:B:562:LEU:HD11	2.20	0.41
1:D:337:PHE:CE1	1:D:354:LYS:NZ	2.89	0.41
1:D:280:VAL:HG11	1:D:284:LEU:CB	2.50	0.41
1:A:540:LEU:HD13	1:D:356:VAL:HG21	2.01	0.41
1:B:185:LYS:NZ	1:B:336:LYS:O	2.54	0.41
1:A:485:PRO:CG	1:A:489:LEU:HD12	2.51	0.41
1:C:557:VAL:HG21	2:C:701:YWI:BR1	2.76	0.41
1:B:180:HIS:O	1:B:184:GLU:HG2	2.21	0.41
1:B:399:ILE:HD13	1:B:422:LEU:HD13	2.03	0.41
1:C:308:ILE:H	1:C:308:ILE:HD12	1.85	0.41
1:D:306:ASN:O	1:D:308:ILE:HD13	2.21	0.41
1:D:494:LYS:O	1:D:495:ALA:CB	2.69	0.41
1:B:185:LYS:O	1:B:186:GLN:C	2.59	0.41
1:B:186:GLN:NE2	1:B:340:VAL:HG12	2.35	0.41
1:C:277:GLU:HG3	1:C:278:SER:H	1.86	0.41
1:A:455:LYS:HE2	1:A:557:VAL:HG22	2.03	0.40
1:A:251:LYS:HB2	1:A:252:PRO:HD3	2.02	0.40
1:A:285:TRP:CE3	1:A:292:GLU:HG2	2.57	0.40
1:A:194:ARG:CZ	1:A:260:ILE:HD12	2.51	0.40
1:B:179:VAL:HG21	1:B:199:VAL:HG11	2.04	0.40
1:D:356:VAL:CG1	1:D:357:GLY:N	2.85	0.40
1:B:334:PHE:CE1	1:B:359:LEU:HD23	2.57	0.40
1:C:112:MET:O	1:C:114:THR:HG23	2.21	0.40
1:C:564:ALA:O	1:C:568:TYR:HD2	2.05	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:403:GLY:O	1:C:408:ARG:NH1[2_554]	2.02	0.18

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	457/516 (89%)	436 (95%)	19 (4%)	2 (0%)	34	41
1	B	433/516 (84%)	406 (94%)	25 (6%)	2 (0%)	29	34
1	C	430/516 (83%)	411 (96%)	19 (4%)	0	100	100
1	D	462/516 (90%)	437 (95%)	21 (4%)	4 (1%)	17	19
All	All	1782/2064 (86%)	1690 (95%)	84 (5%)	8 (0%)	34	41

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	486	LYS
1	B	545	PHE
1	A	490	ASP
1	D	495	ALA
1	D	543	GLU
1	A	280	VAL
1	D	344	ASP
1	D	545	PHE

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	411/461 (89%)	392 (95%)	19 (5%)	27	35
1	B	390/461 (85%)	381 (98%)	9 (2%)	50	63
1	C	384/461 (83%)	369 (96%)	15 (4%)	32	42
1	D	414/461 (90%)	400 (97%)	14 (3%)	37	48
All	All	1599/1844 (87%)	1542 (96%)	57 (4%)	35	46

All (57) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	115	MET
1	A	262	GLU
1	A	302	SER
1	A	304	LYS
1	A	332	LYS
1	A	341	CYS
1	A	348	ARG
1	A	350	CYS
1	A	367	ASN
1	A	371	ARG
1	A	507	TYR
1	A	512	LYS
1	A	516	ASP
1	A	517	HIS
1	A	545	PHE
1	A	559	ARG
1	A	567	GLN
1	A	580	LYS
1	A	582	GLN
1	B	125	HIS
1	B	276	LEU
1	B	284	LEU
1	B	315	TYR
1	B	333	ARG
1	B	505	MET
1	B	544	LYS
1	B	547	GLU
1	B	560	LYS
1	C	134	ARG
1	C	143	ARG
1	C	277	GLU
1	C	284	LEU
1	C	295	SER

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Mol	Chain	Res	Type
1	C	315	TYR
1	C	334	PHE
1	C	345	ASN
1	C	346	GLU
1	C	350	CYS
1	C	405	LYS
1	C	465	GLN
1	C	467	LYS
1	C	505	MET
1	C	580	LYS
1	D	262	GLU
1	D	278	SER
1	D	339	ARG
1	D	341	CYS
1	D	371	ARG
1	D	442	ARG
1	D	455	LYS
1	D	467	LYS
1	D	535	ASN
1	D	536	GLN
1	D	556	LYS
1	D	560	LYS
1	D	561	SER
1	D	566	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	567	GLN
1	D	504	ASN

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 (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
2	YWI	B	701	-	43,46,46	0.72	1 (2%)	53,66,66	0.97	4 (7%)
2	YWI	A	701	-	43,46,46	0.71	1 (2%)	53,66,66	0.75	1 (1%)
2	YWI	D	701	-	43,46,46	0.74	1 (2%)	53,66,66	0.94	4 (7%)
2	YWI	C	701	-	43,46,46	0.72	1 (2%)	53,66,66	0.98	5 (9%)

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	YWI	B	701	-	-	4/23/39/39	0/5/5/5
2	YWI	A	701	-	-	3/23/39/39	0/5/5/5
2	YWI	D	701	-	-	6/23/39/39	0/5/5/5
2	YWI	C	701	-	-	6/23/39/39	0/5/5/5

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	701	YWI	C5-C6	-2.64	1.42	1.47
2	D	701	YWI	C5-C6	-2.63	1.42	1.47
2	A	701	YWI	C5-C6	-2.56	1.42	1.47
2	C	701	YWI	C5-C6	-2.55	1.42	1.47

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	701	YWI	C15-C14-C13	2.75	129.53	120.62
2	C	701	YWI	C15-C14-C13	2.73	129.46	120.62
2	D	701	YWI	C2'-C1'-N9	2.69	120.48	114.27
2	C	701	YWI	C12-N5-C13	2.62	128.04	122.08
2	B	701	YWI	C25-C14-C13	-2.42	112.42	120.44
2	C	701	YWI	C25-C14-C13	-2.34	112.68	120.44
2	C	701	YWI	C14-C13-N5	2.29	122.00	117.09
2	D	701	YWI	C15-C14-C13	2.26	127.93	120.62
2	B	701	YWI	C12-N5-C13	2.13	126.94	122.08
2	A	701	YWI	O6-C6-C5	2.12	128.52	124.37
2	D	701	YWI	O6-C6-C5	2.11	128.49	124.37
2	C	701	YWI	O6-C6-C5	2.10	128.47	124.37
2	B	701	YWI	O6-C6-C5	2.09	128.45	124.37
2	D	701	YWI	C12-N5-C13	2.04	126.74	122.08

There are no chirality outliers.

All (19) torsion outliers are listed below:
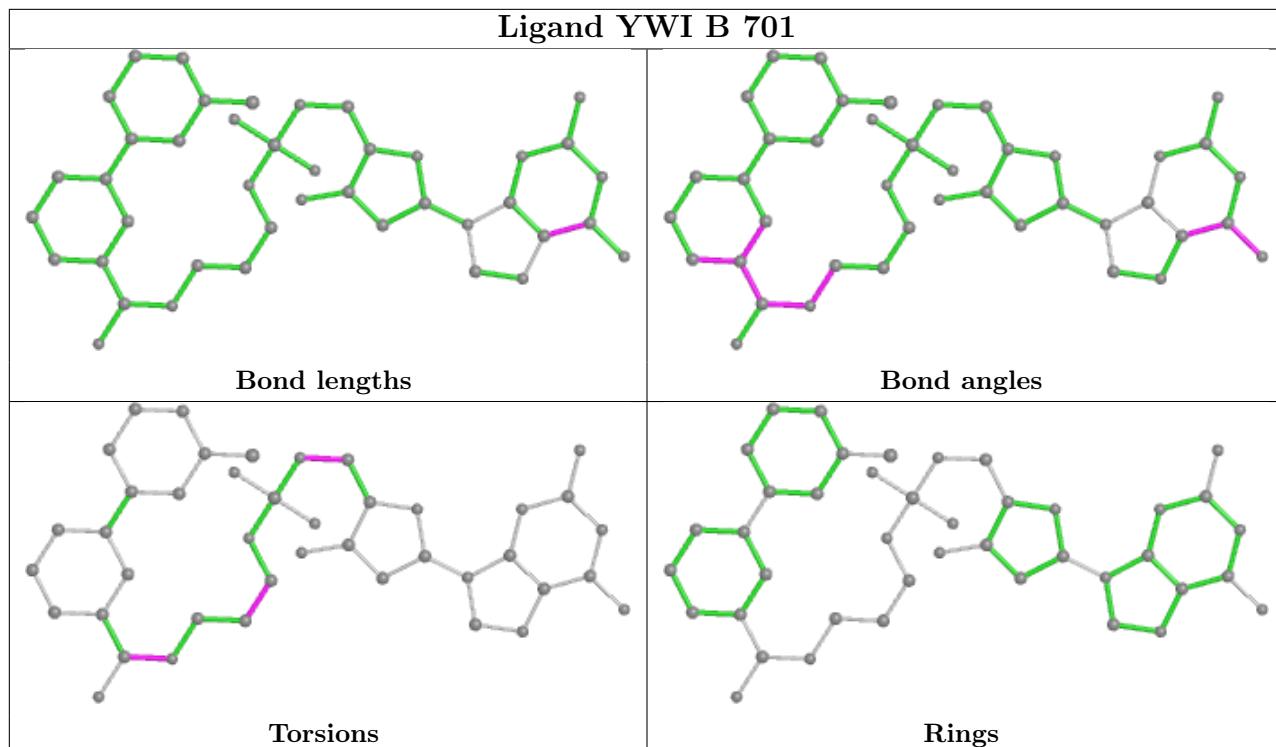
Mol	Chain	Res	Type	Atoms
2	A	701	YWI	C14-C13-N5-C12
2	D	701	YWI	C10-O3A-PB-O2
2	D	701	YWI	C10-O3A-PB-O3B
2	B	701	YWI	C14-C13-N5-C12
2	D	701	YWI	C14-C13-N5-C12
2	B	701	YWI	O1G-C13-N5-C12
2	D	701	YWI	O1G-C13-N5-C12
2	C	701	YWI	C14-C13-N5-C12
2	C	701	YWI	O1G-C13-N5-C12
2	C	701	YWI	O4'-C4'-C5'-O2
2	C	701	YWI	C3'-C4'-C5'-O2
2	C	701	YWI	O3A-C10-C11-C12
2	A	701	YWI	O1G-C13-N5-C12
2	A	701	YWI	C4'-C5'-O2-PB
2	B	701	YWI	C4'-C5'-O2-PB
2	D	701	YWI	C4'-C5'-O2-PB
2	D	701	YWI	C10-C11-C12-N5
2	C	701	YWI	C10-C11-C12-N5
2	B	701	YWI	O3A-C10-C11-C12
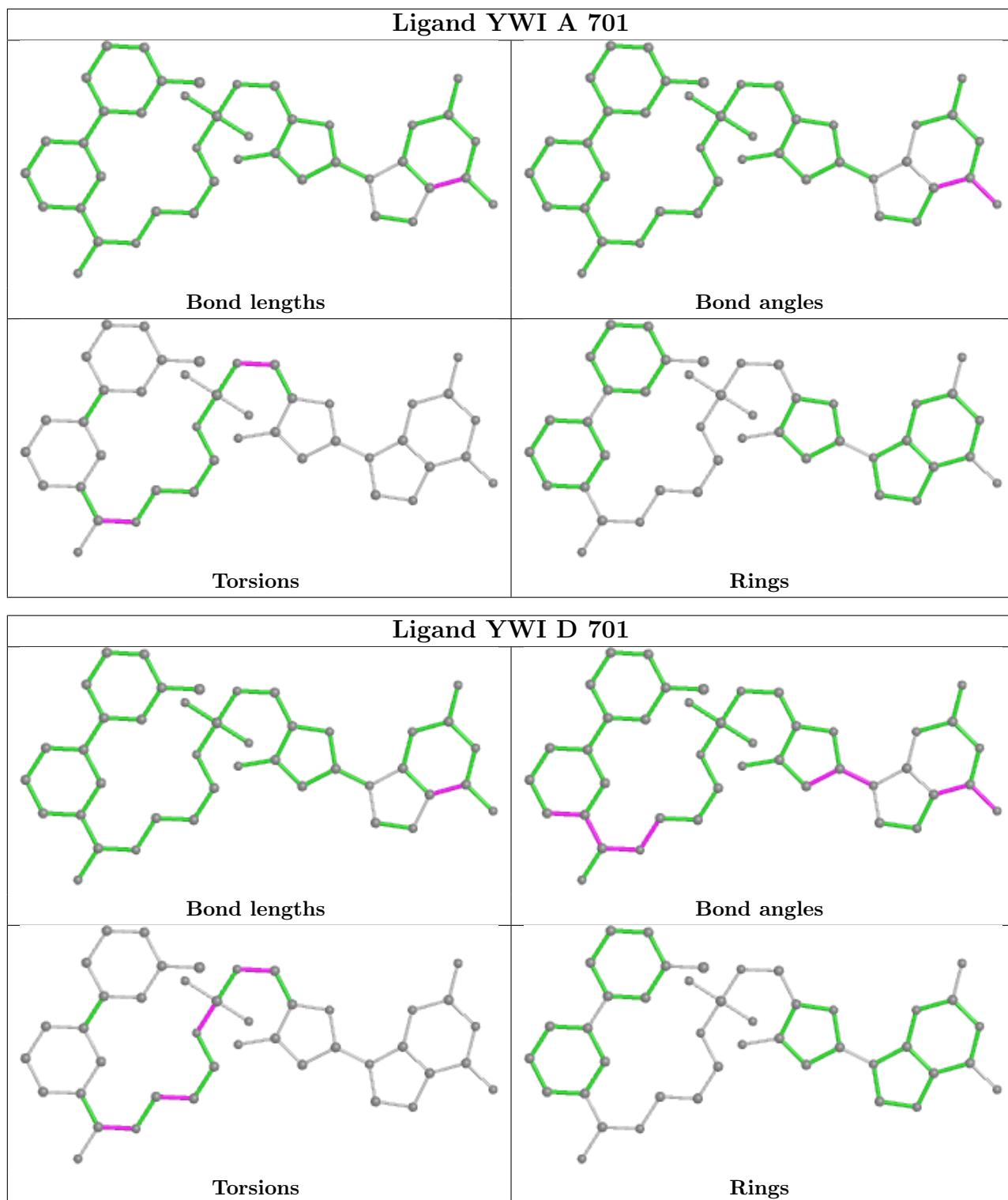
There are no ring outliers.
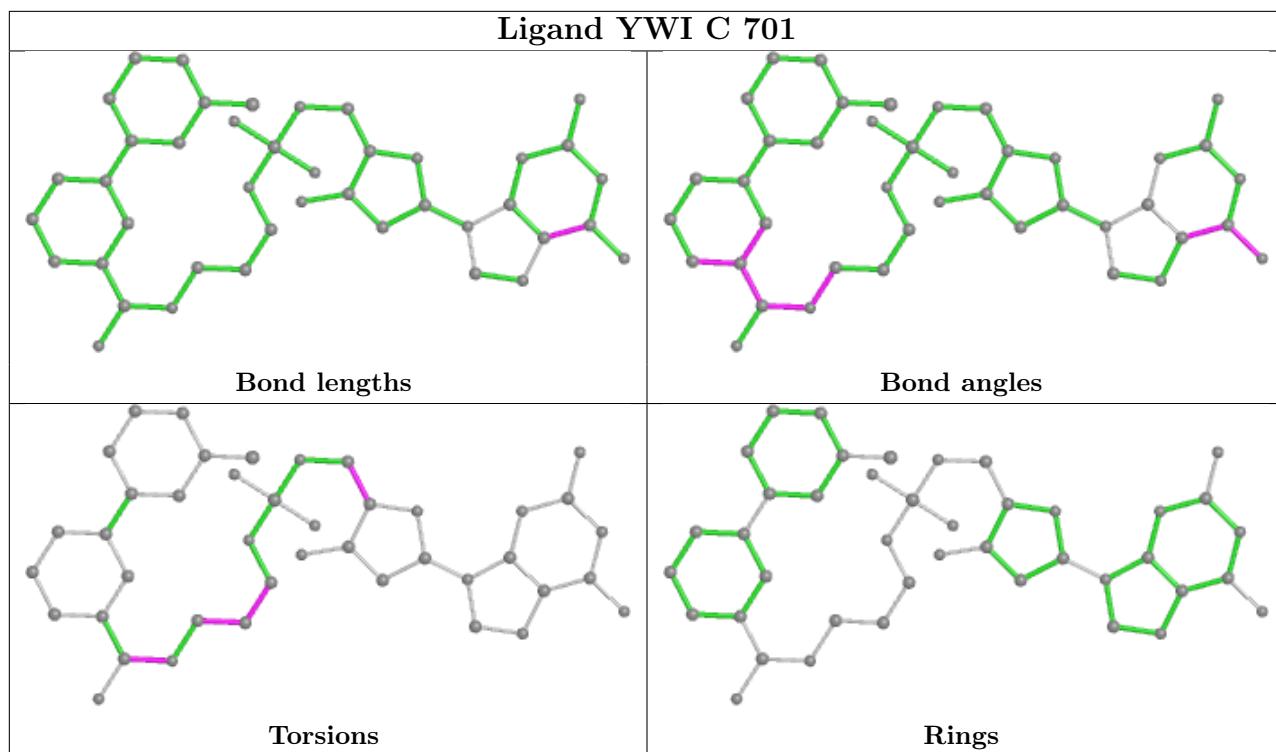
3 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	701	YWI	2	0
2	D	701	YWI	2	0
2	C	701	YWI	3	0

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

Ligand YWI B 701

Ligand YWI A 701

Bond lengths

Bond angles

Torsions

Rings

Ligand YWI D 701

Bond lengths

Bond angles

Torsions

Rings

Ligand YWI C 701

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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(Å²)	Q<0.9
1	A	462/516 (89%)	0.37	11 (2%)	59	54	38, 59, 129, 174	0
1	B	439/516 (85%)	0.38	18 (4%)	37	34	39, 61, 122, 207	0
1	C	434/516 (84%)	0.48	27 (6%)	20	17	45, 69, 132, 277	0
1	D	466/516 (90%)	0.74	43 (9%)	9	6	42, 74, 156, 234	0
All	All	1801/2064 (87%)	0.49	99 (5%)	25	22	38, 66, 137, 277	0

All (99) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	542	PRO	11.7
1	D	537	VAL	9.0
1	D	536	GLN	8.9
1	C	280	VAL	8.6
1	D	532	ILE	8.5
1	A	507	TYR	8.2
1	D	540	LEU	7.8
1	D	535	ASN	7.2
1	D	541	LEU	7.0
1	D	282	ASP	6.3
1	D	515	ILE	6.2
1	A	540	LEU	5.9
1	D	539	GLN	5.7
1	D	546	ALA	5.5
1	D	516	ASP	5.3
1	B	489	LEU	5.3
1	D	538	SER	5.2
1	C	112	MET	5.2
1	D	279	PRO	4.9
1	D	280	VAL	4.9
1	D	543	GLU	4.7

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Mol	Chain	Res	Type	RSRZ
1	D	343	VAL	4.6
1	A	489	LEU	4.6
1	C	347	LEU	4.6
1	B	517	HIS	4.5
1	D	498	PHE	4.4
1	D	491	VAL	4.3
1	A	541	LEU	4.2
1	D	533	THR	4.2
1	C	306	ASN	4.1
1	C	334	PHE	4.0
1	C	308	ILE	3.9
1	C	583	ASP	3.9
1	D	345	ASN	3.9
1	A	545	PHE	3.8
1	D	283	SER	3.8
1	D	478	LYS	3.7
1	D	530	ILE	3.7
1	C	276	LEU	3.7
1	C	277	GLU	3.6
1	D	545	PHE	3.4
1	C	305	ARG	3.4
1	D	360	TYR	3.4
1	C	348	ARG	3.3
1	A	488	LEU	3.3
1	D	557	VAL	3.2
1	D	281	GLU	3.2
1	D	480	VAL	3.2
1	D	570	VAL	3.1
1	B	520	PHE	3.1
1	B	465	GLN	3.0
1	A	491	VAL	3.0
1	C	279	PRO	3.0
1	B	114	THR	2.9
1	D	549	LEU	2.9
1	C	584	GLY	2.8
1	C	282	ASP	2.8
1	C	550	ILE	2.8
1	B	334	PHE	2.7
1	C	281	GLU	2.7
1	D	113	ASP	2.7
1	D	547	GLU	2.7
1	B	280	VAL	2.7

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Mol	Chain	Res	Type	RSRZ
1	D	514	PRO	2.7
1	A	205	CYS	2.6
1	D	572	TRP	2.6
1	A	528	ARG	2.6
1	B	488	LEU	2.5
1	D	114	THR	2.5
1	B	546	ALA	2.5
1	C	301	VAL	2.5
1	C	468	ILE	2.5
1	D	291	PRO	2.5
1	D	569	PHE	2.4
1	C	403	GLY	2.4
1	B	308	ILE	2.4
1	D	517	HIS	2.3
1	C	118	ILE	2.3
1	C	349	ILE	2.3
1	B	545	PHE	2.3
1	D	518	VAL	2.3
1	A	281	GLU	2.3
1	D	528	ARG	2.3
1	D	493	LEU	2.3
1	B	582	GLN	2.3
1	C	582	GLN	2.2
1	B	351	ALA	2.2
1	B	572	TRP	2.2
1	B	544	LYS	2.2
1	A	113	ASP	2.2
1	B	347	LEU	2.2
1	C	502	VAL	2.1
1	C	505	MET	2.1
1	B	301	VAL	2.1
1	C	355	GLU	2.1
1	C	572	TRP	2.0
1	D	567	GLN	2.0
1	B	519	SER	2.0
1	C	345	ASN	2.0

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

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

6.3 Carbohydrates ⓘ
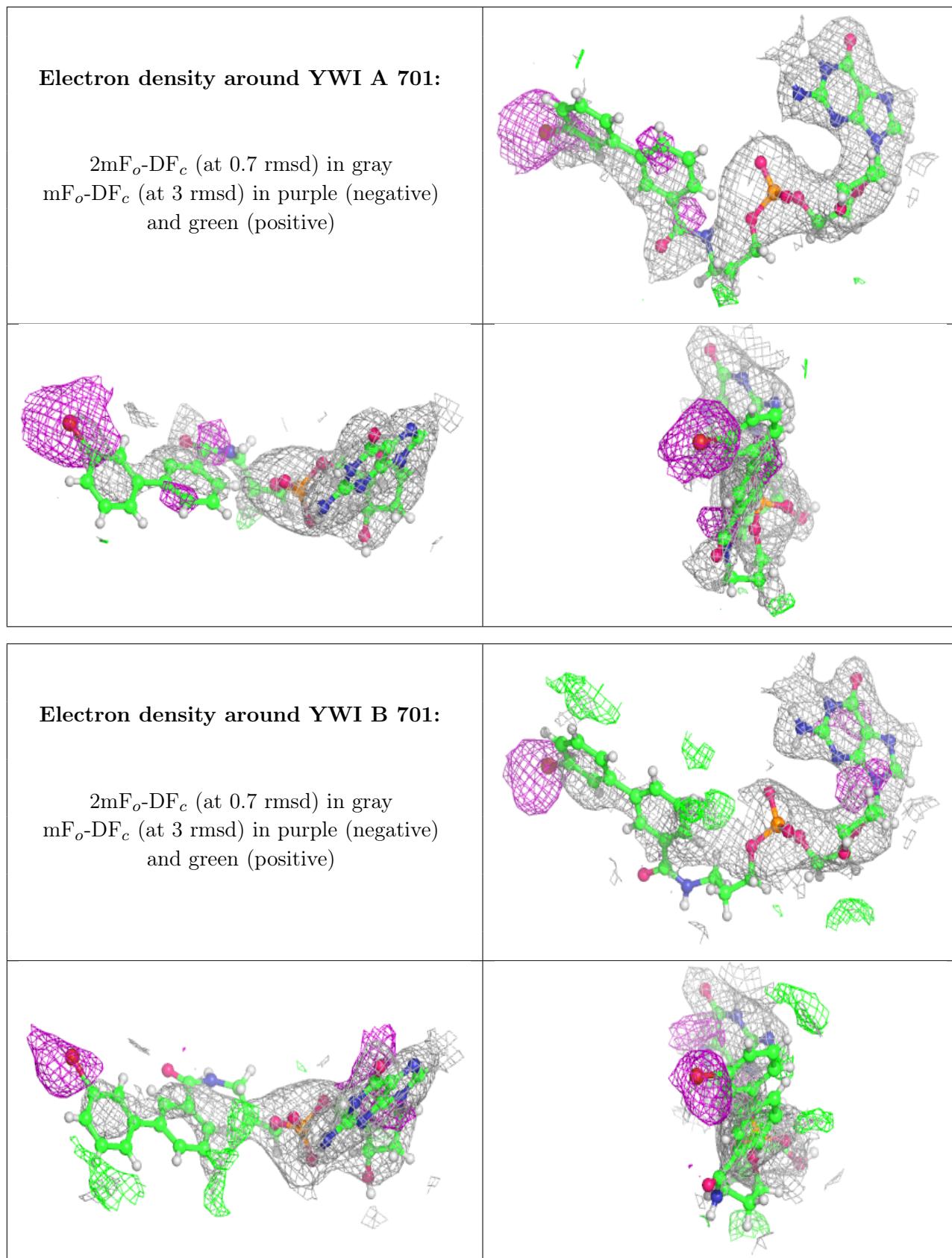
There are no monosaccharides in this entry.
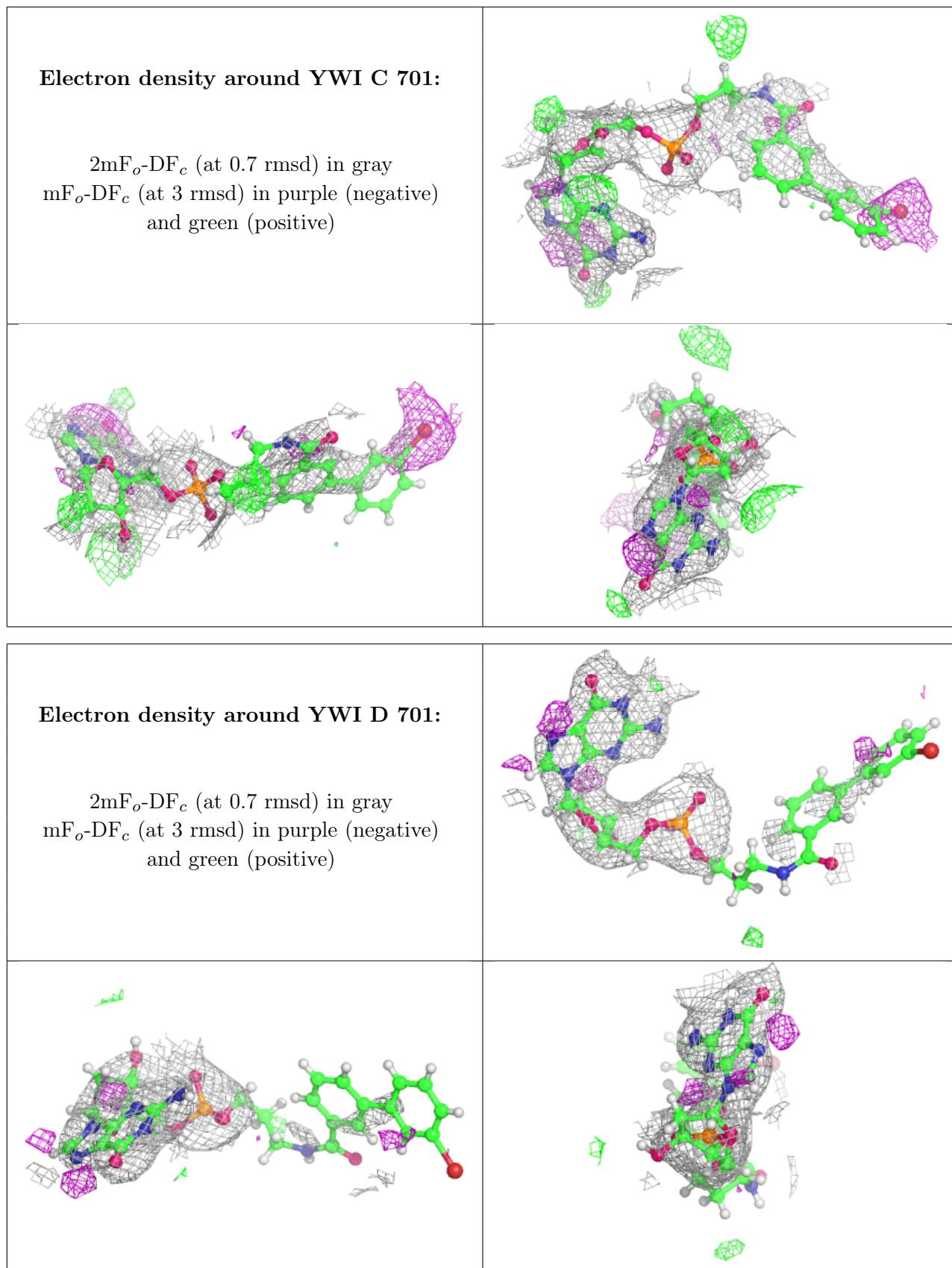
6.4 Ligands ⓘ

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
2	YWI	A	701	42/42	0.86	0.27	52,93,137,158	0
2	YWI	B	701	42/42	0.86	0.33	50,118,161,190	0
2	YWI	C	701	42/42	0.86	0.32	58,102,153,184	0
3	FE	A	702	1/1	0.90	0.33	86,86,86,86	0
2	YWI	D	701	42/42	0.91	0.33	58,114,197,370	0
3	FE	D	702	1/1	0.97	0.22	60,60,60,60	0
3	FE	C	702	1/1	0.99	0.19	64,64,64,64	0
3	FE	B	702	1/1	0.99	0.20	58,58,58,58	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 YWI A 701:

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

Electron density around YWI B 701:

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

Electron density around YWI C 701:

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

Electron density around YWI D 701:

$2mF_o$-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 ⓘ

There are no such residues in this entry.