



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 4, 2023 – 04:04 AM EDT

PDB ID : 6O8B  
Title : Crystal structure of STING CTD in complex with TBK1  
Authors : Li, P.; Zhao, B.; Du, F.  
Deposited on : 2019-03-09  
Resolution : 3.40 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](mailto: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>.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.35.1  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.35.1

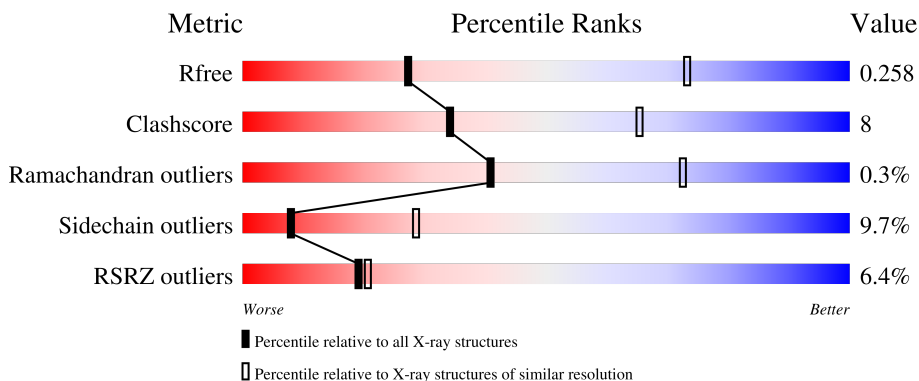
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

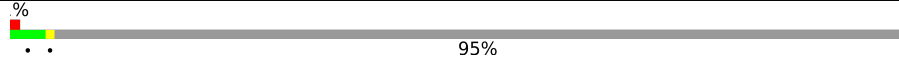
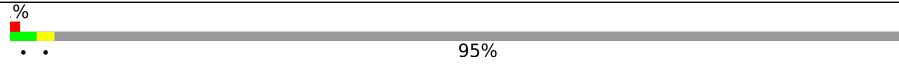
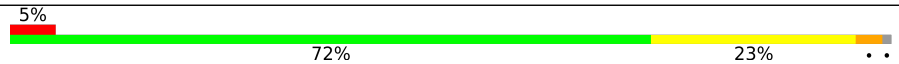

The reported resolution of this entry is 3.40 Å.

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	1026 (3.48-3.32)
Clashscore	141614	1055 (3.48-3.32)
Ramachandran outliers	138981	1038 (3.48-3.32)
Sidechain outliers	138945	1038 (3.48-3.32)
RSRZ outliers	127900	2173 (3.50-3.30)

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  $\geq 3$ , 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	D	226	 95%
1	E	226	 95%
2	A	665	 72% 23%
2	B	665	 74% 22%

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 10897 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 Stimulator of interferon genes protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	D	11	98	64	16	17	1	0	0	0
1	E	12	106	69	17	18	2	0	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	154	SER	-	expression tag	UNP Q86WV6
D	232	ARG	HIS	variant	UNP Q86WV6
D	376	GLU	THR	engineered mutation	UNP Q86WV6
D	378	MET	PHE	engineered mutation	UNP Q86WV6
D	379	TRP	SER	engineered mutation	UNP Q86WV6
E	154	SER	-	expression tag	UNP Q86WV6
E	232	ARG	HIS	variant	UNP Q86WV6
E	376	GLU	THR	engineered mutation	UNP Q86WV6
E	378	MET	PHE	engineered mutation	UNP Q86WV6
E	379	TRP	SER	engineered mutation	UNP Q86WV6

- Molecule 2 is a protein called Serine/threonine-protein kinase TBK1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	A	656	5305	3379	910	991	25	0	0	0
2	B	657	5320	3389	912	993	26	0	0	0

There are 26 discrepancies between the modelled and reference sequences:

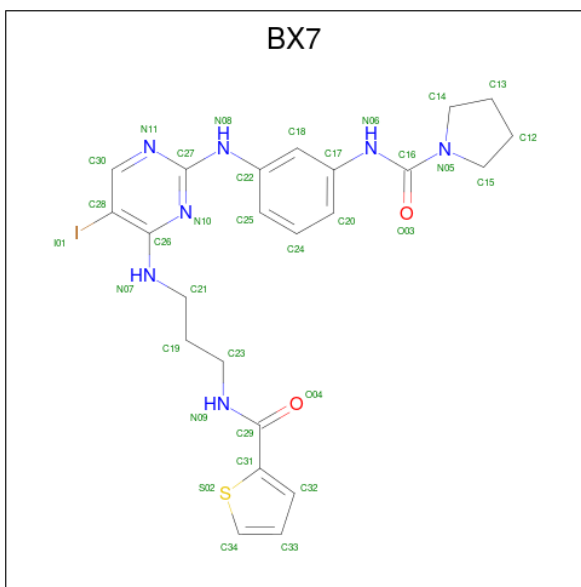
Chain	Residue	Modelled	Actual	Comment	Reference
A	-7	GLY	-	expression tag	UNP Q9UHD2
A	-6	SER	-	expression tag	UNP Q9UHD2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-5	PRO	-	expression tag	UNP Q9UHD2
A	-4	GLY	-	expression tag	UNP Q9UHD2
A	-3	LEU	-	expression tag	UNP Q9UHD2
A	-2	ASP	-	expression tag	UNP Q9UHD2
A	-1	GLY	-	expression tag	UNP Q9UHD2
A	0	ILE	-	expression tag	UNP Q9UHD2
A	1	CYS	-	expression tag	UNP Q9UHD2
A	135	ASN	ASP	engineered mutation	UNP Q9UHD2
A	172	GLU	SER	engineered mutation	UNP Q9UHD2
A	388	ASP	ASN	variant	UNP Q9UHD2
A	570	GLN	LYS	variant	UNP Q9UHD2
B	-7	GLY	-	expression tag	UNP Q9UHD2
B	-6	SER	-	expression tag	UNP Q9UHD2
B	-5	PRO	-	expression tag	UNP Q9UHD2
B	-4	GLY	-	expression tag	UNP Q9UHD2
B	-3	LEU	-	expression tag	UNP Q9UHD2
B	-2	ASP	-	expression tag	UNP Q9UHD2
B	-1	GLY	-	expression tag	UNP Q9UHD2
B	0	ILE	-	expression tag	UNP Q9UHD2
B	1	CYS	-	expression tag	UNP Q9UHD2
B	135	ASN	ASP	engineered mutation	UNP Q9UHD2
B	172	GLU	SER	engineered mutation	UNP Q9UHD2
B	388	ASP	ASN	variant	UNP Q9UHD2
B	570	GLN	LYS	variant	UNP Q9UHD2

- Molecule 3 is N-(3-{[5-iodo-4-({3-[(thiophen-2-ylcarbonyl)amino]propyl}amino)pyrimidin-2-yl]amino}phenyl)pyrrolidine-1-carboxamide (three-letter code: BX7) (formula: C<sub>23</sub>H<sub>26</sub>IN<sub>7</sub>O<sub>2</sub>S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	I	N	O			S
3	A	1	Total	C	I	N	O	S	0	0
			34	23	1	7	2	1		
3	B	1	Total	C	I	N	O	S	0	0
			34	23	1	7	2	1		





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 65 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	250.69Å 250.69Å 239.24Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	82.06 – 3.40 82.06 – 3.40	Depositor EDS
% Data completeness (in resolution range)	98.3 (82.06-3.40) 98.4 (82.06-3.40)	Depositor EDS
$R_{merge}$	0.15	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.34 (at 3.41Å)	Xtrriage
Refinement program	PHENIX (1.13_2998: ???)	Depositor
R, $R_{free}$	0.243 , 0.258 0.243 , 0.258	Depositor DCC
$R_{free}$ test set	3022 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	117.1	Xtrriage
Anisotropy	0.027	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 84.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	10897	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	137.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.54% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: BX7

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	D	0.24	0/101	0.55	0/136
1	E	0.23	0/109	0.43	0/146
2	A	0.25	0/5416	0.43	2/7314 (0.0%)
2	B	0.25	0/5431	0.43	0/7335
All	All	0.25	0/11057	0.43	2/14931 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	361	LEU	CA-CB-CG	5.83	128.71	115.30
2	A	173	LEU	CA-CB-CG	5.38	127.68	115.30

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	98	0	96	2	0
1	E	106	0	105	4	0
2	A	5305	0	5293	88	0
2	B	5320	0	5320	92	0
3	A	34	0	26	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	34	0	26	5	0
All	All	10897	0	10866	182	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 8.

All (182) 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)
2:B:134:ARG:HH12	2:B:172:GLU:HG3	1.42	0.83
2:A:38:LYS:HE3	3:A:701:BX7:H26	1.65	0.78
2:B:241:LYS:NZ	2:B:285:LEU:O	2.17	0.77
2:B:479:VAL:HA	2:B:482:TYR:HB2	1.71	0.72
2:A:357:ARG:NH1	2:B:356:GLY:O	2.23	0.72
2:A:40:PHE:HB3	2:A:44:SER:HB2	1.72	0.71
2:A:357:ARG:NH2	2:B:452:ASP:OD2	2.27	0.67
2:A:127:ARG:NH1	2:A:166:ASP:OD1	2.28	0.66
2:A:543:HIS:HB3	2:A:545:LYS:HE2	1.77	0.66
2:B:182:PRO:HG3	2:B:238:ILE:HG12	1.76	0.66
1:E:377:ASP:OD1	1:E:377:ASP:N	2.24	0.66
2:B:75:GLU:OE1	2:B:80:ARG:NH1	2.30	0.65
2:A:184:MET:HA	2:A:187:ARG:HG2	1.80	0.64
2:B:173:LEU:HD21	2:B:187:ARG:HD3	1.80	0.64
2:A:140:ASN:ND2	2:A:157:ASP:HB3	2.13	0.64
2:B:461:LYS:NZ	2:B:516:GLU:OE1	2.31	0.64
2:B:171:VAL:HB	2:B:197:LYS:HE3	1.80	0.62
2:B:440:ARG:NH2	2:B:542:THR:O	2.33	0.61
2:B:481:VAL:HA	2:B:484:LYS:HB3	1.83	0.61
2:A:317:GLN:NE2	2:A:383:SER:O	2.34	0.59
2:A:127:ARG:HE	2:A:295:PHE:HB3	1.66	0.59
2:B:201:THR:HA	2:B:204:LEU:HD12	1.85	0.59
2:A:336:HIS:HB3	2:A:347:SER:HB3	1.85	0.58
2:A:483:GLU:HB3	2:A:485:LEU:HD13	1.85	0.58
2:A:160:ALA:HB2	2:A:174:TYR:HB2	1.85	0.57
2:B:64:HIS:ND1	2:B:65:LYS:O	2.37	0.57
1:E:375:ARG:NH1	1:E:377:ASP:OD2	2.38	0.57
3:A:701:BX7:N10	3:A:701:BX7:H13	2.19	0.57
2:B:508:LEU:HD22	2:B:640:ILE:HG13	1.87	0.56
2:B:541:GLY:HA2	2:B:608:LYS:HB3	1.88	0.56
2:A:372:LYS:HD2	2:B:545:LYS:HZ3	1.70	0.56
2:B:196:LYS:HG2	2:B:198:TYR:HE1	1.71	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:0:ILE:HB	2:B:11:LEU:HD12	1.87	0.56
2:B:230:ASN:HB3	2:B:233:VAL:HB	1.88	0.56
2:B:276:LEU:HD23	2:B:305:ILE:HG12	1.87	0.56
2:B:173:LEU:HD21	2:B:187:ARG:HB2	1.87	0.55
2:B:532:LEU:HD22	2:B:626:LEU:HD13	1.88	0.55
2:B:65:LYS:HG3	2:B:154:LYS:HE2	1.89	0.55
2:A:495:LEU:HG	2:A:496:GLY:H	1.72	0.55
2:A:522:ILE:HG21	2:A:630:LEU:HD12	1.90	0.54
2:B:173:LEU:HD22	2:B:188:ALA:HB2	1.89	0.54
2:B:545:LYS:H	2:B:545:LYS:HD2	1.73	0.54
2:A:38:LYS:CE	3:A:701:BX7:H26	2.35	0.54
2:B:15:LEU:HD21	2:B:25:ARG:HB2	1.90	0.54
2:B:38:LYS:NZ	2:B:55:GLU:OE2	2.34	0.54
2:B:137:LYS:HG2	2:B:140:ASN:HB2	1.90	0.53
2:A:508:LEU:HD22	2:A:640:ILE:HG13	1.90	0.53
2:A:39:VAL:HG12	2:A:83:VAL:HB	1.91	0.53
2:A:504:LYS:HA	2:A:507:ARG:HB3	1.91	0.53
3:B:701:BX7:H13	3:B:701:BX7:N10	2.23	0.53
2:B:440:ARG:NH1	2:B:537:ALA:O	2.39	0.53
2:B:346:ILE:H	2:B:346:ILE:HD13	1.74	0.53
2:A:253:GLU:HG2	2:A:254:ASN:HD22	1.73	0.53
2:A:114:ILE:HD13	2:A:117:ARG:HH11	1.74	0.52
2:A:279:PRO:O	2:A:283:ASN:ND2	2.42	0.52
2:A:107:LEU:HD12	2:A:214:ALA:HB1	1.91	0.52
2:B:16:GLY:HA3	3:B:701:BX7:H18	1.92	0.52
2:B:473:ARG:HA	2:B:476:GLU:HB2	1.92	0.52
2:B:196:LYS:HG2	2:B:198:TYR:CE1	2.45	0.52
2:B:140:ASN:OD1	2:B:157:ASP:HB3	2.11	0.51
2:A:7:HIS:CE1	2:A:85:ILE:HG12	2.45	0.51
2:A:532:LEU:HD22	2:A:626:LEU:HD13	1.93	0.51
2:A:358:ARG:HG3	2:A:449:LEU:HD11	1.93	0.51
1:D:377:ASP:OD1	1:D:377:ASP:N	2.43	0.51
2:A:225:GLU:OE2	2:A:230:ASN:ND2	2.44	0.50
2:B:49:VAL:HA	2:B:52:GLN:HG2	1.93	0.50
2:A:453:ASP:O	2:A:457:THR:HG23	2.12	0.50
2:B:187:ARG:HB3	2:B:193:ASP:OD2	2.12	0.50
2:B:648:GLN:O	2:B:652:ASN:ND2	2.45	0.50
2:B:423:CYS:SG	2:B:556:LEU:HD21	2.51	0.50
2:B:132:VAL:HG12	2:B:134:ARG:HG3	1.94	0.49
2:A:170:PHE:HB2	2:A:198:TYR:CE1	2.47	0.49
2:A:158:PHE:HB3	2:A:161:ALA:HB2	1.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:230:ASN:O	2:B:234:MET:N	2.37	0.49
2:A:114:ILE:HG23	2:A:117:ARG:HH11	1.77	0.49
2:A:422:VAL:HG12	2:A:556:LEU:HD12	1.94	0.49
2:A:-3:LEU:HB2	2:A:0:ILE:HD12	1.95	0.49
2:A:117:ARG:NH2	2:A:118:ASP:OD1	2.46	0.49
2:B:470:PHE:HA	2:B:473:ARG:HG2	1.95	0.49
2:B:472:ILE:O	2:B:476:GLU:HB2	2.13	0.49
2:B:336:HIS:CE1	2:B:361:LEU:HD12	2.47	0.48
2:B:88:PHE:HE1	3:B:701:BX7:H22	1.79	0.48
2:B:178:GLU:H	2:B:178:GLU:CD	2.17	0.48
2:A:17:GLN:O	3:A:701:BX7:H24	2.14	0.48
2:A:48:PRO:HB2	2:A:51:VAL:HG22	1.96	0.48
2:A:197:LYS:HE3	2:A:197:LYS:HA	1.96	0.48
1:E:370:LYS:N	1:E:371:PRO:HD2	2.29	0.47
2:A:469:ASP:O	2:A:473:ARG:HB3	2.14	0.47
2:B:241:LYS:HD3	2:B:245:ALA:O	2.13	0.47
2:B:466:ILE:HA	2:B:469:ASP:HB2	1.95	0.47
2:A:452:ASP:OD2	2:B:357:ARG:NH2	2.47	0.47
2:A:616:SER:O	2:A:620:ILE:HG12	2.14	0.47
2:B:173:LEU:HD11	2:B:187:ARG:HB2	1.96	0.47
2:B:164:LEU:HD21	2:B:170:PHE:HD1	1.79	0.47
2:A:47:ARG:NH1	2:A:161:ALA:O	2.48	0.47
2:A:71:PHE:HB2	2:A:85:ILE:HG22	1.97	0.47
2:B:162:ARG:HH11	2:B:164:LEU:HD22	1.79	0.47
2:B:481:VAL:HG13	2:B:484:LYS:HD3	1.96	0.47
2:A:43:ILE:HG23	2:A:46:LEU:HB3	1.97	0.46
2:A:455:ASN:O	2:A:459:HIS:HB2	2.15	0.46
2:A:109:GLU:OE1	2:A:325:TYR:OH	2.29	0.46
2:A:223:PRO:O	2:A:225:GLU:N	2.48	0.46
2:B:38:LYS:HE3	3:B:701:BX7:H26	1.97	0.45
2:A:654:LEU:HG	2:B:477:LYS:HD2	1.98	0.45
2:B:501:ILE:HD13	2:B:650:TYR:CD2	2.51	0.45
2:A:132:VAL:HG11	2:A:134:ARG:HH11	1.81	0.45
2:B:460:LYS:O	2:B:464:VAL:HG13	2.16	0.45
2:A:26:GLY:HA3	2:A:37:ILE:HD13	1.98	0.45
2:A:38:LYS:HE2	2:A:40:PHE:CZ	2.52	0.45
2:B:156:THR:OG1	2:B:157:ASP:N	2.45	0.45
2:B:452:ASP:O	2:B:456:GLU:HB2	2.17	0.45
2:B:454:TYR:HE2	2:B:519:LEU:HB3	1.81	0.45
2:B:480:LYS:HE2	2:B:481:VAL:HG22	1.99	0.45
2:A:472:ILE:HG22	2:A:505:LEU:HD22	1.98	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:322:HIS:HD1	2:B:342:GLN:HG2	1.83	0.44
2:B:231:LYS:HA	2:B:234:MET:HB3	1.99	0.44
2:B:334:ILE:O	2:B:338:LEU:HD12	2.17	0.44
2:B:7:HIS:CE1	2:B:85:ILE:HG12	2.53	0.44
2:B:94:LEU:HG	2:B:98:LEU:HD13	2.00	0.44
2:A:114:ILE:HG23	2:A:117:ARG:NH1	2.32	0.44
2:A:638:PHE:HA	2:A:641:GLU:HG2	2.00	0.44
2:B:235:TYR:HA	2:B:238:ILE:HG22	1.98	0.44
2:B:292:CYS:SG	2:B:293:TRP:N	2.91	0.44
2:A:500:ASP:O	2:A:504:LYS:HG2	2.17	0.44
2:A:286:GLU:HG2	2:A:291:LYS:HB2	1.99	0.43
2:A:14:ILE:HD11	2:A:17:GLN:HG2	2.01	0.43
2:A:621:ARG:HH11	2:A:622:LYS:HG2	1.83	0.43
2:A:43:ILE:HG12	2:A:46:LEU:HB2	2.00	0.43
2:B:59:LEU:HB3	2:B:70:LEU:HD22	1.99	0.43
2:A:406:TYR:CZ	2:A:580:GLU:HG3	2.53	0.43
2:B:180:LEU:HD12	2:B:180:LEU:HA	1.84	0.43
2:B:436:GLN:O	2:B:440:ARG:HG3	2.19	0.43
2:A:43:ILE:O	2:A:46:LEU:HB3	2.18	0.43
2:A:401:LYS:HD3	2:A:401:LYS:HA	1.82	0.43
2:A:362:GLU:OE1	2:A:362:GLU:N	2.40	0.43
2:A:469:ASP:HB3	2:A:473:ARG:NH2	2.34	0.43
2:A:650:TYR:HA	2:A:653:GLU:HG2	2.00	0.43
2:A:138:PRO:C	2:A:140:ASN:H	2.21	0.43
2:A:498:ILE:HD13	2:A:498:ILE:HA	1.74	0.43
2:B:198:TYR:HB3	2:B:202:VAL:HG23	2.00	0.43
2:A:1:CYS:HB3	2:A:10:LEU:HD23	2.00	0.43
2:A:91:CYS:HB3	2:A:143:ARG:NH1	2.34	0.43
2:A:423:CYS:HA	2:A:556:LEU:HD11	2.00	0.43
2:A:562:ILE:HG21	2:A:590:LEU:HB2	1.99	0.43
2:B:361:LEU:H	2:B:361:LEU:HD23	1.84	0.43
2:A:13:ASP:HB3	2:A:25:ARG:HB3	2.01	0.42
1:E:370:LYS:N	1:E:371:PRO:CD	2.82	0.42
2:B:408:LEU:HD13	2:B:408:LEU:HA	1.85	0.42
2:B:114:ILE:HG23	2:B:117:ARG:HH11	1.85	0.42
2:A:167:ASP:OD1	2:A:167:ASP:N	2.53	0.42
2:A:451:LYS:HG2	2:A:526:LEU:HD13	2.02	0.42
2:B:602:THR:HA	2:B:606:VAL:HB	2.01	0.42
2:B:60:LYS:HE3	2:B:60:LYS:HB3	1.88	0.42
2:A:475:ILE:O	2:A:479:VAL:HG12	2.20	0.42
2:B:316:LEU:O	2:B:439:MET:HE1	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:478:THR:O	2:B:482:TYR:N	2.52	0.42
2:A:652:ASN:OD1	2:B:473:ARG:NH1	2.53	0.42
2:A:123:MET:HG3	2:A:207:ILE:HD11	2.01	0.42
2:B:68:VAL:HG13	2:B:87:GLU:HG2	2.01	0.42
2:B:488:ILE:HG13	2:B:490:LEU:HD11	2.02	0.41
3:B:701:BX7:H9	3:B:701:BX7:H15	2.02	0.41
2:B:339:VAL:O	2:B:343:THR:OG1	2.35	0.41
2:B:362:GLU:OE1	2:B:362:GLU:N	2.50	0.41
2:B:38:LYS:HB3	2:B:84:LEU:HB2	2.03	0.41
1:D:371:PRO:HB2	2:A:585:PHE:CE1	2.55	0.41
2:A:440:ARG:NH2	2:A:542:THR:O	2.54	0.41
2:A:519:LEU:HD23	2:A:519:LEU:HA	1.85	0.41
2:A:503:THR:O	2:A:507:ARG:N	2.48	0.41
2:A:22:ASN:OD1	2:A:41:ASN:ND2	2.53	0.41
2:A:137:LYS:O	2:A:140:ASN:HB3	2.20	0.41
2:A:455:ASN:HA	2:A:458:VAL:HG12	2.03	0.41
2:A:42:ASN:C	2:A:44:SER:H	2.22	0.41
2:B:470:PHE:CE2	2:B:473:ARG:HD3	2.56	0.41
2:B:314:PHE:HE1	2:B:439:MET:HE3	1.85	0.41
2:B:469:ASP:O	2:B:472:ILE:HG22	2.21	0.41
2:A:189:VAL:HB	2:A:190:LEU:HD22	2.03	0.41
2:B:224:PHE:CG	2:B:225:GLU:N	2.88	0.41
2:A:15:LEU:HD21	2:A:25:ARG:HB2	2.03	0.40
2:A:566:PHE:HA	2:A:569:ASP:HB2	2.03	0.40
2:B:624:LEU:HD12	2:B:624:LEU:HA	1.86	0.40
2:B:134:ARG:HD3	2:B:134:ARG:H	1.86	0.40
2:B:409:ASP:OD1	2:B:409:ASP:N	2.51	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	D	9/226 (4%)	7 (78%)	2 (22%)	0	100	100
1	E	10/226 (4%)	8 (80%)	2 (20%)	0	100	100
2	A	652/665 (98%)	623 (96%)	26 (4%)	3 (0%)	29	61
2	B	655/665 (98%)	627 (96%)	27 (4%)	1 (0%)	47	78
All	All	1326/1782 (74%)	1265 (95%)	57 (4%)	4 (0%)	41	72

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	A	43	ILE
2	A	171	VAL
2	A	224	PHE
2	B	572	GLU

### 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	D	11/199 (6%)	10 (91%)	1 (9%)	9	32
1	E	12/199 (6%)	10 (83%)	2 (17%)	2	8
2	A	583/592 (98%)	524 (90%)	59 (10%)	7	27
2	B	586/592 (99%)	532 (91%)	54 (9%)	9	31
All	All	1192/1582 (75%)	1076 (90%)	116 (10%)	8	28

All (116) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	379	TRP
1	E	376	GLU
1	E	377	ASP
2	A	0	ILE
2	A	20	THR
2	A	41	ASN
2	A	43	ILE

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	A	45	PHE
2	A	46	LEU
2	A	49	VAL
2	A	59	LEU
2	A	63	ASN
2	A	73	ILE
2	A	83	VAL
2	A	110	SER
2	A	127	ARG
2	A	132	VAL
2	A	169	GLN
2	A	170	PHE
2	A	173	LEU
2	A	176	THR
2	A	191	ARG
2	A	194	HIS
2	A	197	LYS
2	A	201	THR
2	A	225	GLU
2	A	241	LYS
2	A	258	ASP
2	A	262	ASP
2	A	271	ARG
2	A	276	LEU
2	A	293	TRP
2	A	340	TYR
2	A	342	GLN
2	A	349	ASN
2	A	361	LEU
2	A	376	GLU
2	A	405	ARG
2	A	449	LEU
2	A	453	ASP
2	A	459	HIS
2	A	464	VAL
2	A	480	LYS
2	A	481	VAL
2	A	482	TYR
2	A	494	GLU
2	A	498	ILE
2	A	507	ARG
2	A	512	GLN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	A	525	ARG
2	A	534	ASP
2	A	545	LYS
2	A	549	VAL
2	A	567	LYS
2	A	589	LYS
2	A	602	THR
2	A	637	CYS
2	A	639	ASP
2	A	641	GLU
2	A	643	GLU
2	A	648	GLN
2	A	654	LEU
2	B	-2	ASP
2	B	5	SER
2	B	31	THR
2	B	34	LEU
2	B	39	VAL
2	B	57	GLU
2	B	96	THR
2	B	110	SER
2	B	123	MET
2	B	134	ARG
2	B	140	ASN
2	B	164	LEU
2	B	166	ASP
2	B	187	ARG
2	B	191	ARG
2	B	195	GLN
2	B	196	LYS
2	B	228	ARG
2	B	241	LYS
2	B	262	ASP
2	B	271	ARG
2	B	289	GLN
2	B	296	ASP
2	B	316	LEU
2	B	317	GLN
2	B	333	THR
2	B	338	LEU
2	B	346	ILE
2	B	358	ARG

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Mol	Chain	Res	Type
2	B	361	LEU
2	B	372	LYS
2	B	393	ILE
2	B	401	LYS
2	B	408	LEU
2	B	409	ASP
2	B	423	CYS
2	B	433	LEU
2	B	456	GLU
2	B	465	VAL
2	B	482	TYR
2	B	484	LYS
2	B	485	LEU
2	B	488	ILE
2	B	497	GLU
2	B	498	ILE
2	B	500	ASP
2	B	512	GLN
2	B	526	LEU
2	B	534	ASP
2	B	549	VAL
2	B	572	GLU
2	B	590	LEU
2	B	630	LEU
2	B	641	GLU

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

Mol	Chain	Res	Type
2	A	254	ASN
2	B	520	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](#)

2 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	BX7	B	701	-	35,37,37	4.44	15 (42%)	42,49,49	2.20	8 (19%)
3	BX7	A	701	-	35,37,37	4.46	15 (42%)	42,49,49	2.18	10 (23%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	BX7	B	701	-	-	5/22/31/31	0/4/4/4
3	BX7	A	701	-	-	4/22/31/31	0/4/4/4

All (30) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	701	BX7	C31-S02	-12.72	1.56	1.72
3	B	701	BX7	C31-S02	-12.54	1.57	1.72
3	B	701	BX7	C26-N07	12.15	1.53	1.34
3	A	701	BX7	C26-N07	12.08	1.53	1.34
3	A	701	BX7	C16-N06	7.51	1.50	1.37
3	B	701	BX7	C27-N08	7.46	1.51	1.36
3	B	701	BX7	C16-N06	7.40	1.50	1.37
3	A	701	BX7	C27-N08	7.34	1.51	1.36
3	B	701	BX7	C15-N05	7.09	1.62	1.47
3	A	701	BX7	C16-N05	7.03	1.49	1.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	701	BX7	C15-N05	6.93	1.62	1.47
3	B	701	BX7	C16-N05	6.78	1.49	1.36
3	B	701	BX7	C33-C32	6.73	1.61	1.39
3	A	701	BX7	C33-C32	6.68	1.61	1.39
3	A	701	BX7	C14-N05	-4.86	1.36	1.47
3	B	701	BX7	C14-N05	-4.78	1.37	1.47
3	A	701	BX7	C29-N09	4.76	1.44	1.33
3	A	701	BX7	C22-N08	4.73	1.51	1.40
3	B	701	BX7	C22-N08	4.73	1.51	1.40
3	B	701	BX7	C29-N09	4.66	1.44	1.33
3	B	701	BX7	C33-C34	3.45	1.45	1.34
3	A	701	BX7	C33-C34	3.45	1.45	1.34
3	B	701	BX7	C12-C15	-3.20	1.40	1.51
3	A	701	BX7	C12-C15	-3.18	1.40	1.51
3	B	701	BX7	C34-S02	-3.18	1.55	1.71
3	A	701	BX7	C34-S02	-3.16	1.55	1.71
3	A	701	BX7	C19-C23	2.61	1.62	1.51
3	B	701	BX7	C19-C23	2.54	1.61	1.51
3	A	701	BX7	C13-C14	2.48	1.60	1.51
3	B	701	BX7	C13-C14	2.36	1.60	1.51

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	701	BX7	N11-C27-N10	-9.05	117.98	126.55
3	A	701	BX7	N11-C27-N10	-8.93	118.09	126.55
3	B	701	BX7	C33-C34-S02	-6.10	108.03	112.98
3	A	701	BX7	C33-C34-S02	-5.30	108.68	112.98
3	A	701	BX7	C15-N05-C14	-3.45	106.61	111.34
3	B	701	BX7	C30-N11-C27	3.25	120.79	115.88
3	A	701	BX7	C30-N11-C27	3.16	120.65	115.88
3	B	701	BX7	C28-C30-N11	-3.05	120.69	123.15
3	B	701	BX7	C21-N07-C26	-2.98	117.90	122.95
3	A	701	BX7	C28-C30-N11	-2.86	120.85	123.15
3	A	701	BX7	C21-N07-C26	-2.80	118.21	122.95
3	B	701	BX7	C19-C23-N09	-2.60	104.78	112.21
3	B	701	BX7	C12-C15-N05	2.58	108.05	103.44
3	A	701	BX7	N06-C16-N05	2.47	118.72	115.89
3	A	701	BX7	C27-N10-C26	2.32	121.71	116.39
3	A	701	BX7	C19-C23-N09	-2.31	105.60	112.21
3	B	701	BX7	C27-N10-C26	2.31	121.68	116.39
3	A	701	BX7	C32-C33-C34	-2.05	108.07	113.74

There are no chirality outliers.

All (9) torsion outliers are listed below:

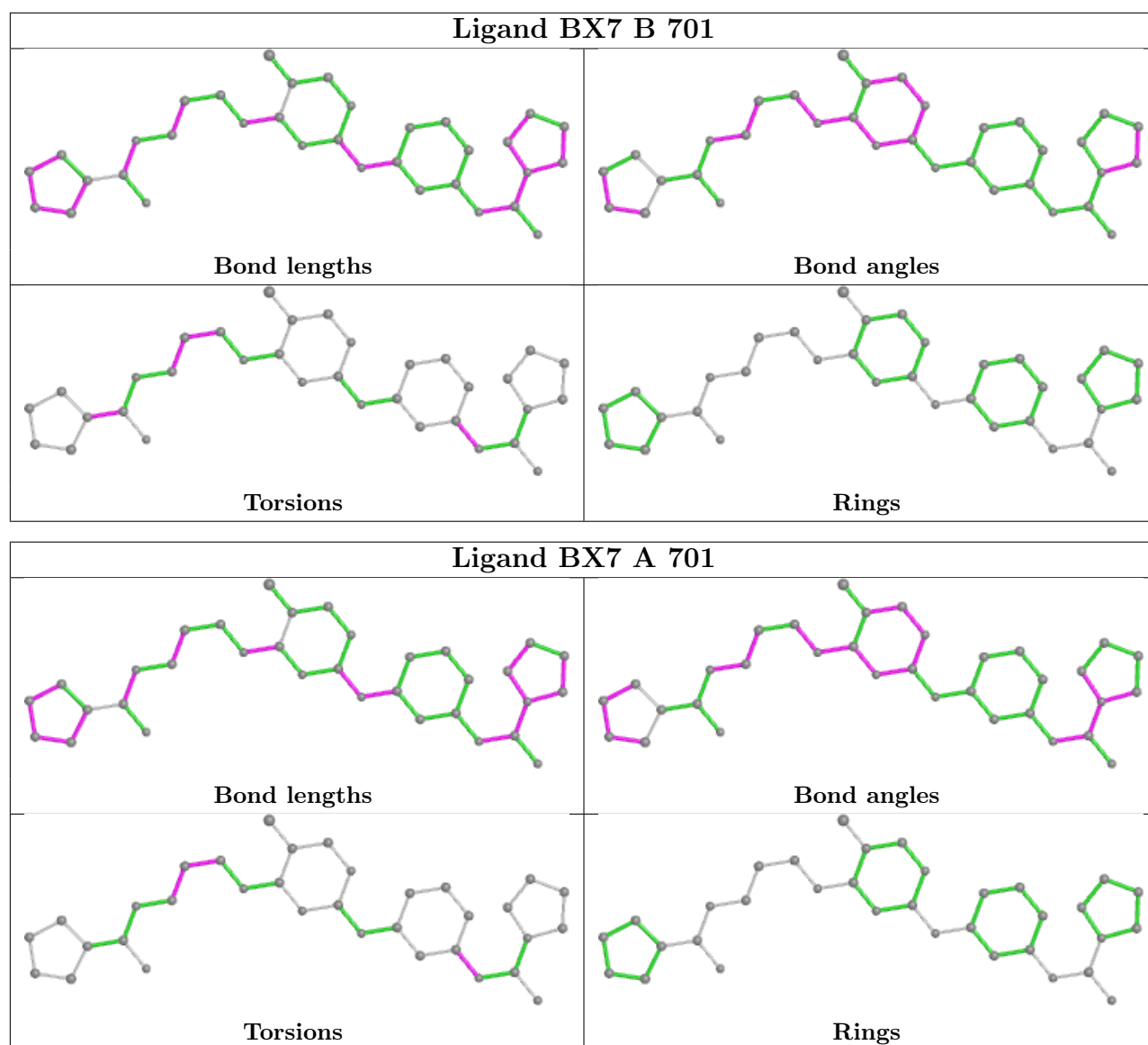
Mol	Chain	Res	Type	Atoms
3	B	701	BX7	O04-C29-C31-C32
3	B	701	BX7	N09-C29-C31-C32
3	A	701	BX7	C21-C19-C23-N09
3	B	701	BX7	C23-C19-C21-N07
3	B	701	BX7	C21-C19-C23-N09
3	A	701	BX7	C18-C17-N06-C16
3	A	701	BX7	C20-C17-N06-C16
3	A	701	BX7	C23-C19-C21-N07
3	B	701	BX7	C18-C17-N06-C16

There are no ring outliers.

2 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	701	BX7	5	0
3	A	701	BX7	4	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 [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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	D	11/226 (4%)	1.30	3 (27%) 0 0	158, 172, 188, 195	0
1	E	12/226 (5%)	1.36	3 (25%) 0 0	112, 120, 165, 176	0
2	A	656/665 (98%)	0.49	34 (5%) 27 27	75, 119, 219, 259	0
2	B	657/665 (98%)	0.48	46 (7%) 16 18	91, 132, 225, 268	0
All	All	1336/1782 (74%)	0.50	86 (6%) 19 20	75, 125, 222, 268	0

All (86) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	A	163	GLU	13.6
2	B	175	GLY	12.2
2	A	162	ARG	11.8
2	A	164	LEU	11.7
2	A	169	GLN	9.0
2	B	174	TYR	8.6
2	B	166	ASP	8.6
2	B	167	ASP	8.4
2	A	165	GLU	7.6
1	E	368	MET	7.1
2	A	194	HIS	6.6
2	A	168	GLU	6.6
2	A	167	ASP	6.6
2	B	165	GLU	6.5
2	A	193	ASP	6.4
2	A	481	VAL	6.3
2	B	170	PHE	6.1
2	A	170	PHE	6.0
2	B	495	LEU	6.0
2	B	168	GLU	6.0
2	A	493	ALA	5.6

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
2	A	161	ALA	5.5
2	B	164	LEU	5.5
2	B	193	ASP	5.3
2	A	-5	PRO	5.3
2	A	175	GLY	4.7
2	A	166	ASP	4.6
2	A	-4	GLY	4.5
2	A	492	ALA	4.5
2	B	198	TYR	4.4
1	E	379	TRP	4.4
2	B	194	HIS	4.4
2	A	195	GLN	4.4
2	A	174	TYR	4.3
1	E	369	GLU	4.2
2	B	196	LYS	4.2
2	A	480	LYS	4.1
2	A	479	VAL	3.9
1	D	369	GLU	3.8
2	A	196	LYS	3.7
1	D	379	TRP	3.7
2	A	171	VAL	3.7
2	B	176	THR	3.4
2	B	482	TYR	3.4
2	B	195	GLN	3.3
2	A	192	LYS	3.3
2	A	227	PRO	3.2
2	A	482	TYR	3.2
2	B	59	LEU	3.1
2	B	475	ILE	2.9
2	A	-2	ASP	2.9
2	A	647	TYR	2.8
2	B	42	ASN	2.8
2	B	295	PHE	2.7
2	B	654	LEU	2.6
2	B	186	GLU	2.6
2	B	485	LEU	2.6
2	B	487	LYS	2.6
2	B	493	ALA	2.6
2	B	246	ILE	2.6
2	B	640	ILE	2.5
2	B	169	GLN	2.5
2	A	173	LEU	2.5

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Mol	Chain	Res	Type	RSRZ
2	B	192	LYS	2.5
2	A	500	ASP	2.5
2	B	190	LEU	2.4
2	B	56	PHE	2.4
2	B	644	VAL	2.4
2	B	285	LEU	2.4
2	B	498	ILE	2.4
2	B	284	ILE	2.3
2	B	488	ILE	2.3
2	B	158	PHE	2.3
2	B	183	ASP	2.2
2	B	189	VAL	2.2
1	D	375	ARG	2.2
2	B	185	TYR	2.1
2	A	172	GLU	2.1
2	B	73	ILE	2.1
2	B	237	ILE	2.1
2	B	173	LEU	2.1
2	B	526	LEU	2.1
2	A	190	LEU	2.1
2	B	515	ILE	2.0
2	B	494	GLU	2.0
2	A	281	LEU	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](#)

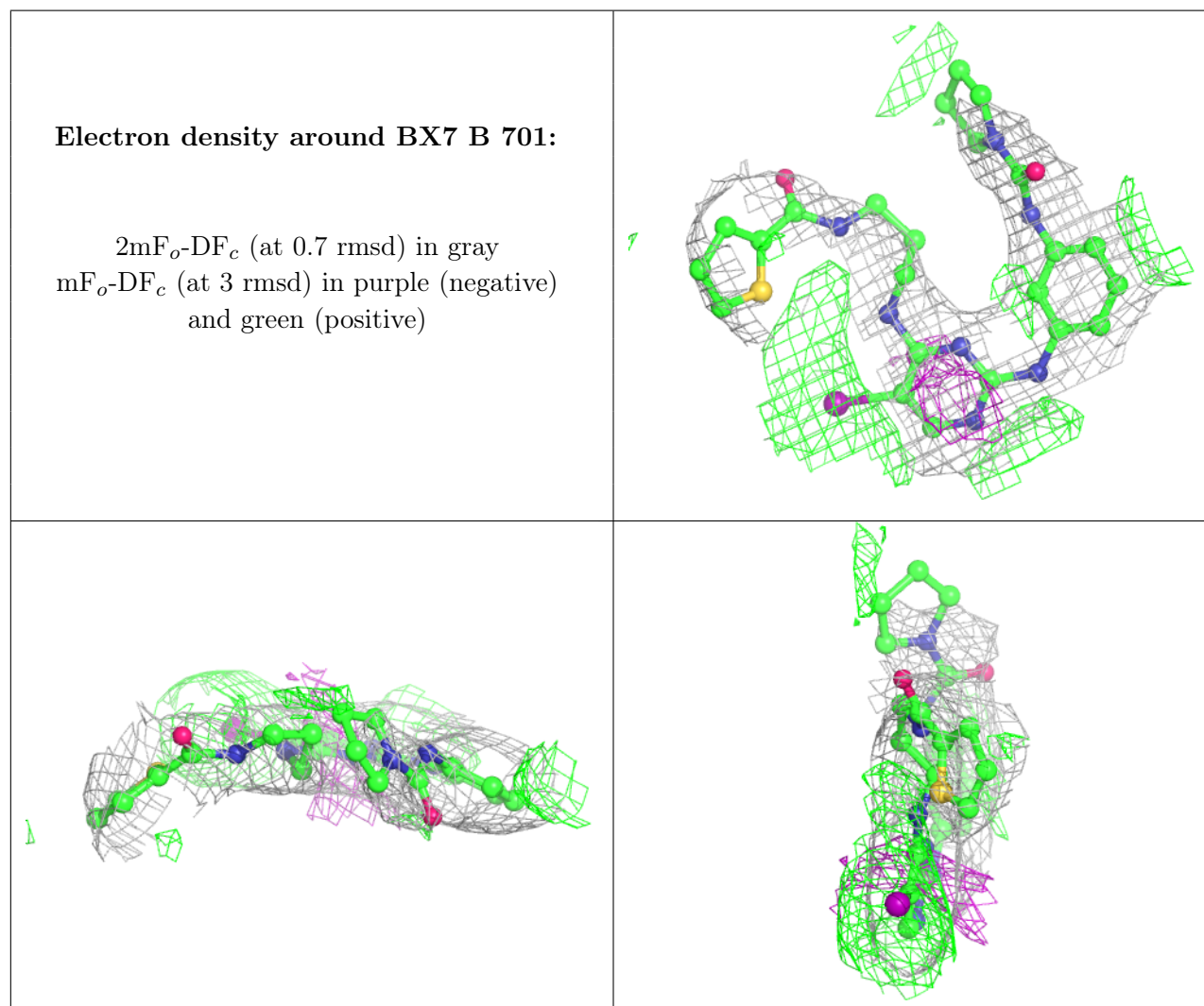
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

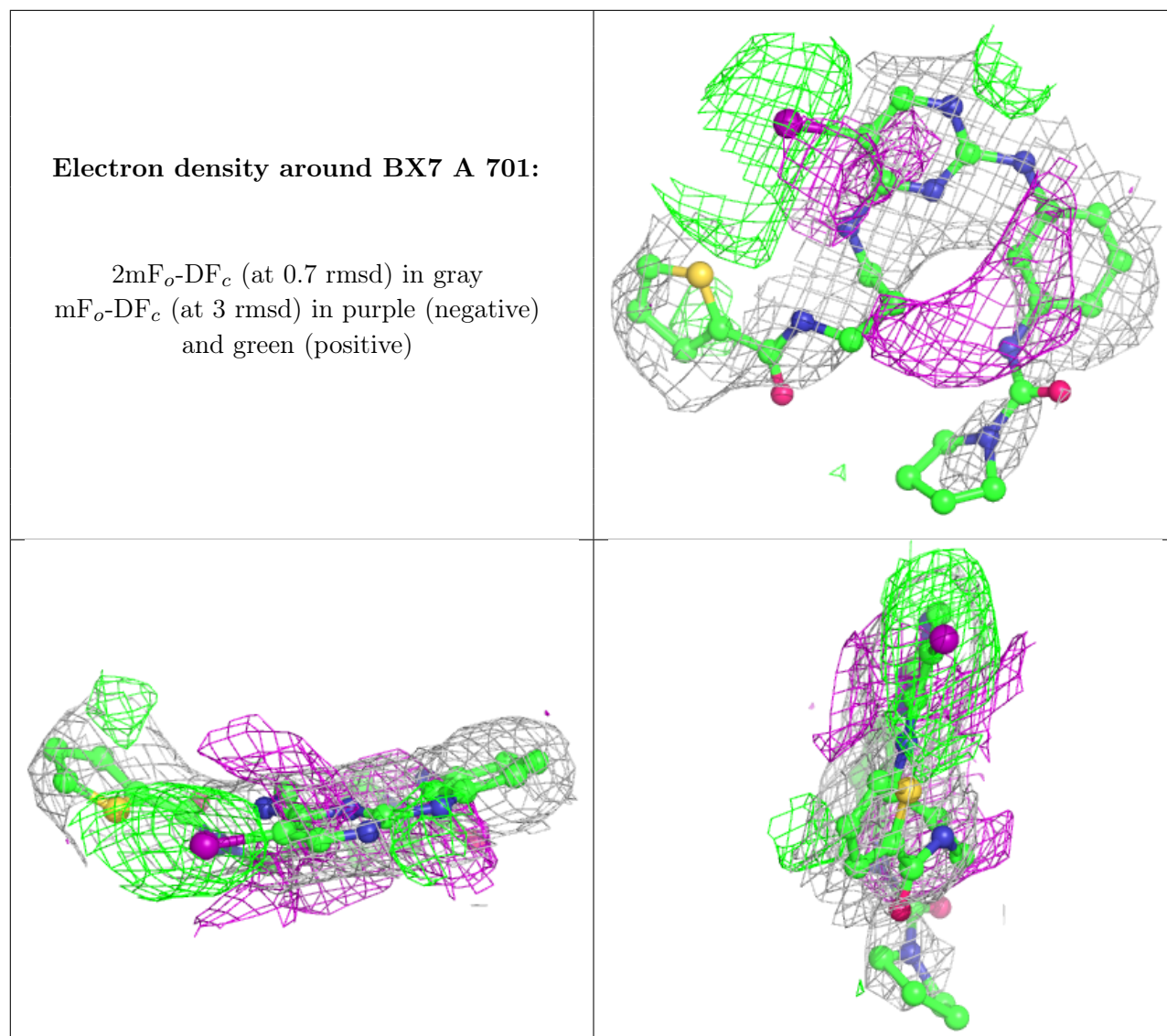
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	BX7	B	701	34/34	0.78	0.34	78,123,165,288	0
3	BX7	A	701	34/34	0.85	0.39	46,102,149,210	0

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.





## 6.5 Other polymers [i](#)

There are no such residues in this entry.