



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 7, 2023 – 01:33 pm BST

PDB ID : 8BUO
Title : Structure of DDB1 bound to DS24-engaged CDK12-cyclin K
Authors : Kozicka, Z.; Kempf, G.; Petzold, G.; Thoma, N.H.
Deposited on : 2022-11-30
Resolution : 3.58 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 : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35
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

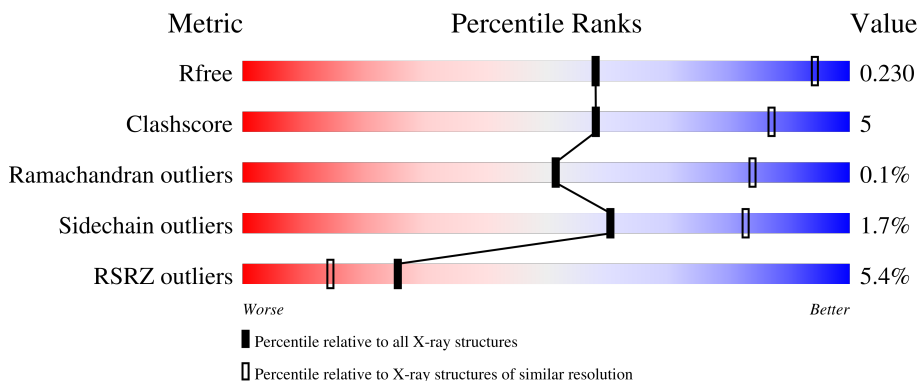
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.58 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.



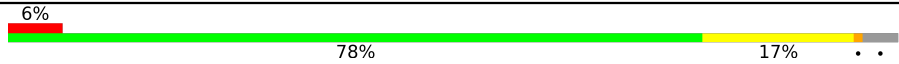

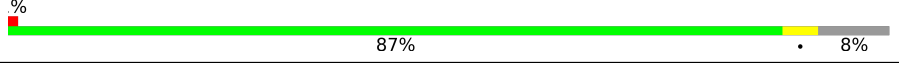
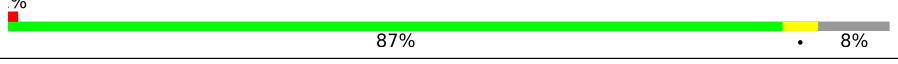
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1094 (3.66-3.50)
Clashscore	141614	1181 (3.66-3.50)
Ramachandran outliers	138981	1143 (3.66-3.50)
Sidechain outliers	138945	1143 (3.66-3.50)
RSRZ outliers	127900	1012 (3.66-3.50)

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

Mol	Chain	Length	Quality of chain
1	A	840	 6% 88% 11%
1	D	840	 5% 84% 14%
1	G	840	 6% 83% 15%
2	B	344	 11% 79% 14% 5%
2	E	344	 4% 79% 15% 5%

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Mol	Chain	Length	Quality of chain
2	H	344	 <p>6% 78% 17% • •</p>
3	C	271	 <p>2% 83% 9% 8%</p>
3	F	271	 <p>% 87% • 8%</p>
3	I	271	 <p>% 87% • 8%</p>

2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 67528 atoms, of which 33637 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 DNA damage-binding protein 1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	826	12938	4105	6451	1094	1252	36	6451	0	0
1	D	827	12957	4111	6462	1095	1253	36	6462	0	0
1	G	826	12940	4106	6454	1093	1251	36	6454	0	0

There are 30 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	expression tag	UNP Q3U1J4
A	-2	GLY	-	expression tag	UNP Q3U1J4
A	-1	GLY	-	expression tag	UNP Q3U1J4
A	0	ARG	-	expression tag	UNP Q3U1J4
A	700	GLY	-	linker	UNP Q3U1J4
A	701	ASN	-	linker	UNP Q3U1J4
A	702	GLY	-	linker	UNP Q3U1J4
A	703	ASN	-	linker	UNP Q3U1J4
A	704	SER	-	linker	UNP Q3U1J4
A	705	GLY	-	linker	UNP Q3U1J4
D	-3	GLY	-	expression tag	UNP Q3U1J4
D	-2	GLY	-	expression tag	UNP Q3U1J4
D	-1	GLY	-	expression tag	UNP Q3U1J4
D	0	ARG	-	expression tag	UNP Q3U1J4
D	700	GLY	-	linker	UNP Q3U1J4
D	701	ASN	-	linker	UNP Q3U1J4
D	702	GLY	-	linker	UNP Q3U1J4
D	703	ASN	-	linker	UNP Q3U1J4
D	704	SER	-	linker	UNP Q3U1J4
D	705	GLY	-	linker	UNP Q3U1J4
G	-3	GLY	-	expression tag	UNP Q3U1J4
G	-2	GLY	-	expression tag	UNP Q3U1J4
G	-1	GLY	-	expression tag	UNP Q3U1J4

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Chain	Residue	Modelled	Actual	Comment	Reference
G	0	ARG	-	expression tag	UNP Q3U1J4
G	700	GLY	-	linker	UNP Q3U1J4
G	701	ASN	-	linker	UNP Q3U1J4
G	702	GLY	-	linker	UNP Q3U1J4
G	703	ASN	-	linker	UNP Q3U1J4
G	704	SER	-	linker	UNP Q3U1J4
G	705	GLY	-	linker	UNP Q3U1J4

- Molecule 2 is a protein called Cyclin-dependent kinase 12.

Mol	Chain	Residues	Atoms							ZeroOcc	AltConf	Trace
			Total	C	H	N	O	P	S			
2	B	326	5326	1701	2670	450	487	1	17	2670	0	0
2	E	326	5326	1701	2670	450	487	1	17	2670	0	0
2	H	330	5395	1726	2702	455	494	1	17	2702	0	0

There are 15 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	709	GLY	-	expression tag	UNP Q9NYV4
B	710	GLY	-	expression tag	UNP Q9NYV4
B	711	GLY	-	expression tag	UNP Q9NYV4
B	965	ARG	LYS	engineered mutation	UNP Q9NYV4
B	1052	GLN	-	expression tag	UNP Q9NYV4
E	709	GLY	-	expression tag	UNP Q9NYV4
E	710	GLY	-	expression tag	UNP Q9NYV4
E	711	GLY	-	expression tag	UNP Q9NYV4
E	965	ARG	LYS	engineered mutation	UNP Q9NYV4
E	1052	GLN	-	expression tag	UNP Q9NYV4
H	709	GLY	-	expression tag	UNP Q9NYV4
H	710	GLY	-	expression tag	UNP Q9NYV4
H	711	GLY	-	expression tag	UNP Q9NYV4
H	965	ARG	LYS	engineered mutation	UNP Q9NYV4
H	1052	GLN	-	expression tag	UNP Q9NYV4

- Molecule 3 is a protein called Cyclin-K.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
3	C	248	4111	1341	2048	346	363	13	2048	0	0

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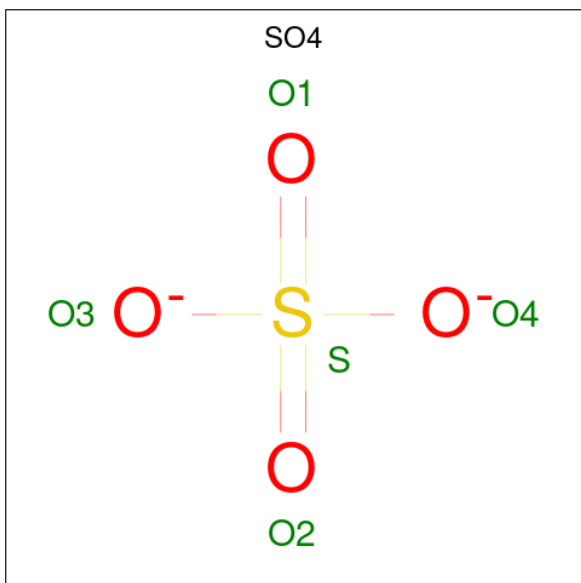
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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	H	N	O				S
3	F	248	4111	1341	2048	346	363	13	2048	0	0
3	I	248	4111	1341	2048	346	363	13	2048	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-3	GLY	-	expression tag	UNP O75909
C	-2	GLY	-	expression tag	UNP O75909
C	-1	GLY	-	expression tag	UNP O75909
C	0	ARG	-	expression tag	UNP O75909
F	-3	GLY	-	expression tag	UNP O75909
F	-2	GLY	-	expression tag	UNP O75909
F	-1	GLY	-	expression tag	UNP O75909
F	0	ARG	-	expression tag	UNP O75909
I	-3	GLY	-	expression tag	UNP O75909
I	-2	GLY	-	expression tag	UNP O75909
I	-1	GLY	-	expression tag	UNP O75909
I	0	ARG	-	expression tag	UNP O75909

- Molecule 4 is SULFATE ION (three-letter code: SO₄) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
4	A	1	5	4	1	0	0

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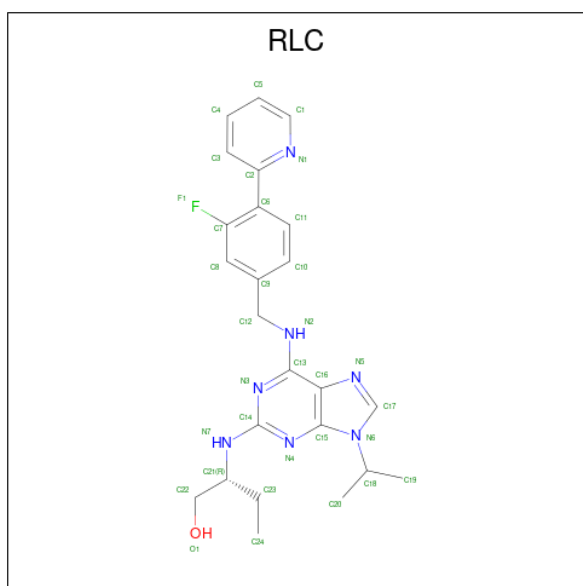
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
4	A	1	5	4	1	0	0
4	A	1	5	4	1	0	0
4	A	1	5	4	1	0	0
4	A	1	5	4	1	0	0
4	B	1	5	4	1	0	0
4	C	1	5	4	1	0	0
4	C	1	5	4	1	0	0
4	C	1	5	4	1	0	0
4	D	1	5	4	1	0	0
4	D	1	5	4	1	0	0
4	D	1	5	4	1	0	0
4	D	1	5	4	1	0	0
4	D	1	5	4	1	0	0
4	E	1	5	4	1	0	0
4	F	1	5	4	1	0	0
4	F	1	5	4	1	0	0
4	G	1	5	4	1	0	0
4	G	1	5	4	1	0	0
4	G	1	5	4	1	0	0
4	G	1	5	4	1	0	0
4	H	1	5	4	1	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	H	1	Total	O	S	0	0
			5	4	1		
4	I	1	Total	O	S	0	0
			5	4	1		
4	I	1	Total	O	S	0	0
			5	4	1		
4	I	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is (2 {R})-2-[[6-[(3-fluoranyl-4-pyridin-2-yl-phenyl)methylamino]-9-propan-2-yl-purin-2-yl]amino]butan-1-ol (three-letter code: RLC) (formula: C₂₄H₂₈FN₇O) (labeled as "Ligand of Interest" by depositor).

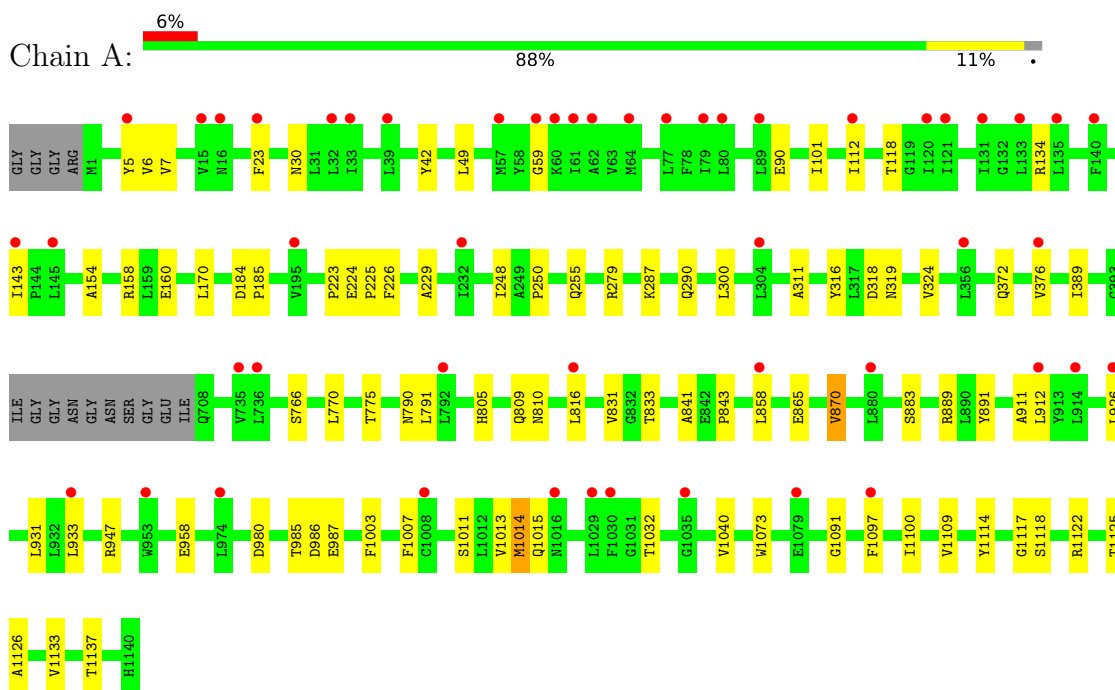


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
5	B	1	Total	C	F	H	N	O	28	0
			61	24	1	28	7	1		
5	E	1	Total	C	F	H	N	O	28	0
			61	24	1	28	7	1		
5	H	1	Total	C	F	H	N	O	28	0
			61	24	1	28	7	1		

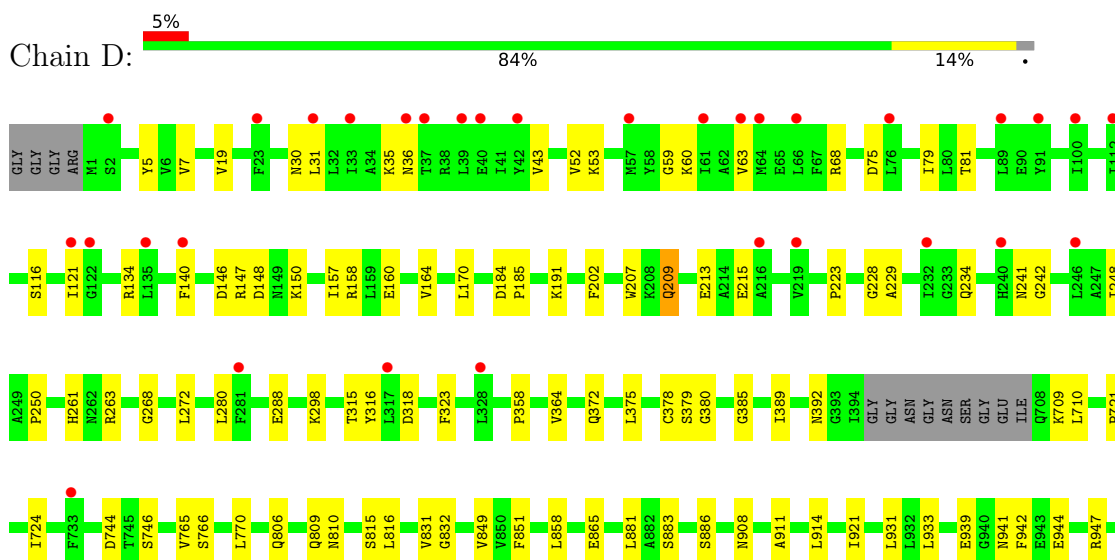
3 Residue-property plots [i](#)

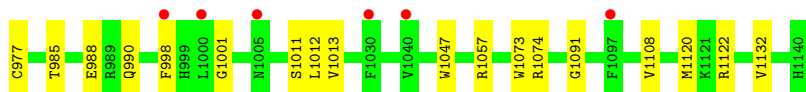
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: DNA damage-binding protein 1

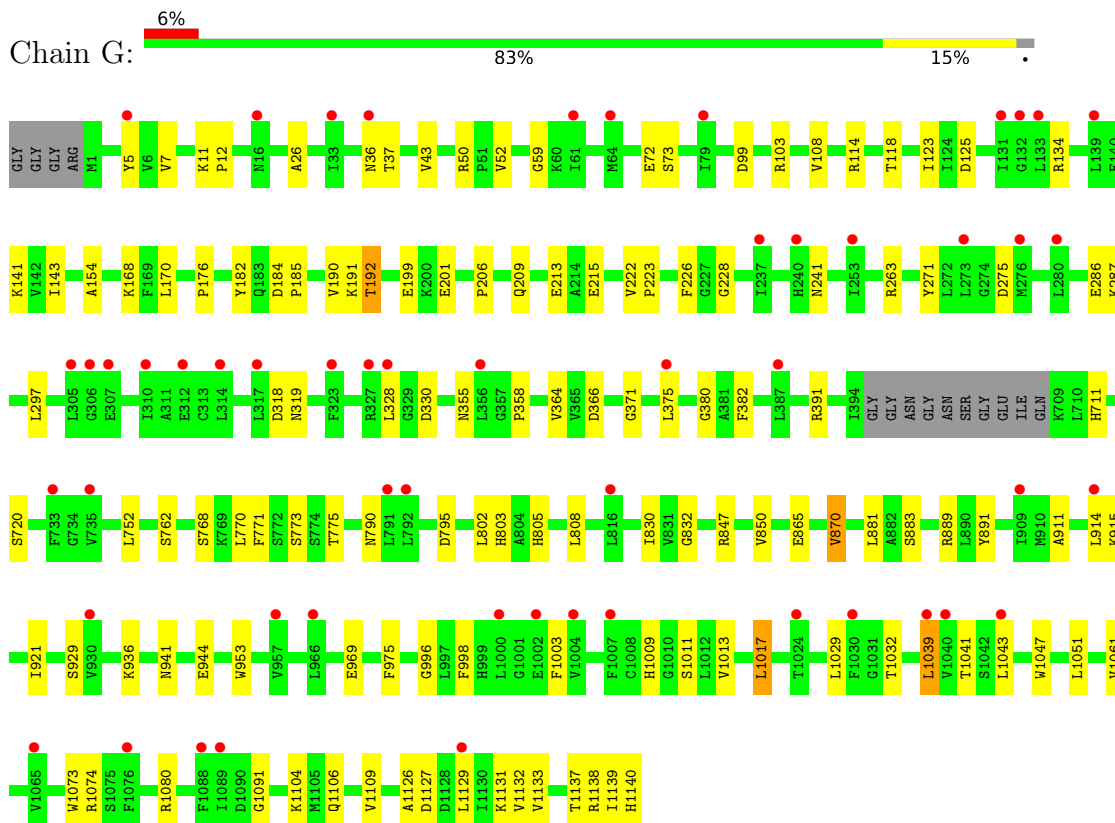


- Molecule 1: DNA damage-binding protein 1

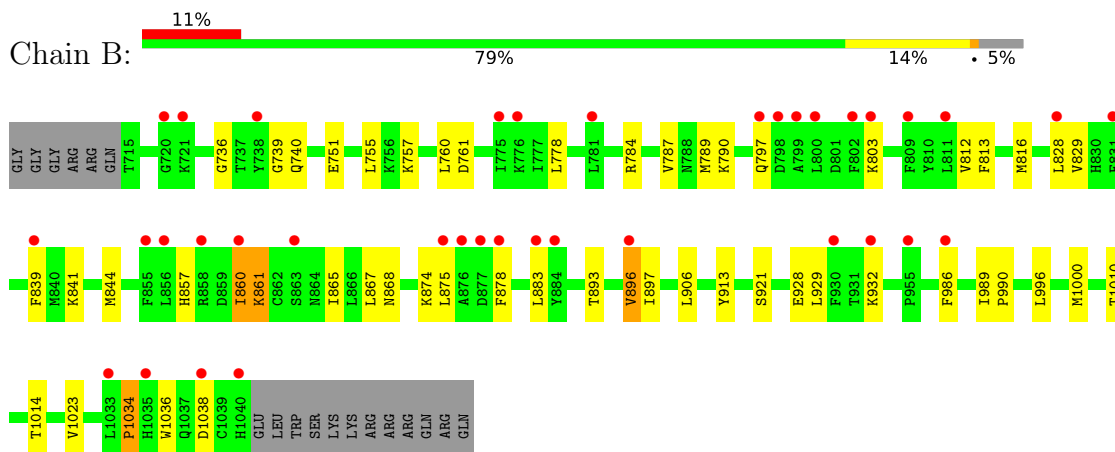




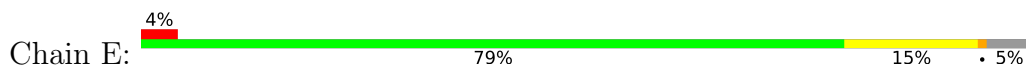
- Molecule 1: DNA damage-binding protein 1

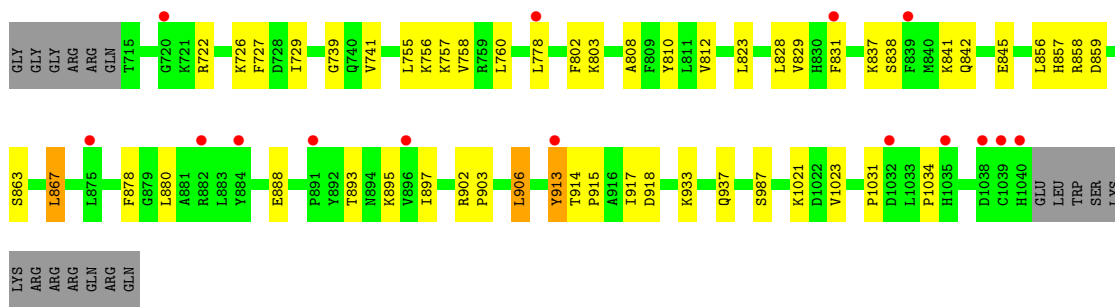


- Molecule 2: Cyclin-dependent kinase 12

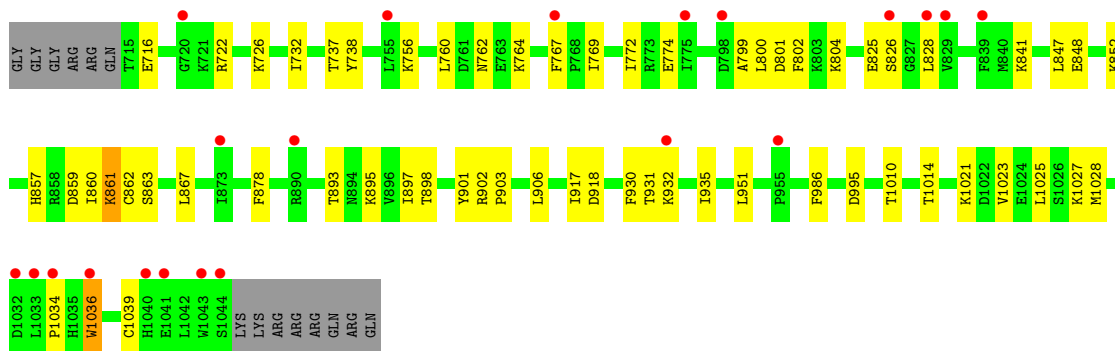
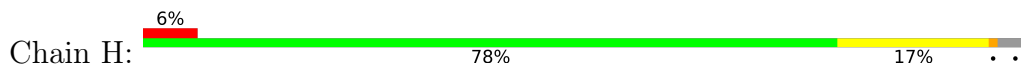


- Molecule 2: Cyclin-dependent kinase 12

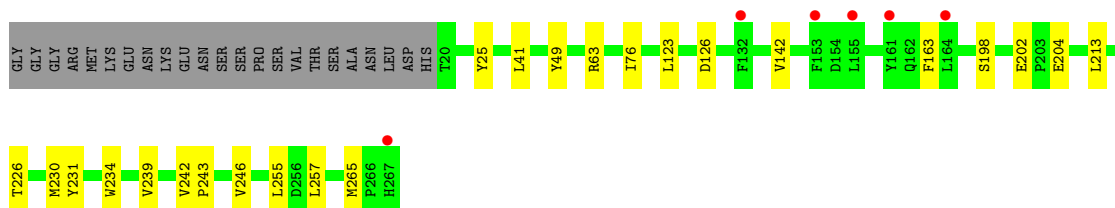
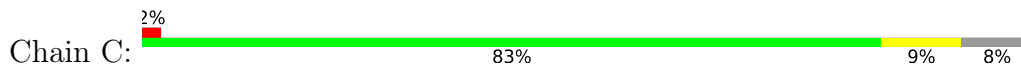




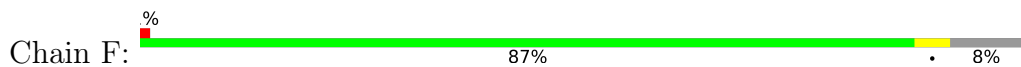
• Molecule 2: Cyclin-dependent kinase 12



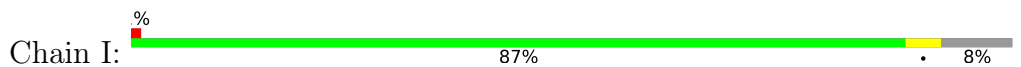
• Molecule 3: Cyclin-K



• Molecule 3: Cyclin-K



• Molecule 3: Cyclin-K



4 Data and refinement statistics i

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	249.80Å 249.80Å 218.08Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	54.19 – 3.58 216.33 – 3.58	Depositor EDS
% Data completeness (in resolution range)	78.7 (54.19-3.58) 78.8 (216.33-3.58)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.52 (at 3.58Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.177 , 0.219 0.196 , 0.230	Depositor DCC
R_{free} test set	3658 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	152.4	Xtrriage
Anisotropy	0.025	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 121.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.42$, $\langle L^2 \rangle = 0.25$	Xtrriage
Estimated twinning fraction	0.073 for -h,-k,l	Xtrriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	67528	wwPDB-VP
Average B, all atoms (Å ²)	181.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.60% 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: RLC, TPO, SO4

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	0.35	0/6604	0.65	0/8931
1	D	0.34	0/6612	0.63	0/8942
1	G	0.35	0/6603	0.64	0/8930
2	B	0.36	0/2704	0.63	0/3645
2	E	0.36	0/2704	0.65	0/3645
2	H	0.37	0/2743	0.64	0/3699
3	C	0.35	0/2120	0.58	0/2868
3	F	0.34	0/2120	0.58	0/2868
3	I	0.33	0/2120	0.57	0/2868
All	All	0.35	0/34330	0.63	0/46396

There are no bond length outliers.

There are no bond angle outliers.

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	6487	6451	6451	48	0
1	D	6495	6462	6464	77	0
1	G	6486	6454	6456	82	0
2	B	2656	2670	2670	26	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	E	2656	2670	2670	38	0
2	H	2693	2702	2702	41	0
3	C	2063	2048	2048	13	0
3	F	2063	2048	2048	8	0
3	I	2063	2048	2048	6	0
4	A	25	0	0	0	0
4	B	5	0	0	0	0
4	C	15	0	0	0	0
4	D	20	0	0	0	0
4	E	5	0	0	0	0
4	F	10	0	0	0	0
4	G	25	0	0	0	0
4	H	10	0	0	0	0
4	I	15	0	0	0	0
5	B	33	28	0	1	0
5	E	33	28	0	1	0
5	H	33	28	0	1	0
All	All	33891	33637	33557	321	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 5.

All (321) 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:H:862:CYS:HG	2:H:901:TYR:HH	0.85	0.82
2:E:758:VAL:O	2:E:808:ALA:HB1	1.86	0.76
1:D:228:GLY:HA3	1:D:241:ASN:HB2	1.73	0.71
1:G:770:LEU:HD21	1:G:865:GLU:HB2	1.74	0.68
2:H:828:LEU:HB3	2:H:1034:PRO:HG3	1.75	0.67
1:A:816:LEU:HD13	1:A:831:VAL:HG22	1.77	0.67
2:E:722:ARG:HE	2:E:726:LYS:HG3	1.60	0.67
2:B:1010:THR:O	2:B:1014:THR:HG23	1.97	0.64
1:D:364:VAL:HG22	1:D:375:LEU:HD13	1.80	0.63
1:G:1109:VAL:HG11	1:G:1126:ALA:HA	1.79	0.63
2:H:760:LEU:HD12	2:H:760:LEU:O	1.99	0.62
1:G:190:VAL:O	1:G:209:GLN:HA	2.00	0.62
1:D:933:LEU:HD21	1:D:942:PHE:CG	2.36	0.61
1:D:116:SER:HB2	1:D:134:ARG:HH12	1.65	0.61
2:H:841:LYS:HD2	2:H:1023:VAL:HB	1.84	0.60
1:G:1013:VAL:HG11	1:G:1138:ARG:O	2.01	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:1047:TRP:HZ3	1:G:1132:VAL:HG13	1.66	0.60
1:D:315:THR:HG22	1:D:323:PHE:HB3	1.84	0.59
2:B:896:VAL:HG23	2:B:906:LEU:HD13	1.85	0.59
2:B:751:GLU:OE1	2:B:790:LYS:NZ	2.36	0.59
1:D:157:ILE:HD11	1:D:202:PHE:N	2.17	0.59
1:A:376:VAL:HG22	1:A:389:ILE:CD1	2.33	0.58
2:E:828:LEU:O	2:E:1034:PRO:HD3	2.03	0.58
1:G:228:GLY:HA3	1:G:241:ASN:HB2	1.85	0.58
3:C:265:MET:SD	3:C:265:MET:N	2.76	0.58
1:D:134:ARG:HG3	1:D:134:ARG:O	2.04	0.58
1:G:773:SER:C	1:G:775:THR:H	2.07	0.58
1:D:170:LEU:HD21	1:D:229:ALA:HB2	1.86	0.58
1:D:213:GLU:HG2	1:D:215:GLU:H	1.68	0.58
1:D:931:LEU:HD11	1:D:944:GLU:HG3	1.87	0.57
1:A:775:THR:HG22	1:A:775:THR:O	2.04	0.57
2:E:906:LEU:HD11	2:E:913:TYR:CD2	2.40	0.57
2:H:774:GLU:HG3	2:H:878:PHE:HB2	1.86	0.57
1:D:886:SER:HB3	1:D:908:ASN:O	2.05	0.56
1:D:881:LEU:HD21	1:D:921:ILE:HG21	1.88	0.56
1:D:375:LEU:HB2	1:D:1012:LEU:HD21	1.88	0.56
1:G:790:ASN:HA	1:G:805:HIS:O	2.04	0.56
1:D:389:ILE:HD12	1:D:389:ILE:N	2.20	0.56
1:G:1047:TRP:CZ3	1:G:1132:VAL:HG13	2.40	0.56
1:D:816:LEU:HD13	1:D:831:VAL:HG22	1.88	0.56
1:D:851:PHE:HB3	1:D:858:LEU:HD22	1.88	0.56
2:B:989:ILE:HG23	2:B:990:PRO:HD2	1.88	0.55
1:A:1114:TYR:CZ	1:A:1122:ARG:HB2	2.42	0.55
2:E:857:HIS:O	2:E:918:ASP:OD1	2.23	0.55
1:A:912:LEU:HD11	1:A:926:LEU:HD13	1.88	0.55
3:C:63:ARG:HG3	3:C:123:LEU:HD11	1.89	0.55
1:G:773:SER:O	1:G:775:THR:N	2.36	0.55
1:D:378:CYS:SG	1:D:724:ILE:HB	2.47	0.54
1:G:223:PRO:HD3	1:G:271:TYR:OH	2.08	0.54
1:A:7:VAL:HG12	1:A:1091:GLY:HA3	1.90	0.54
1:D:709:LYS:HG2	1:D:710:LEU:N	2.22	0.54
1:G:1080:ARG:HE	2:H:825:GLU:HG2	1.70	0.54
1:D:140:PHE:HB3	1:D:157:ILE:HG23	1.88	0.54
2:E:831:PHE:HE1	2:E:1031:PRO:HB3	1.73	0.54
2:B:736:GLY:HA3	2:B:739:GLY:O	2.08	0.53
2:E:739:GLY:HA3	2:E:757:LYS:O	2.07	0.53
1:D:7:VAL:HG12	1:D:1091:GLY:HA3	1.90	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:936:LYS:HB2	1:G:941:ASN:OD1	2.09	0.53
1:D:770:LEU:HD13	1:D:865:GLU:HB2	1.91	0.53
2:E:841:LYS:O	2:E:845:GLU:HB2	2.09	0.53
1:A:248:ILE:HG12	1:A:250:PRO:HD3	1.91	0.52
1:G:36:ASN:O	1:G:37:THR:OG1	2.25	0.52
1:D:116:SER:CB	1:D:134:ARG:HH22	2.22	0.52
1:G:192:THR:OG1	1:G:206:PRO:HD2	2.10	0.52
1:A:843:PRO:HG2	2:B:1036:TRP:CZ3	2.45	0.52
1:A:184:ASP:HB2	1:A:185:PRO:CD	2.40	0.52
2:H:1010:THR:O	2:H:1014:THR:HG23	2.10	0.52
1:A:931:LEU:HD23	1:A:947:ARG:HB2	1.93	0.51
1:A:1133:VAL:O	1:A:1137:THR:HG23	2.11	0.51
1:G:286:GLU:O	1:G:297:LEU:HD12	2.10	0.51
1:D:60:LYS:O	1:D:81:THR:HA	2.11	0.51
2:E:823:LEU:HB3	2:E:829:VAL:HG11	1.93	0.51
2:E:897:ILE:HB	2:E:902:ARG:HG3	1.92	0.51
1:G:953:TRP:CD1	2:H:828:LEU:HD21	2.46	0.51
1:G:223:PRO:HG3	1:G:263:ARG:HH11	1.76	0.50
1:G:226:PHE:CE2	1:G:287:LYS:HB3	2.46	0.50
2:B:906:LEU:HD21	2:B:913:TYR:CD2	2.47	0.50
1:A:112:ILE:HD13	2:B:986:PHE:CE2	2.46	0.50
1:D:30:ASN:ND2	1:D:43:VAL:HG22	2.26	0.50
1:G:1003:PHE:O	1:G:1032:THR:HA	2.12	0.50
2:H:1025:LEU:O	2:H:1028:MET:HB2	2.11	0.50
2:E:856:LEU:HD11	2:E:915:PRO:HG3	1.93	0.50
1:G:114:ARG:HD3	2:H:930:PHE:O	2.12	0.50
1:A:889:ARG:HD2	1:A:891:TYR:CZ	2.47	0.49
2:B:803:LYS:HG3	3:C:142:VAL:HG21	1.93	0.49
2:E:729:ILE:HD12	2:E:729:ILE:H	1.76	0.49
1:G:11:LYS:HB3	1:G:12:PRO:HD2	1.94	0.49
2:E:823:LEU:HB3	2:E:829:VAL:CG1	2.41	0.49
1:D:316:TYR:CE2	1:D:318:ASP:HA	2.48	0.49
1:G:953:TRP:O	1:G:969:GLU:HG3	2.13	0.49
1:A:1114:TYR:CE2	1:A:1122:ARG:HB2	2.47	0.49
2:E:858:ARG:O	2:E:897:ILE:HG12	2.13	0.49
1:G:59:GLY:HA2	1:G:1073:TRP:CE3	2.48	0.49
1:G:72:GLU:OE2	1:G:103:ARG:NH2	2.46	0.49
1:D:288:GLU:HB2	1:D:298:LYS:HB2	1.94	0.49
1:D:1047:TRP:HZ3	1:D:1132:VAL:HG13	1.77	0.49
1:G:883:SER:HB2	1:G:911:ALA:HB3	1.94	0.49
1:G:123:ILE:HG21	1:G:168:LYS:HA	1.93	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:59:GLY:HA2	1:A:1073:TRP:CZ3	2.48	0.48
1:A:376:VAL:HG22	1:A:389:ILE:HD12	1.95	0.48
2:E:888:GLU:HG2	2:E:888:GLU:O	2.14	0.48
1:G:5:TYR:HB3	1:G:1041:THR:HG23	1.95	0.48
1:D:815:SER:OG	1:D:832:GLY:HA3	2.14	0.48
1:G:998:PHE:CZ	1:G:1074:ARG:HD2	2.49	0.48
2:H:762:ASN:HD22	2:H:764:LYS:HD3	1.77	0.48
2:H:917:ILE:HG13	2:H:918:ASP:N	2.29	0.48
1:G:382:PHE:H	1:G:720:SER:HB3	1.78	0.48
2:H:857:HIS:CE1	2:H:859:ASP:O	2.67	0.48
1:D:121:ILE:HB	1:D:134:ARG:HG2	1.95	0.48
1:D:191:LYS:HB2	1:D:209:GLN:HB3	1.96	0.48
1:G:184:ASP:HB2	1:G:185:PRO:CD	2.44	0.48
2:B:828:LEU:O	2:B:1034:PRO:HD3	2.14	0.48
1:D:849:VAL:HG11	1:D:851:PHE:CZ	2.49	0.48
1:G:795:ASP:HB2	1:G:802:LEU:HD11	1.94	0.48
3:C:163:PHE:CZ	3:C:204:GLU:HG3	2.49	0.48
2:H:802:PHE:CG	3:I:146:ILE:HD11	2.49	0.48
1:D:1057:ARG:HD3	1:D:1108:VAL:O	2.14	0.47
1:G:213:GLU:HG2	1:G:215:GLU:H	1.78	0.47
3:C:226:THR:HG21	3:C:234:TRP:HB2	1.95	0.47
3:F:231:TYR:OH	3:F:236:GLU:OE1	2.21	0.47
1:D:207:TRP:HB3	1:D:242:GLY:HA2	1.96	0.47
1:D:213:GLU:OE2	1:D:234:GLN:N	2.41	0.47
1:A:1003:PHE:O	1:A:1032:THR:HA	2.15	0.47
3:C:76:ILE:HD12	3:C:198:SER:HB3	1.96	0.47
1:G:1039:LEU:HD11	1:G:1139:ILE:HD12	1.96	0.47
2:E:802:PHE:CG	3:F:146:ILE:HD11	2.50	0.47
2:B:739:GLY:HA3	2:B:757:LYS:O	2.14	0.47
2:B:861:LYS:HB3	2:B:861:LYS:HE3	1.77	0.47
1:A:1117:GLY:O	1:A:1118:SER:HB3	2.15	0.46
1:D:5:TYR:CE2	1:D:7:VAL:HG13	2.50	0.46
1:G:5:TYR:CE1	1:G:1091:GLY:HA2	2.50	0.46
2:E:778:LEU:HD21	2:E:878:PHE:CD1	2.49	0.46
3:F:38:LEU:O	1:G:752:LEU:HA	2.15	0.46
1:G:953:TRP:NE1	2:H:828:LEU:HD21	2.30	0.46
1:A:170:LEU:HD21	1:A:229:ALA:HB2	1.96	0.46
1:D:63:VAL:O	1:D:79:ILE:HA	2.15	0.46
1:G:762:SER:O	1:G:803:HIS:HA	2.15	0.46
1:D:158:ARG:HD2	2:E:987:SER:HB2	1.98	0.46
1:G:43:VAL:HB	1:G:50:ARG:HB3	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:366:ASP:OD2	1:G:371:GLY:N	2.49	0.46
3:C:25:TYR:CZ	3:C:202:GLU:HG3	2.51	0.46
2:E:757:LYS:HG3	2:E:810:TYR:CE1	2.50	0.46
2:H:767:PHE:HD2	2:H:772:ILE:HG13	1.81	0.46
2:H:861:LYS:HE2	2:H:863:SER:HB3	1.97	0.46
1:A:318:ASP:OD1	1:A:319:ASN:N	2.49	0.46
2:H:722:ARG:HE	2:H:726:LYS:HG3	1.81	0.46
1:G:975:PHE:HA	1:G:996:GLY:O	2.16	0.46
2:H:951:LEU:HD21	2:H:986:PHE:HE2	1.81	0.46
1:A:223:PRO:HB2	1:A:225:PRO:HD2	1.97	0.46
1:G:944:GLU:OE1	2:H:732:ILE:HG22	2.16	0.45
1:D:921:ILE:HD12	1:D:933:LEU:HD23	1.98	0.45
3:F:185:ALA:HB1	3:F:210:VAL:HG23	1.98	0.45
2:H:800:LEU:N	2:H:800:LEU:HD12	2.31	0.45
3:F:195:THR:CG2	3:F:257:LEU:HD11	2.47	0.45
1:A:255:GLN:OE1	1:A:279:ARG:NH2	2.50	0.45
2:E:760:LEU:HD12	2:E:760:LEU:O	2.16	0.45
1:D:116:SER:CB	1:D:134:ARG:HH12	2.29	0.45
1:G:1127:ASP:O	1:G:1131:LYS:HG2	2.16	0.45
2:E:823:LEU:HD12	2:E:867:LEU:HD21	1.97	0.45
2:E:895:LYS:O	2:E:895:LYS:HG3	2.17	0.45
1:G:134:ARG:C	1:G:134:ARG:HD2	2.37	0.45
1:G:768:SER:HB3	1:G:808:LEU:HD11	1.99	0.45
1:G:328:LEU:HA	1:G:358:PRO:HD3	1.99	0.45
1:G:1080:ARG:NE	2:H:825:GLU:HG2	2.32	0.45
1:D:358:PRO:HD2	1:D:380:GLY:HA2	1.97	0.45
1:G:222:VAL:CG1	1:G:226:PHE:HB2	2.47	0.45
1:G:1080:ARG:HD3	2:H:825:GLU:HA	1.98	0.45
2:B:1034:PRO:O	2:B:1038:ASP:CG	2.55	0.44
1:D:146:ASP:OD1	1:D:147:ARG:N	2.51	0.44
1:A:42:TYR:CD2	1:A:49:LEU:HB3	2.53	0.44
1:A:6:VAL:HG22	1:A:1040:VAL:HG22	1.99	0.44
1:A:1011:SER:HB3	1:A:1014:MET:HG2	1.98	0.44
1:D:7:VAL:CG1	1:D:1091:GLY:HA3	2.48	0.44
1:D:121:ILE:HB	1:D:134:ARG:CG	2.47	0.44
2:H:716:GLU:HG3	3:I:20:THR:N	2.32	0.44
1:D:223:PRO:HD2	1:D:268:GLY:HA3	1.99	0.44
1:G:1029:LEU:HD23	1:G:1039:LEU:HB3	1.98	0.44
2:H:738:TYR:OH	2:H:756:LYS:HD2	2.18	0.44
2:E:727:PHE:CD2	2:E:755:LEU:HD21	2.52	0.44
1:A:958:GLU:HB2	1:A:1007:PHE:CB	2.47	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1097:PHE:O	1:A:1100:ILE:HG12	2.17	0.44
2:B:803:LYS:HA	3:C:142:VAL:CG1	2.48	0.44
3:C:41:LEU:HD21	3:C:49:TYR:CE2	2.53	0.44
1:G:358:PRO:HD2	1:G:380:GLY:HA2	1.99	0.44
1:A:1114:TYR:CD2	1:A:1122:ARG:O	2.71	0.44
2:B:860:ILE:HB	2:B:921:SER:CB	2.47	0.44
2:H:931:THR:O	2:H:932:LYS:HB2	2.17	0.44
2:B:928:GLU:O	2:B:932:LYS:N	2.44	0.44
5:B:1101:RLC:F1	5:B:1101:RLC:N1	2.39	0.44
1:D:158:ARG:HH12	1:D:160:GLU:HG2	1.83	0.44
1:G:318:ASP:OD1	1:G:319:ASN:N	2.50	0.44
5:H:1101:RLC:N1	5:H:1101:RLC:F1	2.40	0.44
2:B:841:LYS:HD2	2:B:1023:VAL:HB	2.00	0.43
3:C:243:PRO:HG2	3:C:246:VAL:HG23	2.00	0.43
1:D:207:TRP:CB	1:D:242:GLY:HA2	2.47	0.43
2:E:837:LYS:HD3	2:E:1023:VAL:HG22	2.00	0.43
1:G:1043:LEU:HD13	1:G:1051:LEU:HD12	1.99	0.43
3:C:239:VAL:HG12	3:C:242:VAL:HG23	2.00	0.43
1:D:148:ASP:HA	1:D:150:LYS:HE3	1.99	0.43
1:A:23:PHE:N	1:A:30:ASN:OD1	2.51	0.43
1:A:791:LEU:HD23	1:A:858:LEU:HD21	2.00	0.43
2:B:839:PHE:CD2	2:B:929:LEU:HD11	2.53	0.43
1:D:931:LEU:HD13	1:D:947:ARG:NH1	2.33	0.43
1:A:226:PHE:HE2	1:A:287:LYS:HB3	1.83	0.43
1:A:770:LEU:HD13	1:A:865:GLU:HB2	2.01	0.43
2:B:816:MET:HA	2:B:868:ASN:OD1	2.19	0.43
3:F:222:ILE:HD12	3:F:234:TRP:CZ2	2.54	0.43
1:G:391:ARG:NH2	1:G:711:HIS:ND1	2.66	0.43
1:G:1011:SER:OG	1:G:1013:VAL:HG22	2.18	0.43
1:A:311:ALA:HB2	1:A:324:VAL:HG13	2.01	0.43
2:E:741:VAL:HG22	2:E:756:LYS:HG3	2.01	0.43
2:E:802:PHE:CB	3:F:146:ILE:HD11	2.48	0.43
1:G:1061:VAL:HG11	1:G:1104:LYS:HB3	1.99	0.43
2:H:935:ILE:HD12	2:H:986:PHE:HZ	1.83	0.43
1:D:765:VAL:HG22	1:D:806:GLN:HB3	2.00	0.43
2:H:902:ARG:HG2	2:H:903:PRO:HD2	2.01	0.43
3:I:262:LYS:HE2	3:I:262:LYS:HB2	1.82	0.43
1:A:1109:VAL:HG11	1:A:1126:ALA:HA	2.00	0.43
2:E:803:LYS:HA	3:F:142:VAL:CG1	2.49	0.43
1:G:99:ASP:OD1	1:G:99:ASP:N	2.52	0.43
1:A:833:THR:O	1:A:870:VAL:HG23	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:213:LEU:HD11	3:C:255:LEU:HD11	2.01	0.42
1:D:223:PRO:HG3	1:D:263:ARG:HH11	1.82	0.42
2:E:726:LYS:C	2:E:727:PHE:HD1	2.22	0.42
1:G:330:ASP:HA	1:G:355:ASN:HB3	2.01	0.42
2:H:769:ILE:HA	2:H:772:ILE:HB	2.01	0.42
1:D:372:GLN:NE2	1:D:392:ASN:O	2.51	0.42
2:E:727:PHE:HD2	2:E:755:LEU:HD21	1.84	0.42
1:G:43:VAL:HG23	1:G:52:VAL:HG21	2.01	0.42
3:I:195:THR:CG2	3:I:257:LEU:HD11	2.49	0.42
1:A:316:TYR:OH	1:A:319:ASN:O	2.17	0.42
1:A:883:SER:HB2	1:A:911:ALA:HB3	2.00	0.42
1:G:773:SER:C	1:G:775:THR:N	2.71	0.42
2:H:732:ILE:O	2:H:732:ILE:HG23	2.20	0.42
2:B:789:MET:HE2	2:B:813:PHE:CZ	2.55	0.42
1:D:30:ASN:HD22	1:D:43:VAL:HG22	1.85	0.42
1:D:1120:MET:HG3	1:D:1122:ARG:HG3	2.01	0.42
2:E:933:LYS:HE2	2:E:937:GLN:OE1	2.18	0.42
1:A:5:TYR:CE2	1:A:7:VAL:HG13	2.55	0.42
1:D:31:LEU:HD13	1:D:315:THR:HG21	2.02	0.42
1:D:116:SER:HB3	1:D:134:ARG:HH22	1.84	0.42
1:G:1109:VAL:HG12	1:G:1129:LEU:HD12	2.01	0.42
2:H:760:LEU:HD12	2:H:760:LEU:C	2.39	0.42
2:H:799:ALA:HB1	2:H:804:LYS:HB2	1.99	0.42
2:B:996:LEU:O	2:B:1000:MET:HG3	2.19	0.42
2:E:1021:LYS:HB3	2:E:1021:LYS:HE3	1.89	0.42
2:B:755:LEU:CD2	2:B:812:VAL:HG22	2.49	0.42
1:G:881:LEU:HD21	1:G:921:ILE:HG21	2.01	0.42
2:H:801:ASP:HB3	2:H:804:LYS:HG3	2.02	0.42
1:A:790:ASN:HA	1:A:805:HIS:O	2.18	0.42
1:D:998:PHE:CZ	1:D:1074:ARG:HD2	2.55	0.42
1:G:832:GLY:HA3	1:G:870:VAL:HB	2.01	0.42
2:H:848:GLU:O	2:H:852:LYS:HB3	2.20	0.42
1:A:143:ILE:HG12	1:A:154:ALA:HB2	2.02	0.42
1:D:36:ASN:ND2	1:D:1001:GLY:O	2.52	0.42
1:D:358:PRO:O	1:D:379:SER:HA	2.20	0.42
1:D:744:ASP:OD1	1:D:746:SER:HB3	2.19	0.42
1:G:275:ASP:C	1:G:275:ASP:OD1	2.59	0.42
1:G:1017:LEU:H	1:G:1017:LEU:HG	1.63	0.42
1:G:1133:VAL:O	1:G:1137:THR:HG23	2.19	0.42
2:H:903:PRO:HG2	2:H:906:LEU:HG	2.02	0.42
1:D:19:VAL:O	1:D:31:LEU:HD12	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:184:ASP:HB2	1:D:185:PRO:CD	2.50	0.42
1:D:709:LYS:CG	1:D:710:LEU:N	2.82	0.42
2:H:1027:LYS:O	2:H:1028:MET:C	2.58	0.42
3:I:63:ARG:HE	3:I:123:LEU:HD21	1.85	0.42
1:A:809:GLN:O	1:A:810:ASN:HB2	2.20	0.41
1:A:931:LEU:CD1	1:A:933:LEU:HG	2.50	0.41
1:G:771:PHE:CZ	1:G:847:ARG:HG3	2.56	0.41
3:I:266:PRO:O	3:I:267:HIS:C	2.58	0.41
1:D:248:ILE:HG12	1:D:250:PRO:HD3	2.03	0.41
1:D:939:GLU:HB2	1:D:941:ASN:OD1	2.20	0.41
1:G:108:VAL:O	1:G:141:LYS:HE3	2.19	0.41
1:A:841:ALA:O	2:B:1036:TRP:HB2	2.20	0.41
2:B:803:LYS:HA	3:C:142:VAL:HG13	2.01	0.41
1:D:170:LEU:HA	1:D:170:LEU:HD23	1.80	0.41
1:D:1011:SER:OG	1:D:1013:VAL:HG22	2.19	0.41
2:H:847:LEU:HD12	2:H:847:LEU:HA	1.94	0.41
2:B:778:LEU:HD21	2:B:878:PHE:CD1	2.55	0.41
1:D:59:GLY:HA2	1:D:1073:TRP:CZ3	2.56	0.41
1:A:90:GLU:HB3	1:A:101:ILE:HB	2.03	0.41
1:A:248:ILE:HD12	1:A:300:LEU:O	2.21	0.41
2:E:902:ARG:HG2	2:E:903:PRO:HD2	2.03	0.41
1:G:914:LEU:O	1:G:915:LYS:HG2	2.21	0.41
1:G:889:ARG:HD2	1:G:891:TYR:CZ	2.55	0.41
1:A:224:GLU:N	1:A:225:PRO:CD	2.84	0.41
1:D:385:GLY:HA3	1:D:721:PRO:HD3	2.02	0.41
2:E:838:SER:O	2:E:842:GLN:HG3	2.20	0.41
1:G:199:GLU:HB3	1:G:201:GLU:HG2	2.03	0.41
1:G:953:TRP:HE1	2:H:828:LEU:HD21	1.86	0.41
2:B:906:LEU:HD21	2:B:913:TYR:HD2	1.85	0.41
1:D:68:ARG:HB2	1:D:75:ASP:OD1	2.21	0.41
1:D:809:GLN:O	1:D:810:ASN:HB2	2.21	0.41
2:E:755:LEU:CD2	2:E:812:VAL:HG22	2.51	0.41
2:E:859:ASP:HB2	2:E:880:LEU:HD12	2.03	0.41
1:G:7:VAL:HG22	1:G:1091:GLY:HA3	2.03	0.41
1:G:59:GLY:HA2	1:G:1073:TRP:CZ3	2.56	0.41
1:G:364:VAL:HG22	1:G:375:LEU:HD13	2.02	0.41
1:G:1106:GLN:HA	1:G:1109:VAL:HG22	2.03	0.41
2:H:826:SER:HB2	2:H:828:LEU:HG	2.03	0.41
1:D:35:LYS:O	1:D:36:ASN:C	2.59	0.41
1:D:883:SER:HB2	1:D:911:ALA:HB3	2.02	0.41
2:E:831:PHE:CE1	2:E:1031:PRO:HB3	2.54	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:26:ALA:HB2	1:G:73:SER:O	2.20	0.41
1:D:140:PHE:HB3	1:D:157:ILE:CG2	2.50	0.40
1:G:125:ASP:OD2	1:G:176:PRO:HB3	2.22	0.40
2:H:1036:TRP:HA	2:H:1039:CYS:SG	2.61	0.40
1:A:134:ARG:C	1:A:134:ARG:HD2	2.41	0.40
1:D:272:LEU:HD22	1:D:280:LEU:HD11	2.03	0.40
2:E:727:PHE:CD1	2:E:727:PHE:N	2.89	0.40
2:E:914:THR:O	2:E:917:ILE:HG12	2.21	0.40
1:G:182:TYR:HE2	1:G:191:LYS:HB2	1.87	0.40
2:H:1021:LYS:HE3	2:H:1021:LYS:HB3	1.82	0.40
1:D:52:VAL:HG23	1:D:53:LYS:N	2.37	0.40
1:D:261:HIS:HA	1:D:272:LEU:O	2.20	0.40
1:G:143:ILE:HG12	1:G:154:ALA:HB2	2.04	0.40
1:A:158:ARG:NH1	1:A:160:GLU:HG2	2.37	0.40
1:D:883:SER:HB3	1:D:914:LEU:HD11	2.03	0.40
5:E:1101:RLC:F1	5:E:1101:RLC:N1	2.44	0.40
1:G:170:LEU:HD12	1:G:170:LEU:HA	1.96	0.40
1:G:830:ILE:HG12	1:G:850:VAL:HG13	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	822/840 (98%)	798 (97%)	22 (3%)	2 (0%)	47	80
1	D	823/840 (98%)	801 (97%)	22 (3%)	0	100	100
1	G	822/840 (98%)	798 (97%)	24 (3%)	0	100	100
2	B	323/344 (94%)	314 (97%)	8 (2%)	1 (0%)	41	74
2	E	323/344 (94%)	318 (98%)	5 (2%)	0	100	100
2	H	327/344 (95%)	319 (98%)	8 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	C	246/271 (91%)	243 (99%)	3 (1%)	0	100	100
3	F	246/271 (91%)	243 (99%)	3 (1%)	0	100	100
3	I	246/271 (91%)	242 (98%)	4 (2%)	0	100	100
All	All	4178/4365 (96%)	4076 (98%)	99 (2%)	3 (0%)	51	84

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	372	GLN
1	A	1014	MET
2	B	1034	PRO

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	721/728 (99%)	710 (98%)	11 (2%)	65	85
1	D	722/728 (99%)	715 (99%)	7 (1%)	76	89
1	G	721/728 (99%)	713 (99%)	8 (1%)	73	88
2	B	293/308 (95%)	275 (94%)	18 (6%)	18	53
2	E	293/308 (95%)	289 (99%)	4 (1%)	67	85
2	H	297/308 (96%)	288 (97%)	9 (3%)	41	72
3	C	223/242 (92%)	219 (98%)	4 (2%)	59	81
3	F	223/242 (92%)	222 (100%)	1 (0%)	91	97
3	I	223/242 (92%)	221 (99%)	2 (1%)	78	90
All	All	3716/3834 (97%)	3652 (98%)	64 (2%)	60	83

All (64) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	118	THR

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Mol	Chain	Res	Type
1	A	290	GLN
1	A	766	SER
1	A	870	VAL
1	A	980	ASP
1	A	985	THR
1	A	986	ASP
1	A	987	GLU
1	A	1013	VAL
1	A	1015	GLN
1	A	1125	THR
2	B	740	GLN
2	B	760	LEU
2	B	761	ASP
2	B	784	ARG
2	B	787	VAL
2	B	797	GLN
2	B	829	VAL
2	B	844	MET
2	B	857	HIS
2	B	860	ILE
2	B	861	LYS
2	B	865	ILE
2	B	867	LEU
2	B	874	LYS
2	B	875	LEU
2	B	883	LEU
2	B	896	VAL
2	B	897	ILE
3	C	126	ASP
3	C	230	MET
3	C	231	TYR
3	C	257	LEU
1	D	164	VAL
1	D	209	GLN
1	D	766	SER
1	D	977	CYS
1	D	985	THR
1	D	988	GLU
1	D	990	GLN
2	E	863	SER
2	E	867	LEU
2	E	906	LEU

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Mol	Chain	Res	Type
2	E	913	TYR
3	F	230	MET
1	G	118	THR
1	G	192	THR
1	G	870	VAL
1	G	929	SER
1	G	1009	HIS
1	G	1017	LEU
1	G	1039	LEU
1	G	1140	HIS
2	H	737	THR
2	H	860	ILE
2	H	861	LYS
2	H	867	LEU
2	H	895	LYS
2	H	897	ILE
2	H	898	THR
2	H	995	ASP
2	H	1036	TRP
3	I	142	VAL
3	I	231	TYR

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

Mol	Chain	Res	Type
1	G	189	HIS
2	H	999	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

3 non-standard protein/DNA/RNA residues 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	TPO	H	893	2	8,10,11	1.26	1 (12%)	10,14,16	1.07	0
2	TPO	E	893	2	8,10,11	1.02	0	10,14,16	1.21	1 (10%)
2	TPO	B	893	2	8,10,11	1.58	1 (12%)	10,14,16	1.29	1 (10%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	TPO	H	893	2	-	0/9/11/13	-
2	TPO	E	893	2	-	6/9/11/13	-
2	TPO	B	893	2	-	0/9/11/13	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	893	TPO	P-O1P	3.47	1.61	1.50
2	H	893	TPO	P-OG1	2.07	1.63	1.59

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	893	TPO	P-OG1-CB	-3.08	113.89	123.21
2	B	893	TPO	P-OG1-CB	-2.96	114.28	123.21

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	E	893	TPO	N-CA-CB-OG1
2	E	893	TPO	C-CA-CB-CG2
2	E	893	TPO	CB-OG1-P-O1P
2	E	893	TPO	N-CA-CB-CG2
2	E	893	TPO	CB-OG1-P-O3P
2	E	893	TPO	O-C-CA-CB

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

29 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	$\# Z > 2$
4	SO4	I	301	-	4,4,4	0.46	0	6,6,6	0.08	0
5	RLC	H	1101	-	33,36,36	0.65	0	38,50,50	0.89	1 (2%)
4	SO4	D	1204	-	4,4,4	0.45	0	6,6,6	0.09	0
4	SO4	F	301	-	4,4,4	0.37	0	6,6,6	0.10	0
4	SO4	D	1203	-	4,4,4	0.38	0	6,6,6	0.14	0
4	SO4	C	303	-	4,4,4	0.43	0	6,6,6	0.15	0
4	SO4	A	1205	-	4,4,4	0.41	0	6,6,6	0.11	0
4	SO4	H	1103	-	4,4,4	0.47	0	6,6,6	0.12	0
4	SO4	G	1205	-	4,4,4	0.42	0	6,6,6	0.16	0
4	SO4	A	1203	-	4,4,4	0.41	0	6,6,6	0.12	0
4	SO4	I	303	-	4,4,4	0.23	0	6,6,6	0.18	0
4	SO4	G	1204	-	4,4,4	0.39	0	6,6,6	0.12	0
4	SO4	A	1204	-	4,4,4	0.45	0	6,6,6	0.17	0
4	SO4	A	1201	-	4,4,4	0.35	0	6,6,6	0.15	0
4	SO4	D	1201	-	4,4,4	0.38	0	6,6,6	0.13	0
4	SO4	D	1202	-	4,4,4	0.37	0	6,6,6	0.12	0
4	SO4	E	1102	-	4,4,4	0.45	0	6,6,6	0.12	0
4	SO4	I	302	-	4,4,4	0.39	0	6,6,6	0.13	0
5	RLC	B	1101	-	33,36,36	0.66	0	38,50,50	0.91	1 (2%)
4	SO4	G	1201	-	4,4,4	0.33	0	6,6,6	0.08	0
4	SO4	C	302	-	4,4,4	0.47	0	6,6,6	0.15	0
4	SO4	G	1203	-	4,4,4	0.34	0	6,6,6	0.16	0
4	SO4	B	1102	-	4,4,4	0.44	0	6,6,6	0.13	0
4	SO4	F	302	-	4,4,4	0.24	0	6,6,6	0.07	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	SO4	G	1202	-	4,4,4	0.37	0	6,6,6	0.08	0
4	SO4	H	1102	-	4,4,4	0.41	0	6,6,6	0.24	0
4	SO4	A	1202	-	4,4,4	0.33	0	6,6,6	0.15	0
5	RLC	E	1101	-	33,36,36	0.66	0	38,50,50	1.01	2 (5%)
4	SO4	C	301	-	4,4,4	0.32	0	6,6,6	0.06	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
5	RLC	H	1101	-	-	7/21/21/21	0/4/4/4
5	RLC	E	1101	-	-	9/21/21/21	0/4/4/4
5	RLC	B	1101	-	-	7/21/21/21	0/4/4/4

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	H	1101	RLC	C16-C13-N3	-3.10	118.23	120.81
5	B	1101	RLC	C16-C13-N3	-3.02	118.30	120.81
5	E	1101	RLC	C16-C13-N3	-2.90	118.40	120.81
5	E	1101	RLC	C14-N7-C21	2.47	128.48	124.31

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	B	1101	RLC	N3-C14-N7-C21
5	B	1101	RLC	N4-C14-N7-C21
5	B	1101	RLC	C20-C18-N6-C15
5	B	1101	RLC	C20-C18-N6-C17
5	B	1101	RLC	C22-C21-C23-C24
5	B	1101	RLC	N7-C21-C23-C24
5	E	1101	RLC	N3-C14-N7-C21
5	E	1101	RLC	N4-C14-N7-C21
5	E	1101	RLC	C20-C18-N6-C15
5	E	1101	RLC	C20-C18-N6-C17
5	H	1101	RLC	N3-C14-N7-C21

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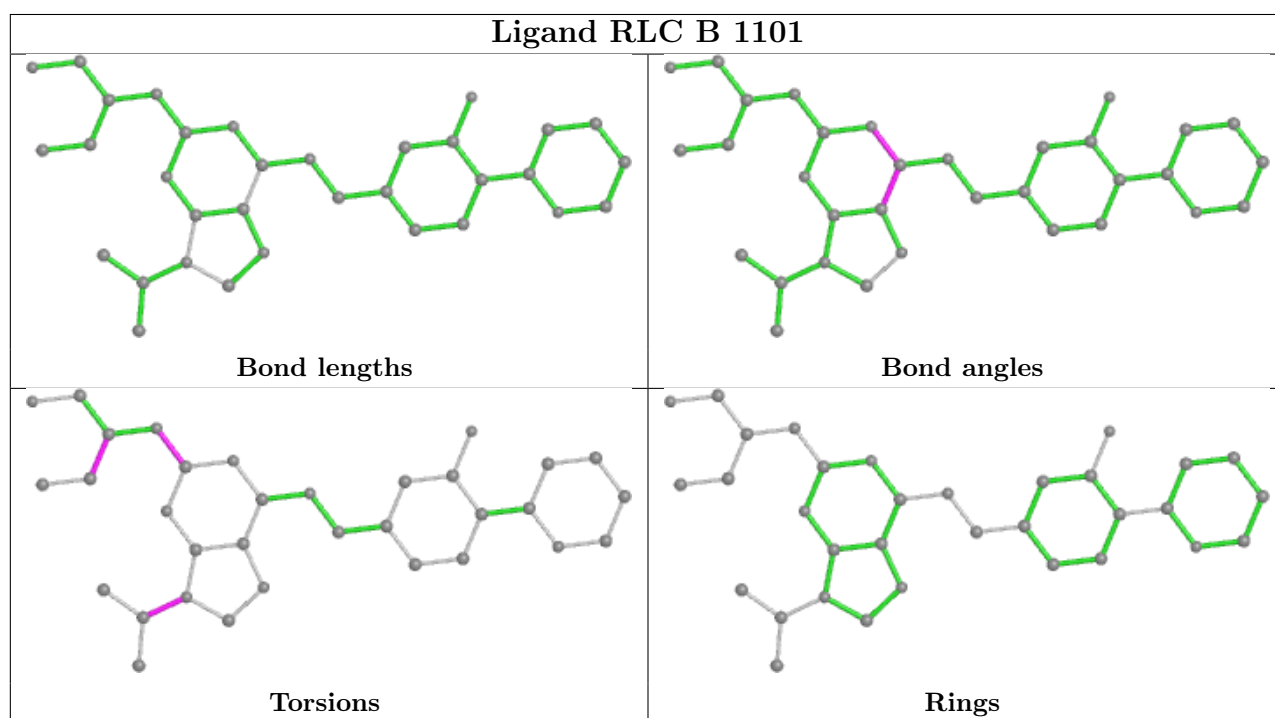
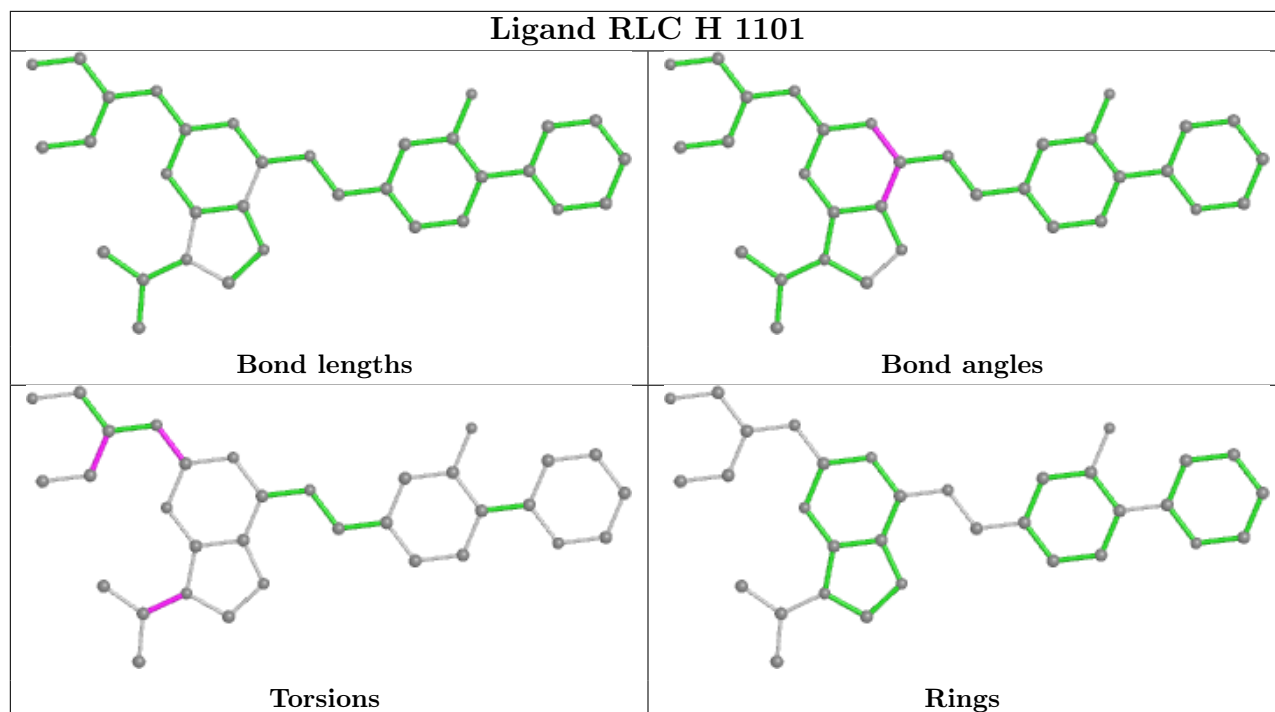
Mol	Chain	Res	Type	Atoms
5	H	1101	RLC	N4-C14-N7-C21
5	H	1101	RLC	C20-C18-N6-C15
5	H	1101	RLC	C20-C18-N6-C17
5	H	1101	RLC	C22-C21-C23-C24
5	H	1101	RLC	N7-C21-C23-C24
5	E	1101	RLC	N3-C13-N2-C12
5	E	1101	RLC	C16-C13-N2-C12
5	E	1101	RLC	C23-C21-C22-O1
5	E	1101	RLC	N7-C21-C22-O1
5	H	1101	RLC	C19-C18-N6-C17
5	B	1101	RLC	C19-C18-N6-C17
5	E	1101	RLC	C19-C18-N6-C17

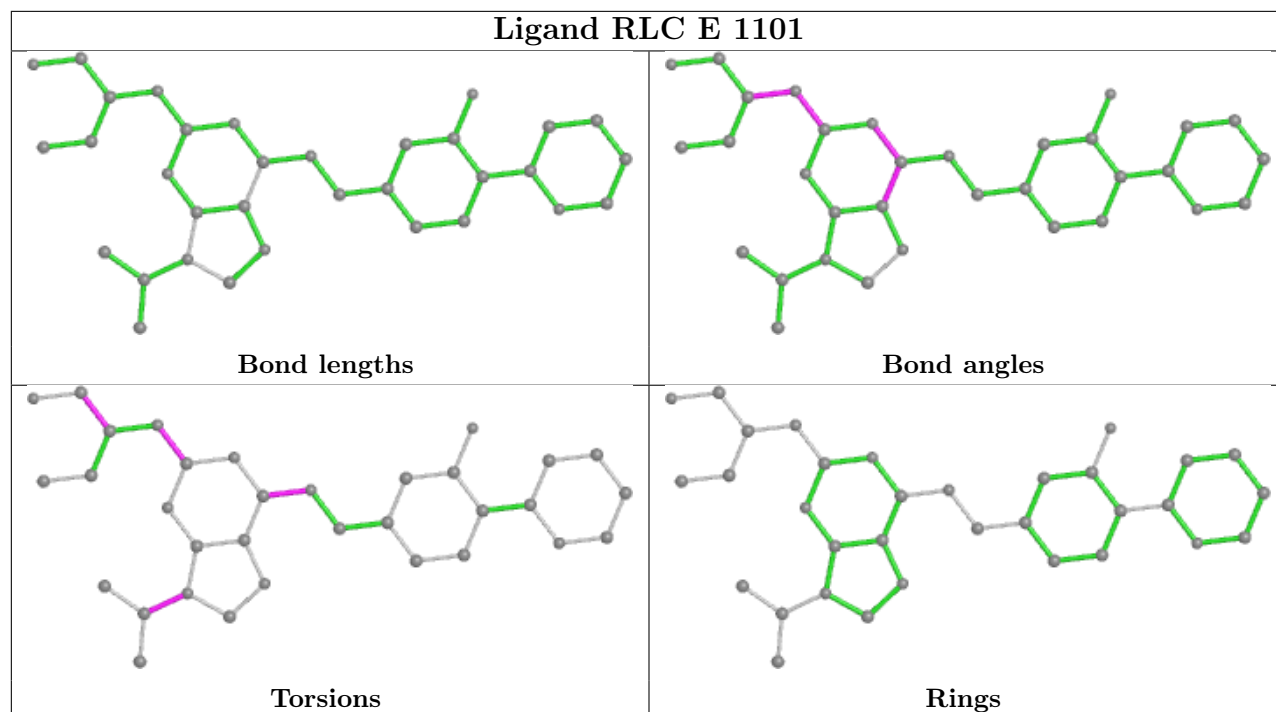
There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	H	1101	RLC	1	0
5	B	1101	RLC	1	0
5	E	1101	RLC	1	0

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





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	826/840 (98%)	0.39	50 (6%) 21 11	119, 164, 236, 318	0
1	D	827/840 (98%)	0.35	38 (4%) 32 19	114, 156, 228, 310	0
1	G	826/840 (98%)	0.37	54 (6%) 18 9	127, 167, 238, 321	0
2	B	325/344 (94%)	0.62	37 (11%) 5 3	138, 170, 238, 275	0
2	E	325/344 (94%)	0.45	15 (4%) 32 19	121, 161, 241, 306	0
2	H	329/344 (95%)	0.61	21 (6%) 19 10	109, 146, 222, 309	0
3	C	248/271 (91%)	0.36	6 (2%) 59 41	129, 160, 202, 270	0
3	F	248/271 (91%)	0.35	3 (1%) 79 64	105, 138, 178, 259	0
3	I	248/271 (91%)	0.37	4 (1%) 72 55	114, 142, 182, 254	0
All	All	4202/4365 (96%)	0.41	228 (5%) 25 14	105, 159, 232, 321	0

All (228) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	799	ALA	6.5
2	H	1043	TRP	6.3
2	E	1040	HIS	6.0
2	B	828	LEU	5.4
1	G	133	LEU	4.5
2	B	800	LEU	4.5
2	H	1032	ASP	4.4
1	G	1088	PHE	4.3
2	H	1044	SER	4.2
2	E	1039	CYS	4.1
2	B	720	GLY	4.1
2	B	802	PHE	4.1
1	A	60	LYS	4.0
2	E	1035	HIS	4.0
2	H	828	LEU	4.0

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Mol	Chain	Res	Type	RSRZ
1	A	1035	GLY	3.9
2	B	738	TYR	3.9
3	C	267	HIS	3.8
2	B	860	ILE	3.8
1	A	1029	LEU	3.7
2	B	798	ASP	3.7
2	E	1038	ASP	3.7
2	B	1035	HIS	3.5
1	G	957	VAL	3.5
2	H	798	ASP	3.4
1	G	253	ILE	3.4
2	B	797	GLN	3.4
2	E	882	ARG	3.4
1	G	328	LEU	3.4
2	B	896	VAL	3.4
1	D	91	TYR	3.3
1	G	61	ILE	3.3
2	B	858	ARG	3.3
1	G	131	ILE	3.3
3	C	155	LEU	3.3
1	A	61	ILE	3.3
1	G	1089	ILE	3.3
1	A	120	ILE	3.3
1	A	112	ILE	3.2
2	H	1036	TRP	3.2
1	A	59	GLY	3.2
1	G	314	LEU	3.1
1	D	39	LEU	3.1
1	A	145	LEU	3.1
1	A	57	MET	3.1
2	H	1041	GLU	3.1
2	B	878	PHE	3.0
3	F	262	LYS	3.0
1	D	33	ILE	3.0
2	H	720	GLY	2.9
1	G	132	GLY	2.9
1	G	5	TYR	2.9
1	G	1004	VAL	2.9
1	G	273	LEU	2.9
1	G	323	PHE	2.8
2	E	913	TYR	2.8
1	G	327	ARG	2.8

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Mol	Chain	Res	Type	RSRZ
1	D	232	ILE	2.8
1	A	79	ILE	2.7
1	A	39	LEU	2.7
2	H	839	PHE	2.7
1	G	1040	VAL	2.7
3	I	266	PRO	2.7
1	D	135	LEU	2.7
1	G	280	LEU	2.7
1	G	387	LEU	2.7
2	E	831	PHE	2.7
2	B	803	LYS	2.7
1	A	1079	GLU	2.7
2	E	891	PRO	2.7
1	A	64	MET	2.7
1	G	1000	LEU	2.7
1	A	32	LEU	2.7
2	B	1038	ASP	2.7
3	I	153	PHE	2.7
1	A	926	LEU	2.6
1	G	966	LEU	2.6
2	H	1040	HIS	2.6
1	G	64	MET	2.6
1	A	133	LEU	2.6
1	D	37	THR	2.6
1	D	57	MET	2.6
1	A	736	LEU	2.6
2	B	884	TYR	2.6
2	B	932	LYS	2.6
2	B	1033	LEU	2.6
1	A	914	LEU	2.6
2	E	778	LEU	2.6
2	H	1033	LEU	2.5
3	F	264	GLN	2.5
2	H	826	SER	2.5
2	B	776	LYS	2.5
1	G	79	ILE	2.5
2	B	856	LEU	2.5
1	A	933	LEU	2.5
1	G	733	PHE	2.5
2	H	829	VAL	2.5
1	A	1030	PHE	2.5
1	G	930	VAL	2.5

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Mol	Chain	Res	Type	RSRZ
1	G	1065	VAL	2.5
2	B	809	PHE	2.5
1	D	66	LEU	2.5
1	G	276	MET	2.5
2	B	877	ASP	2.4
1	D	31	LEU	2.4
1	A	16	ASN	2.4
2	H	1034	PRO	2.4
1	A	304	LEU	2.4
1	A	356	LEU	2.4
2	H	890	ARG	2.4
1	G	1024	THR	2.4
2	B	1040	HIS	2.4
1	D	240	HIS	2.4
1	D	219	VAL	2.4
1	A	62	ALA	2.4
1	A	89	LEU	2.4
1	A	135	LEU	2.4
2	B	781	LEU	2.4
2	B	883	LEU	2.4
1	D	733	PHE	2.4
2	B	775	ILE	2.4
1	G	356	LEU	2.4
2	B	875	LEU	2.4
3	C	164	LEU	2.4
2	B	955	PRO	2.3
1	D	64	MET	2.3
1	D	328	LEU	2.3
2	B	876	ALA	2.3
1	G	33	ILE	2.3
1	G	1129	LEU	2.3
2	E	875	LEU	2.3
2	B	839	PHE	2.3
1	A	80	LEU	2.3
1	G	312	GLU	2.3
2	B	721	LYS	2.3
1	D	121	ILE	2.3
2	H	873	ILE	2.3
1	A	5	TYR	2.3
1	A	77	LEU	2.3
1	A	792	LEU	2.3
1	D	42	TYR	2.3

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Mol	Chain	Res	Type	RSRZ
1	D	317	LEU	2.3
1	G	792	LEU	2.3
1	G	1030	PHE	2.3
2	B	831	PHE	2.3
1	G	1043	LEU	2.3
2	B	855	PHE	2.3
3	C	153	PHE	2.3
1	A	23	PHE	2.3
2	B	930	PHE	2.3
2	H	955	PRO	2.2
1	A	143	ILE	2.2
1	G	909	ILE	2.2
1	G	317	LEU	2.2
2	E	839	PHE	2.2
1	D	1097	PHE	2.2
1	D	36	ASN	2.2
1	D	40	GLU	2.2
1	A	15	VAL	2.2
2	H	767	PHE	2.2
1	A	816	LEU	2.2
1	D	89	LEU	2.2
2	E	896	VAL	2.2
1	G	307	GLU	2.2
1	A	735	VAL	2.2
1	D	2	SER	2.2
1	D	61	ILE	2.2
1	D	246	LEU	2.2
3	I	148	LEU	2.2
1	D	76	LEU	2.2
1	A	1016	ASN	2.2
1	A	1097	PHE	2.2
1	A	880	LEU	2.2
1	D	23	PHE	2.2
1	G	1002	GLU	2.2
1	G	16	ASN	2.2
1	G	305	LEU	2.2
1	G	36	ASN	2.2
1	A	1008	CYS	2.2
1	G	816	LEU	2.2
1	A	131	ILE	2.2
1	G	240	HIS	2.1
1	D	281	PHE	2.1

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Mol	Chain	Res	Type	RSRZ
1	D	1030	PHE	2.1
2	H	932	LYS	2.1
1	A	376	VAL	2.1
3	I	199	LEU	2.1
1	A	195	VAL	2.1
3	C	161	TYR	2.1
2	E	1032	ASP	2.1
1	G	735	VAL	2.1
1	D	100	ILE	2.1
1	A	121	ILE	2.1
1	G	139	LEU	2.1
2	H	755	LEU	2.1
1	G	1007	PHE	2.1
1	D	122	GLY	2.1
2	E	720	GLY	2.1
1	D	112	ILE	2.1
1	D	1000	LEU	2.1
2	B	811	LEU	2.1
1	G	237	ILE	2.0
1	A	858	LEU	2.0
1	A	974	LEU	2.0
1	G	914	LEU	2.0
1	G	1039	LEU	2.0
1	A	232	ILE	2.0
1	A	953	TRP	2.0
3	F	267	HIS	2.0
2	E	884	TYR	2.0
1	G	375	LEU	2.0
1	G	1076	PHE	2.0
2	B	863	SER	2.0
2	B	986	PHE	2.0
1	G	310	ILE	2.0
2	H	775	ILE	2.0
1	A	912	LEU	2.0
3	C	132	PHE	2.0
1	D	1040	VAL	2.0
1	A	140	PHE	2.0
1	D	140	PHE	2.0
1	D	998	PHE	2.0
1	G	791	LEU	2.0
1	A	33	ILE	2.0
1	D	63	VAL	2.0

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Mol	Chain	Res	Type	RSRZ
1	D	1005	ASN	2.0
1	G	306	GLY	2.0
1	D	216	ALA	2.0

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

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	TPO	H	893	11/12	0.85	0.27	158,186,241,241	6
2	TPO	E	893	11/12	0.86	0.14	212,221,265,267	6
2	TPO	B	893	11/12	0.86	0.19	205,223,273,278	6

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

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

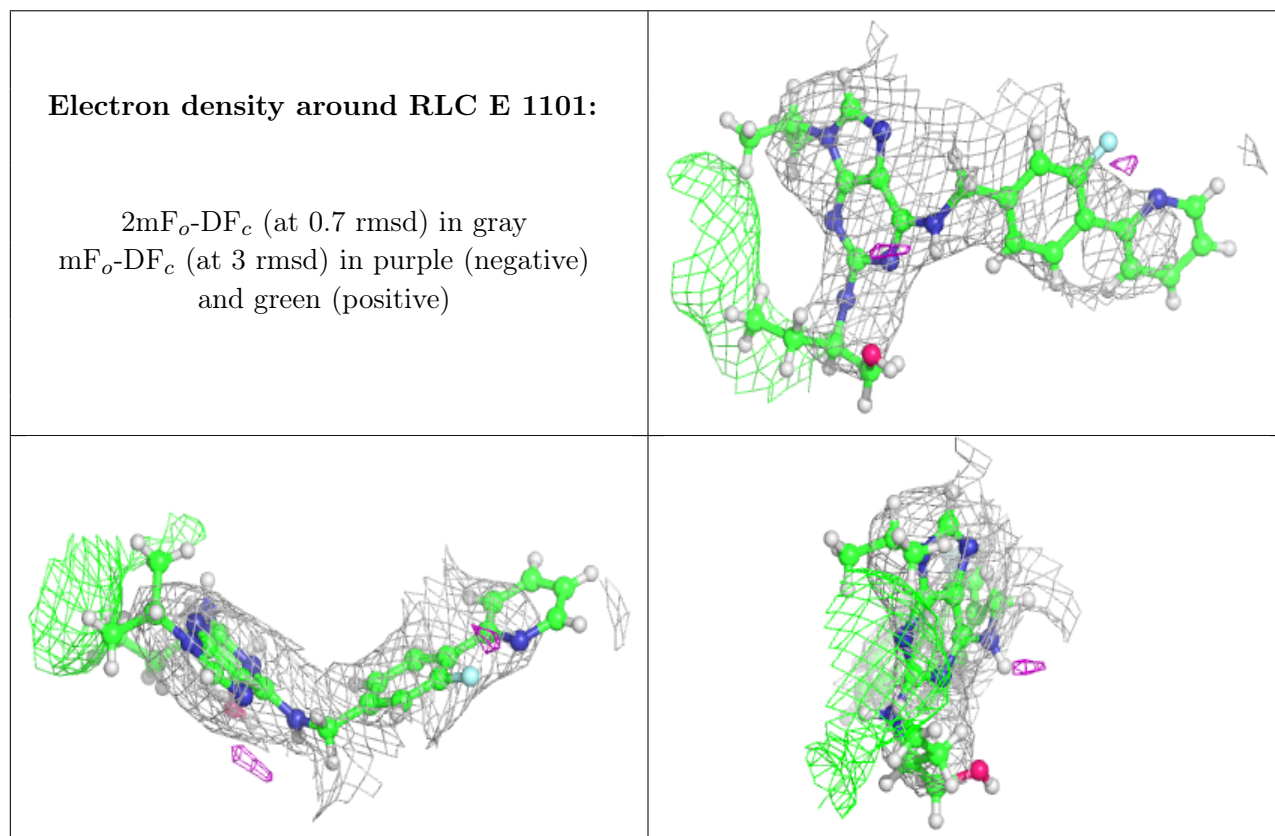
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	SO4	H	1103	5/5	0.60	0.22	195,202,214,247	0
4	SO4	H	1102	5/5	0.62	0.21	193,198,204,230	0
4	SO4	G	1202	5/5	0.66	0.21	176,177,192,217	0
4	SO4	G	1201	5/5	0.74	0.25	156,173,194,198	0
4	SO4	C	302	5/5	0.74	0.14	200,204,213,234	0
4	SO4	I	302	5/5	0.74	0.19	167,184,197,208	0
4	SO4	A	1204	5/5	0.78	0.21	165,190,222,234	0
4	SO4	A	1202	5/5	0.80	0.23	167,178,181,209	0
4	SO4	F	301	5/5	0.80	0.21	166,167,204,214	0
4	SO4	G	1203	5/5	0.80	0.21	182,182,189,212	0
4	SO4	C	301	5/5	0.83	0.24	140,170,179,189	0
4	SO4	I	303	5/5	0.84	0.19	152,156,167,170	0

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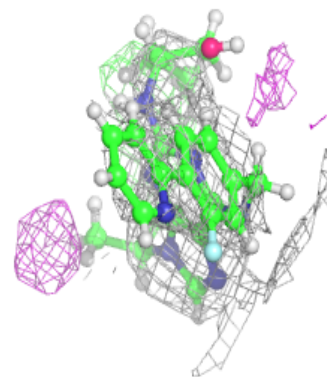
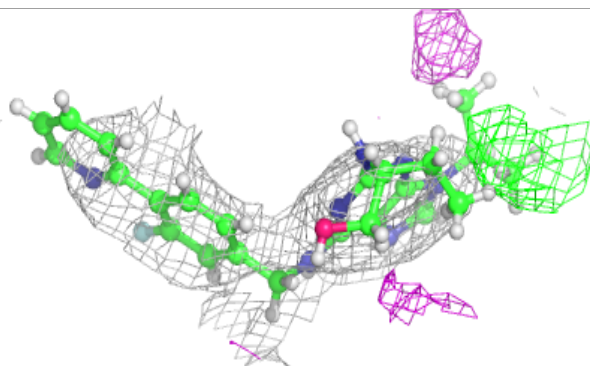
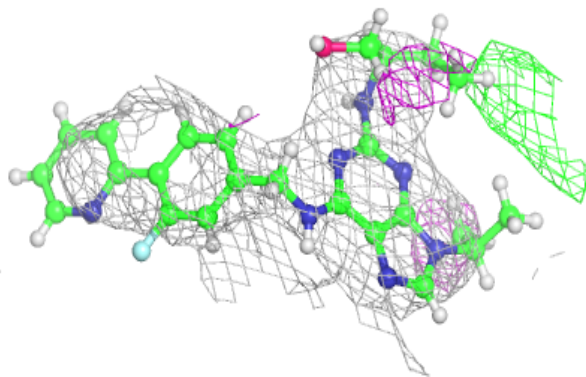
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	SO4	I	301	5/5	0.85	0.20	179,185,191,216	0
5	RLC	E	1101	33/33	0.85	0.69	121,168,194,215	28
4	SO4	D	1203	5/5	0.86	0.26	152,171,209,221	0
4	SO4	E	1102	5/5	0.86	0.16	189,192,219,238	0
4	SO4	C	303	5/5	0.86	0.15	189,197,212,238	0
4	SO4	B	1102	5/5	0.87	0.17	201,212,217,245	0
4	SO4	A	1205	5/5	0.87	0.10	199,206,214,240	0
4	SO4	D	1201	5/5	0.87	0.16	162,168,180,203	0
4	SO4	D	1202	5/5	0.89	0.25	153,176,202,209	0
5	RLC	H	1101	33/33	0.89	0.76	122,157,188,197	28
4	SO4	G	1205	5/5	0.90	0.17	186,200,231,241	0
4	SO4	D	1204	5/5	0.90	0.19	206,211,225,249	0
4	SO4	A	1201	5/5	0.90	0.14	164,171,194,203	0
4	SO4	G	1204	5/5	0.90	0.11	163,184,216,227	0
5	RLC	B	1101	33/33	0.91	0.82	131,168,202,214	28
4	SO4	A	1203	5/5	0.92	0.22	187,194,205,220	0
4	SO4	F	302	5/5	0.93	0.26	137,148,161,170	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.

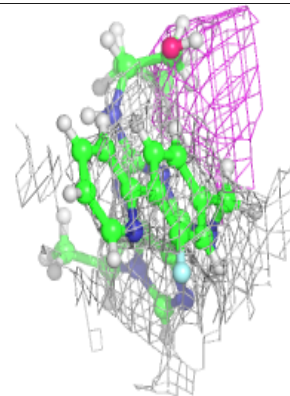
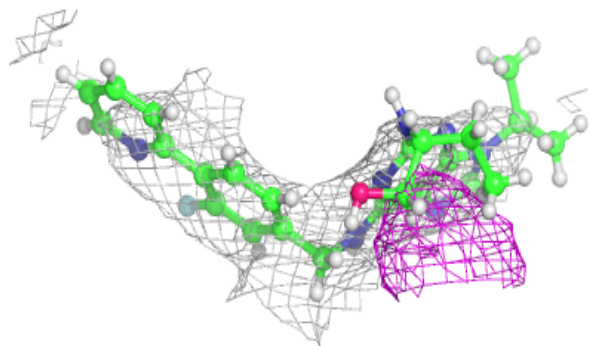
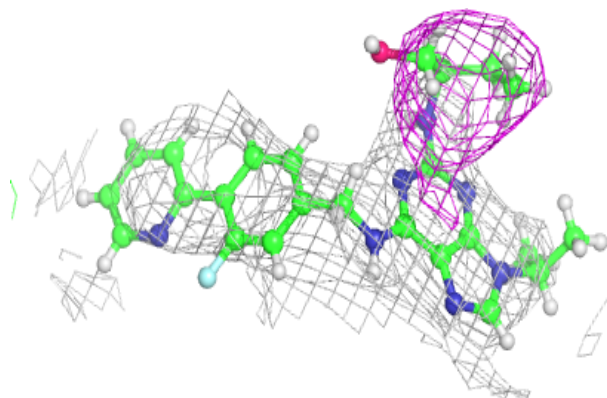


Electron density around RLC H 1101:

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

**Electron density around RLC B 1101:**

$2mF_o-DF_c$ (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.