



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 7, 2023 – 01:32 pm BST

PDB ID : 8BU4  
Title : Structure of DDB1 bound to DS22-engaged CDK12-cyclin K  
Authors : Kozicka, Z.; Kempf, G.; Focht, V.; Thoma, N.H.  
Deposited on : 2022-11-30  
Resolution : 3.09 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 : 1.8.4, 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

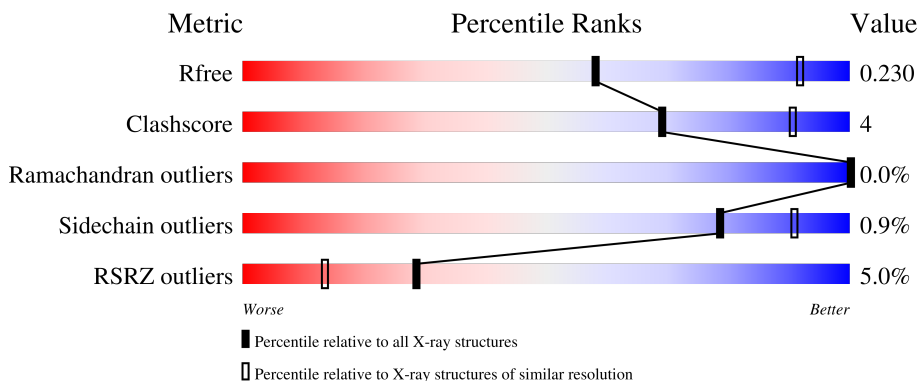
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.09 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.



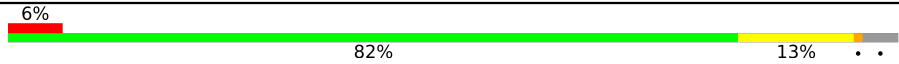

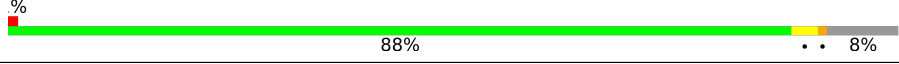
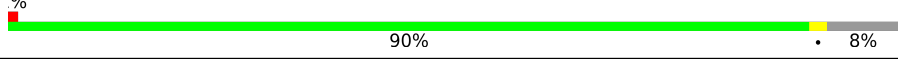
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	1094 (3.10-3.10)
Clashscore	141614	1184 (3.10-3.10)
Ramachandran outliers	138981	1141 (3.10-3.10)
Sidechain outliers	138945	1141 (3.10-3.10)
RSRZ outliers	127900	1067 (3.10-3.10)

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	A	840	 4% 89% 10% .
1	D	840	 4% 87% 11% .
1	G	840	 7% 87% 12% .
2	B	344	 9% 82% 13% .
2	E	344	 4% 80% 14% 6%

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Mol	Chain	Length	Quality of chain
2	H	344	 <p>6% 82% 13% . .</p>
3	C	271	 <p>4% 87% . 8%</p>
3	F	271	 <p>% 88% . . 8%</p>
3	I	271	 <p>% 90% . 8%</p>

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 67490 atoms, of which 33635 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	12937	4105	6450	1094	1252	36	6492	0	0
1	D	827	12957	4111	6462	1095	1253	36	6462	0	0
1	G	826	12938	4106	6452	1093	1251	36	6452	0	0

There are 39 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	expression tag	UNP Q16531
A	-2	GLY	-	expression tag	UNP Q16531
A	-1	GLY	-	expression tag	UNP Q16531
A	0	ARG	-	expression tag	UNP Q16531
A	700	GLY	-	linker	UNP Q16531
A	701	ASN	-	linker	UNP Q16531
A	702	GLY	-	linker	UNP Q16531
A	703	ASN	-	linker	UNP Q16531
A	704	SER	-	linker	UNP Q16531
A	705	GLY	-	linker	UNP Q16531
A	706	GLU	-	linker	UNP Q16531
A	707	ILE	-	linker	UNP Q16531
A	708	GLN	-	linker	UNP Q16531
D	-3	GLY	-	expression tag	UNP Q16531
D	-2	GLY	-	expression tag	UNP Q16531
D	-1	GLY	-	expression tag	UNP Q16531
D	0	ARG	-	expression tag	UNP Q16531
D	700	GLY	-	linker	UNP Q16531
D	701	ASN	-	linker	UNP Q16531
D	702	GLY	-	linker	UNP Q16531
D	703	ASN	-	linker	UNP Q16531
D	704	SER	-	linker	UNP Q16531
D	705	GLY	-	linker	UNP Q16531

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Chain	Residue	Modelled	Actual	Comment	Reference
D	706	GLU	-	linker	UNP Q16531
D	707	ILE	-	linker	UNP Q16531
D	708	GLN	-	linker	UNP Q16531
G	-3	GLY	-	expression tag	UNP Q16531
G	-2	GLY	-	expression tag	UNP Q16531
G	-1	GLY	-	expression tag	UNP Q16531
G	0	ARG	-	expression tag	UNP Q16531
G	700	GLY	-	linker	UNP Q16531
G	701	ASN	-	linker	UNP Q16531
G	702	GLY	-	linker	UNP Q16531
G	703	ASN	-	linker	UNP Q16531
G	704	SER	-	linker	UNP Q16531
G	705	GLY	-	linker	UNP Q16531
G	706	GLU	-	linker	UNP Q16531
G	707	ILE	-	linker	UNP Q16531
G	708	GLN	-	linker	UNP Q16531

- 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	329	Total	C	H	N	O	P	S	2697	0	0
			5384	1723	2697	454	492	1	17			
2	E	325	Total	C	H	N	O	P	S	2663	0	0
			5309	1695	2663	447	486	1	17			
2	H	330	Total	C	H	N	O	P	S	2701	0	0
			5394	1726	2701	455	494	1	17			

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

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Chain	Residue	Modelled	Actual	Comment	Reference
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	
3	C	248	Total	C	H	N	O	S	2048	0	0
			4111	1341	2048	346	363	13			
3	F	248	Total	C	H	N	O	S	2048	0	0
			4111	1341	2048	346	363	13			
3	I	248	Total	C	H	N	O	S	2048	0	0
			4111	1341	2048	346	363	13			

There are 12 discrepancies between the modelled and reference sequences:

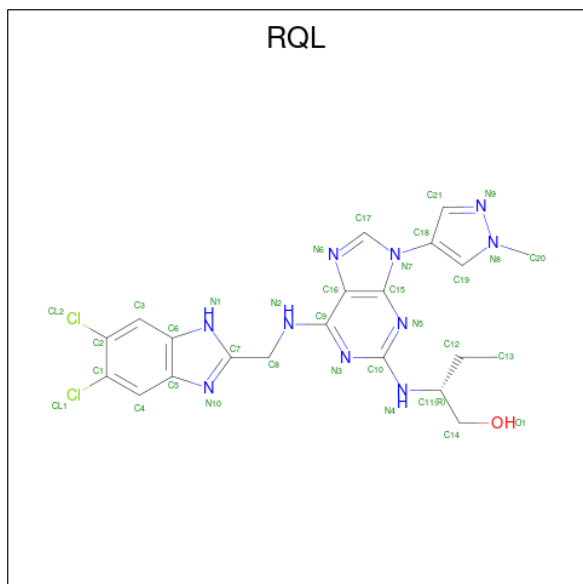
Chain	Residue	Modelled	Actual	Comment	Reference
C	-3	GLY	-	expression tag	UNP O75909
C	-2	GLY	-	expression tag	UNP O75909
C	-1	GLY	-	expression tag	UNP O75909
C	0	ARG	-	expression tag	UNP O75909
F	-3	GLY	-	expression tag	UNP O75909
F	-2	GLY	-	expression tag	UNP O75909
F	-1	GLY	-	expression tag	UNP O75909
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: O<sub>4</sub>S).



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

- Molecule 5 is (2 {R})-2-[[6-[[5,6-bis(chloranyl)-1 {H}-benzimidazol-2-yl]methylamino]-9-(1-methylpyrazol-4-yl)purin-2-yl]amino]butan-1-ol (three-letter code: RQL) (formula: C<sub>21</sub>H<sub>22</sub>Cl<sub>2</sub>N<sub>10</sub>O) (labeled as "Ligand of Interest" by depositor).



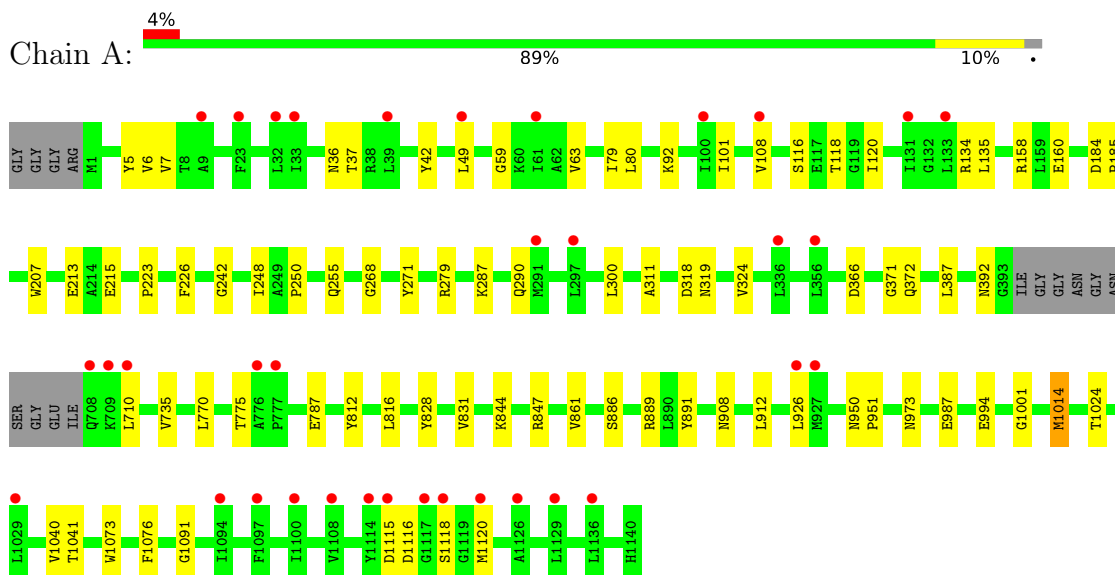
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	Cl	H	N			O
5	B	1	Total	C	Cl	H	N	O	22	0
			56	21	2	22	10	1		
5	E	1	Total	C	Cl	H	N	O	22	0
			56	21	2	22	10	1		
5	H	1	Total	C	Cl	H	N	O	22	0
			56	21	2	22	10	1		



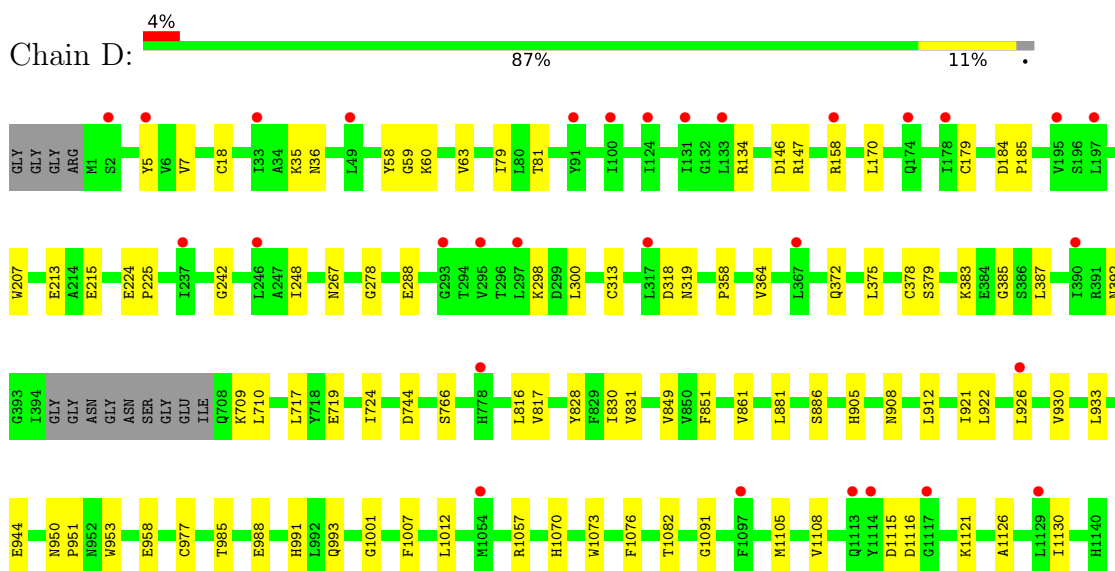
### 3 Residue-property plots [i](#)

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.

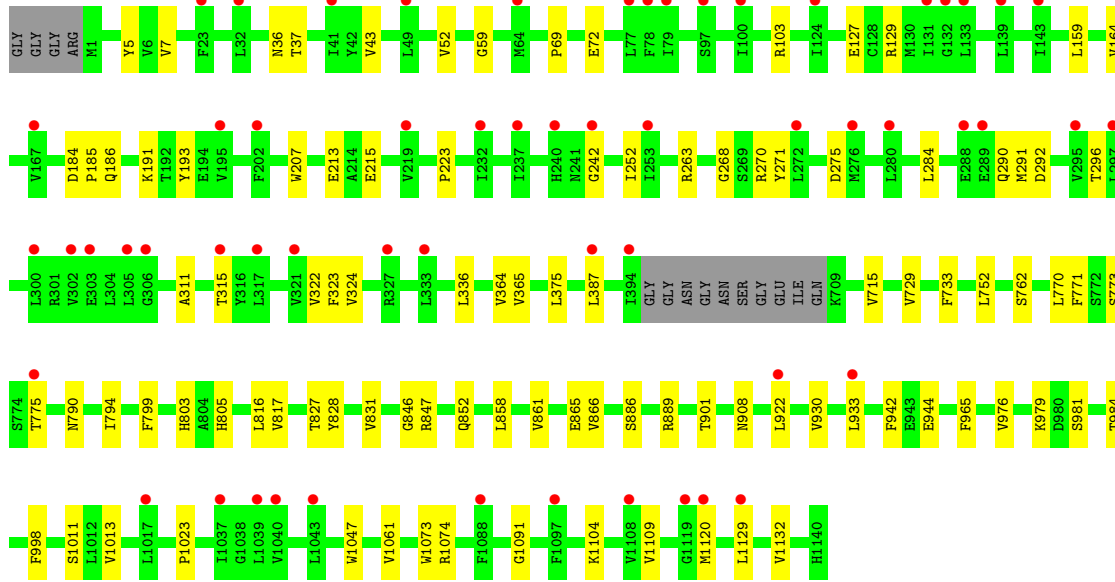
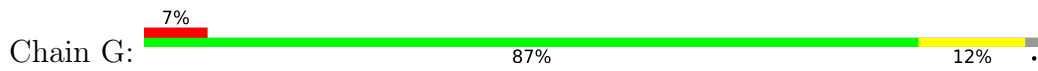
- Molecule 1: DNA damage-binding protein 1



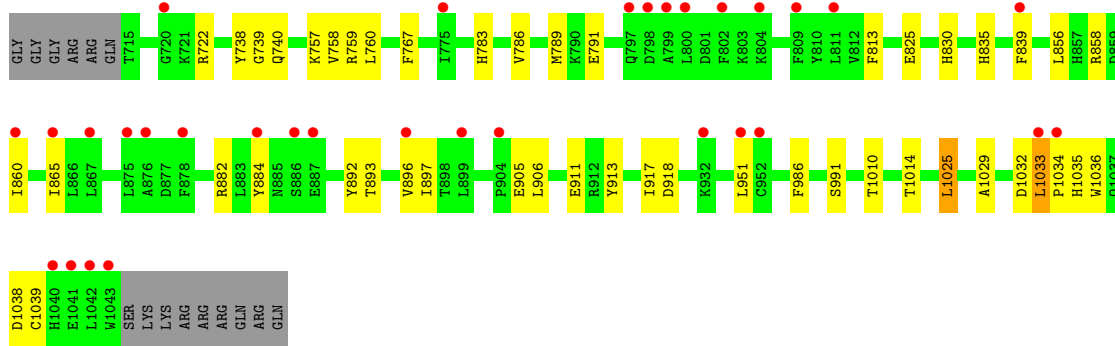
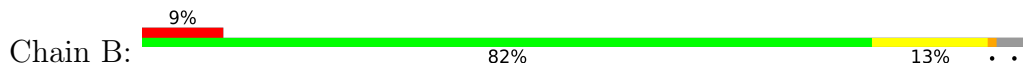
- Molecule 1: DNA damage-binding protein 1



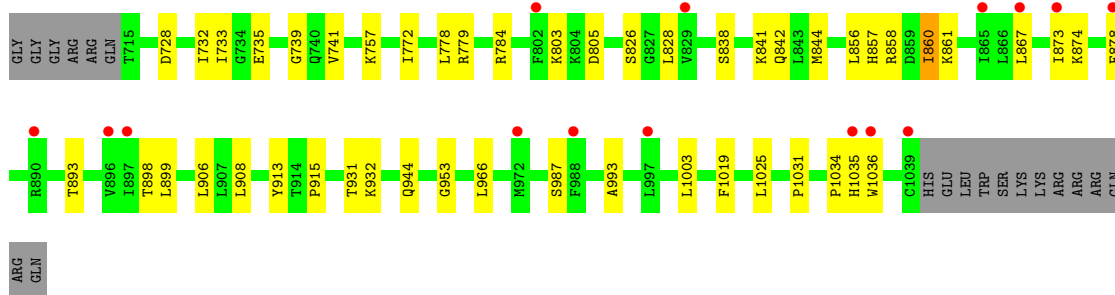
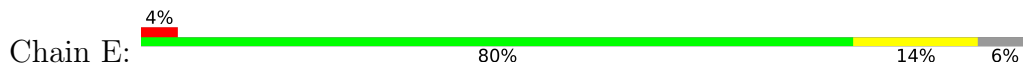
- Molecule 1: DNA damage-binding protein 1



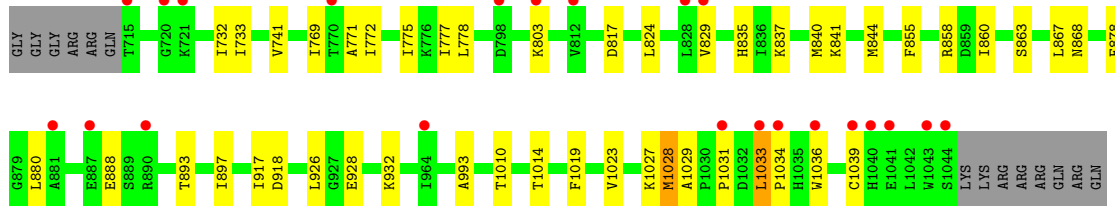
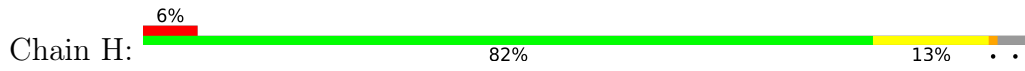
• Molecule 2: Cyclin-dependent kinase 12



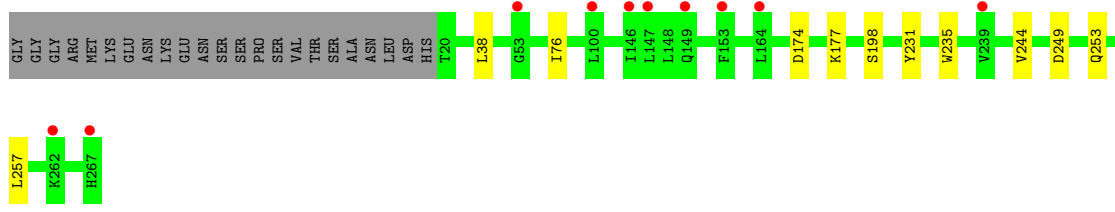
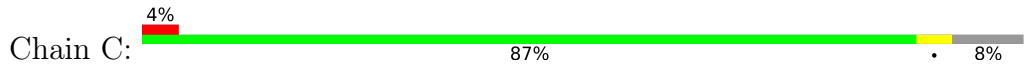
• Molecule 2: Cyclin-dependent kinase 12



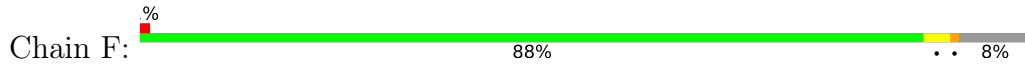
• Molecule 2: Cyclin-dependent kinase 12



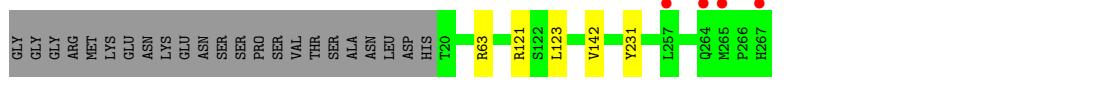
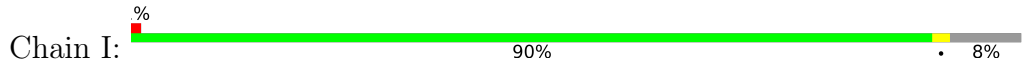
● Molecule 3: Cyclin-K



● 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, $\alpha$ , $\beta$ , $\gamma$	250.40Å 250.40Å 215.71Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	60.05 – 3.09 216.85 – 3.09	Depositor EDS
% Data completeness (in resolution range)	90.1 (60.05-3.09) 90.1 (216.85-3.09)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.59 (at 3.07Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, $R_{free}$	0.205 , 0.223 0.214 , 0.230	Depositor DCC
$R_{free}$ test set	6373 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	110.2	Xtrriage
Anisotropy	0.014	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 74.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.017 for -h,-k,l	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	67490	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	132.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.65% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: SO4, RQL, TPO

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	0.33	0/6604	0.61	0/8931
1	D	0.33	0/6612	0.61	0/8942
1	G	0.34	0/6603	0.61	0/8930
2	B	0.33	0/2737	0.57	0/3691
2	E	0.32	0/2693	0.56	0/3630
2	H	0.33	0/2743	0.54	0/3699
3	C	0.32	0/2120	0.55	0/2868
3	F	0.34	0/2120	0.56	0/2868
3	I	0.33	0/2120	0.55	0/2868
All	All	0.33	0/34352	0.59	0/46427

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	6450	6451	47	1
1	D	6495	6462	6464	57	0
1	G	6486	6452	6454	63	1
2	B	2687	2697	2697	24	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	E	2646	2663	2663	29	0
2	H	2693	2701	2701	26	0
3	C	2063	2048	2048	6	0
3	F	2063	2048	2048	10	0
3	I	2063	2048	2048	4	0
4	A	15	0	0	0	0
4	B	5	0	0	0	0
4	C	5	0	0	0	0
4	D	20	0	0	0	0
4	F	10	0	0	0	0
4	G	10	0	0	0	0
4	I	5	0	0	0	0
5	B	34	22	0	0	0
5	E	34	22	0	1	0
5	H	34	22	0	0	0
All	All	33855	33635	33574	249	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 4.

All (249) 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)
3:F:231:TYR:OH	3:F:236:GLU:OE1	2.11	0.69
1:G:1109:VAL:HG12	1:G:1129:LEU:HD12	1.80	0.62
2:E:841:LYS:HG2	2:E:1025:LEU:HD11	1.83	0.61
1:A:366:ASP:OD2	1:A:371:GLY:N	2.32	0.61
3:F:191:ASP:OD2	3:F:258:TYR:OH	2.06	0.60
1:G:1047:TRP:HZ3	1:G:1132:VAL:HG13	1.64	0.60
1:D:1115:ASP:OD2	1:D:1121:LYS:NZ	2.35	0.60
1:G:43:VAL:HG23	1:G:52:VAL:HG21	1.81	0.60
1:G:828:TYR:CE1	1:G:861:VAL:HG21	2.37	0.60
2:B:835:HIS:HD2	2:B:1029:ALA:HB1	1.65	0.60
1:D:213:GLU:HG2	1:D:215:GLU:H	1.66	0.59
2:E:733:ILE:HD11	2:E:741:VAL:HG12	1.84	0.59
1:G:36:ASN:O	1:G:37:THR:OG1	2.18	0.59
1:D:985:THR:HB	1:D:988:GLU:HG2	1.85	0.59
1:A:775:THR:HG22	1:A:775:THR:O	2.02	0.59
2:B:951:LEU:HD21	2:B:986:PHE:HE2	1.68	0.58
1:D:207:TRP:HB3	1:D:242:GLY:HA2	1.86	0.58
1:G:773:SER:C	1:G:775:THR:H	2.06	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:248:ILE:HG12	1:A:250:PRO:HD3	1.85	0.58
1:D:905:HIS:CG	1:D:933:LEU:HD11	2.38	0.58
2:E:867:LEU:HD13	2:E:873:ILE:HD11	1.86	0.58
1:G:1047:TRP:CZ3	1:G:1132:VAL:HG13	2.37	0.58
1:G:213:GLU:HG2	1:G:215:GLU:H	1.68	0.58
1:A:120:ILE:HG23	1:A:135:LEU:HD23	1.86	0.57
2:E:856:LEU:HD11	2:E:915:PRO:HG3	1.86	0.57
1:A:207:TRP:HB3	1:A:242:GLY:HA2	1.87	0.56
1:G:311:ALA:HB2	1:G:324:VAL:HG13	1.88	0.56
2:E:857:HIS:ND1	2:E:860:ILE:HG12	2.21	0.55
3:F:43:PRO:HG2	1:G:252:ILE:HD11	1.90	0.54
1:D:881:LEU:HD21	1:D:921:ILE:HG21	1.89	0.54
1:G:773:SER:O	1:G:775:THR:N	2.37	0.54
1:G:770:LEU:HD21	1:G:865:GLU:HB2	1.90	0.54
1:G:889:ARG:HD3	1:G:901:THR:HG23	1.89	0.54
3:C:76:ILE:CD1	3:C:198:SER:HB3	2.38	0.53
1:G:828:TYR:HE1	1:G:861:VAL:HG21	1.74	0.53
1:G:1023:PRO:HB3	1:G:1047:TRP:CE2	2.43	0.53
1:A:973:ASN:HB3	1:A:1076:PHE:CE1	2.43	0.53
1:D:372:GLN:NE2	1:D:392:ASN:O	2.41	0.53
1:A:36:ASN:O	1:A:37:THR:OG1	2.22	0.53
1:G:72:GLU:OE2	1:G:103:ARG:NH2	2.42	0.53
1:D:828:TYR:CE1	1:D:861:VAL:HG21	2.44	0.53
1:G:1061:VAL:HG11	1:G:1104:LYS:HB3	1.91	0.52
1:A:912:LEU:HD11	1:A:926:LEU:HD13	1.89	0.52
2:E:867:LEU:HD21	2:E:1031:PRO:HG3	1.90	0.52
2:H:1033:LEU:CB	2:H:1034:PRO:HD2	2.40	0.52
2:H:844:MET:HA	2:H:844:MET:HE2	1.91	0.52
1:D:60:LYS:O	1:D:81:THR:HA	2.10	0.52
1:D:1105:MET:SD	1:D:1130:ILE:HD11	2.49	0.51
2:E:772:ILE:HG23	3:F:155:LEU:HD13	1.91	0.51
3:C:38:LEU:HD12	1:D:744:ASP:HB3	1.90	0.51
1:D:146:ASP:OD1	1:D:147:ARG:N	2.43	0.51
1:G:922:LEU:HD11	1:G:930:VAL:HG21	1.91	0.51
2:H:1031:PRO:HB2	2:H:1033:LEU:HD13	1.92	0.51
1:G:998:PHE:CZ	1:G:1074:ARG:HD2	2.46	0.51
1:G:979:LYS:O	1:G:981:SER:N	2.40	0.51
1:D:922:LEU:HD11	1:D:930:VAL:CG1	2.41	0.51
1:G:43:VAL:HG23	1:G:52:VAL:CG2	2.41	0.51
2:E:739:GLY:HA3	2:E:757:LYS:O	2.11	0.50
2:H:1033:LEU:HB3	2:H:1034:PRO:HD2	1.92	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:709:LYS:HG2	1:D:710:LEU:N	2.26	0.50
1:D:1076:PHE:O	1:D:1082:THR:HA	2.11	0.50
1:A:828:TYR:CE1	1:A:861:VAL:HG21	2.47	0.50
3:F:43:PRO:CD	1:G:252:ILE:HD11	2.42	0.50
2:E:828:LEU:O	2:E:1034:PRO:HD2	2.12	0.49
1:A:59:GLY:HA2	1:A:1073:TRP:CZ3	2.48	0.49
1:G:315:THR:HG22	1:G:323:PHE:HB3	1.95	0.49
2:H:928:GLU:O	2:H:932:LYS:N	2.42	0.49
2:E:906:LEU:HD21	2:E:913:TYR:CD2	2.47	0.49
2:H:1033:LEU:HG	2:H:1034:PRO:HD2	1.95	0.49
1:G:762:SER:O	1:G:803:HIS:HA	2.13	0.49
1:G:59:GLY:HA2	1:G:1073:TRP:CE3	2.48	0.49
2:B:760:LEU:C	2:B:760:LEU:HD12	2.34	0.48
2:H:858:ARG:NE	2:H:880:LEU:O	2.43	0.48
1:D:944:GLU:OE1	2:E:732:ILE:HG22	2.13	0.48
1:A:951:PRO:HG2	2:B:825:GLU:CB	2.43	0.48
1:D:922:LEU:HD11	1:D:930:VAL:HG11	1.94	0.48
2:E:733:ILE:HD11	2:E:741:VAL:CG1	2.43	0.48
1:A:248:ILE:HD12	1:A:300:LEU:O	2.14	0.48
1:D:224:GLU:N	1:D:225:PRO:HD2	2.29	0.48
1:D:5:TYR:CE2	1:D:7:VAL:HG13	2.48	0.48
1:A:318:ASP:OD1	1:A:319:ASN:N	2.47	0.48
1:A:787:GLU:OE1	1:A:812:TYR:CE2	2.67	0.48
1:A:226:PHE:CE2	1:A:287:LYS:HG2	2.49	0.48
1:A:7:VAL:HG12	1:A:1091:GLY:HA3	1.97	0.47
2:E:838:SER:O	2:E:842:GLN:HG3	2.15	0.47
1:A:889:ARG:HD2	1:A:891:TYR:CZ	2.49	0.47
2:H:841:LYS:HD2	2:H:1023:VAL:HB	1.96	0.47
1:A:80:LEU:HD11	1:A:108:VAL:HG21	1.96	0.47
2:B:892:TYR:O	2:B:911:GLU:HG3	2.14	0.47
1:D:18:CYS:HG	1:D:313:CYS:HG	1.62	0.47
1:G:7:VAL:HG12	1:G:1091:GLY:HA3	1.95	0.47
1:G:159:LEU:HD21	1:G:164:VAL:HG21	1.97	0.47
1:G:207:TRP:HB3	1:G:242:GLY:HA2	1.96	0.47
1:G:933:LEU:HD22	1:G:942:PHE:HB3	1.97	0.47
1:A:6:VAL:HG22	1:A:1040:VAL:HG22	1.97	0.46
1:A:184:ASP:HB2	1:A:185:PRO:CD	2.45	0.46
2:B:856:LEU:HD11	2:B:884:TYR:HB2	1.95	0.46
1:D:1116:ASP:OD1	1:D:1116:ASP:O	2.34	0.46
3:F:43:PRO:HD2	1:G:252:ILE:HD11	1.97	0.46
2:B:758:VAL:HG11	2:B:767:PHE:CZ	2.50	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:36:ASN:ND2	1:A:1001:GLY:O	2.49	0.46
2:H:835:HIS:HD2	2:H:1029:ALA:HB1	1.81	0.46
1:D:912:LEU:HD11	1:D:926:LEU:HD13	1.98	0.46
2:E:841:LYS:CG	2:E:1025:LEU:HD11	2.45	0.46
2:E:784:ARG:O	2:E:874:LYS:HE2	2.16	0.46
2:H:867:LEU:HD21	2:H:1031:PRO:HG2	1.97	0.46
3:C:76:ILE:HD12	3:C:198:SER:HB3	1.98	0.46
2:B:1033:LEU:HB2	2:B:1034:PRO:HD2	1.98	0.45
1:G:852:GLN:O	1:G:858:LEU:HA	2.17	0.45
2:H:917:ILE:HG13	2:H:918:ASP:N	2.31	0.45
1:D:816:LEU:HD13	1:D:831:VAL:HG22	1.99	0.45
5:E:1101:RQL:C12	5:E:1101:RQL:N5	2.78	0.45
1:G:59:GLY:HA2	1:G:1073:TRP:CZ3	2.52	0.45
1:G:191:LYS:HE2	1:G:193:TYR:CE1	2.51	0.45
1:G:922:LEU:HD11	1:G:930:VAL:CG2	2.47	0.45
1:D:278:GLY:HA3	1:D:383:LYS:HE2	1.99	0.45
1:D:375:LEU:HB2	1:D:1012:LEU:HD21	1.98	0.45
1:D:18:CYS:SG	1:D:313:CYS:SG	3.14	0.45
1:D:849:VAL:HG11	1:D:851:PHE:CZ	2.51	0.45
1:A:42:TYR:CD2	1:A:49:LEU:HB3	2.52	0.45
2:E:931:THR:O	2:E:932:LYS:HB2	2.17	0.45
1:A:5:TYR:CE2	1:A:7:VAL:HG13	2.53	0.44
1:A:213:GLU:HG2	1:A:215:GLU:H	1.81	0.44
1:A:770:LEU:HD12	1:A:847:ARG:CD	2.46	0.44
1:A:951:PRO:HG2	2:B:825:GLU:HB3	1.98	0.44
1:G:984:THR:O	1:G:984:THR:HG22	2.17	0.44
1:D:248:ILE:HD12	1:D:300:LEU:O	2.16	0.44
2:E:779:ARG:HB3	3:F:21:LYS:HE2	2.00	0.44
1:G:858:LEU:HD12	1:G:858:LEU:O	2.18	0.44
1:D:288:GLU:HB2	1:D:298:LYS:HB2	2.00	0.44
2:E:953:GLY:O	2:E:1003:LEU:HD11	2.17	0.44
2:B:839:PHE:CZ	2:B:865:ILE:HG21	2.52	0.44
1:G:752:LEU:O	1:G:752:LEU:HD23	2.18	0.44
1:D:7:VAL:HG12	1:D:1091:GLY:HA3	2.00	0.44
1:D:378:CYS:SG	1:D:724:ILE:HB	2.58	0.44
3:F:38:LEU:O	1:G:752:LEU:HA	2.18	0.44
1:G:387:LEU:HB2	1:G:715:VAL:HB	1.98	0.44
2:H:837:LYS:HB3	2:H:1023:VAL:HG21	2.00	0.44
1:D:926:LEU:O	1:D:953:TRP:HA	2.18	0.44
1:A:255:GLN:HB2	1:A:279:ARG:HH22	1.82	0.44
2:H:803:LYS:HD3	3:I:142:VAL:HG11	1.98	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:I:63:ARG:HE	3:I:123:LEU:HD21	1.83	0.43
1:A:116:SER:HB3	1:A:134:ARG:NH1	2.33	0.43
1:D:63:VAL:O	1:D:79:ILE:HA	2.18	0.43
2:H:733:ILE:HD11	2:H:741:VAL:HG12	2.00	0.43
3:C:249:ASP:O	3:C:253:GLN:HG3	2.19	0.43
2:H:840:MET:HG3	2:H:926:LEU:HD13	1.99	0.43
2:H:993:ALA:HB2	2:H:1019:PHE:CE1	2.53	0.43
1:A:223:PRO:HD3	1:A:271:TYR:OH	2.19	0.43
1:D:134:ARG:C	1:D:134:ARG:HD2	2.38	0.43
1:A:1115:ASP:HA	1:A:1120:MET:O	2.18	0.43
1:D:358:PRO:O	1:D:379:SER:HA	2.19	0.43
1:D:886:SER:O	1:D:908:ASN:HB2	2.18	0.43
1:A:158:ARG:HH12	1:A:160:GLU:HG2	1.84	0.43
1:A:1116:ASP:OD1	1:A:1116:ASP:O	2.35	0.43
2:B:896:VAL:HG22	2:B:906:LEU:HD13	2.01	0.43
1:D:958:GLU:HB2	1:D:1007:PHE:CB	2.49	0.43
1:D:991:HIS:HB2	2:E:735:GLU:OE2	2.19	0.43
2:E:844:MET:HE2	2:E:844:MET:HA	2.01	0.43
1:G:263:ARG:HB2	1:G:271:TYR:CE2	2.54	0.43
2:H:769:ILE:HA	2:H:772:ILE:HB	2.00	0.43
1:D:225:PRO:HG2	1:D:267:ASN:O	2.18	0.42
1:G:965:PHE:O	1:G:976:VAL:HA	2.19	0.42
1:A:987:GLU:HG2	2:B:740:GLN:NE2	2.34	0.42
1:D:35:LYS:O	1:D:36:ASN:C	2.58	0.42
1:G:5:TYR:CE2	1:G:7:VAL:HG13	2.54	0.42
1:A:63:VAL:O	1:A:79:ILE:HA	2.20	0.42
1:A:223:PRO:HD2	1:A:268:GLY:HA3	2.01	0.42
1:A:816:LEU:HD13	1:A:831:VAL:HG22	2.01	0.42
1:A:950:ASN:HB2	1:A:994:GLU:OE2	2.19	0.42
2:E:857:HIS:O	2:E:858:ARG:HB2	2.20	0.42
1:G:773:SER:C	1:G:775:THR:N	2.72	0.42
1:D:158:ARG:HE	2:E:987:SER:HB2	1.85	0.42
2:E:778:LEU:HD21	2:E:878:PHE:CD2	2.55	0.42
2:B:783:HIS:HB3	2:B:786:VAL:HG23	2.01	0.42
1:D:977:CYS:HA	1:D:993:GLN:O	2.20	0.42
1:A:372:GLN:HG3	1:A:1014:MET:HA	2.02	0.42
1:A:886:SER:O	1:A:908:ASN:HB2	2.20	0.42
1:D:5:TYR:CE2	1:D:7:VAL:CG1	3.03	0.42
1:D:385:GLY:HA3	1:D:719:GLU:O	2.20	0.42
2:H:803:LYS:HA	3:I:142:VAL:HG11	2.02	0.42
2:B:738:TYR:O	2:B:759:ARG:HG3	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:917:ILE:HG13	2:B:918:ASP:N	2.35	0.42
2:E:803:LYS:HA	3:F:142:VAL:HG21	2.02	0.42
2:E:861:LYS:HB3	2:E:898:THR:HG21	2.02	0.42
1:D:817:VAL:HG22	1:D:830:ILE:HB	2.02	0.42
1:A:387:LEU:HD11	1:A:735:VAL:HG21	2.02	0.41
2:B:1025:LEU:HD12	2:B:1025:LEU:HA	1.93	0.41
3:C:235:TRP:CH2	3:C:244:VAL:HG22	2.54	0.41
1:D:950:ASN:HA	1:D:951:PRO:HD3	1.94	0.41
2:E:993:ALA:HB2	2:E:1019:PHE:CE1	2.55	0.41
1:G:127:GLU:HB2	1:G:129:ARG:HG3	2.02	0.41
1:G:816:LEU:HD13	1:G:831:VAL:HG22	2.02	0.41
2:H:777:ILE:HG12	2:H:855:PHE:CE1	2.55	0.41
2:B:830:HIS:HB3	2:B:1032:ASP:HB2	2.02	0.41
1:G:365:VAL:HG11	1:G:733:PHE:HZ	1.85	0.41
1:G:729:VAL:HG21	1:G:827:THR:OG1	2.20	0.41
2:H:817:ASP:HB2	2:H:868:ASN:HA	2.01	0.41
1:D:364:VAL:HG22	1:D:375:LEU:HD13	2.02	0.41
3:F:43:PRO:CG	1:G:252:ILE:HD11	2.50	0.41
1:G:846:GLY:C	1:G:866:VAL:HG22	2.41	0.41
2:H:771:ALA:O	2:H:775:ILE:HG13	2.19	0.41
2:B:906:LEU:HD21	2:B:913:TYR:CD2	2.55	0.41
2:B:1010:THR:O	2:B:1014:THR:HG23	2.20	0.41
1:G:184:ASP:HB2	1:G:185:PRO:HD2	2.03	0.41
1:D:318:ASP:OD1	1:D:319:ASN:N	2.53	0.41
2:E:826:SER:HB2	2:E:828:LEU:HD12	2.03	0.41
2:H:1010:THR:O	2:H:1014:THR:HG23	2.20	0.41
1:A:770:LEU:HD12	1:A:847:ARG:HD3	2.03	0.41
1:D:59:GLY:HA2	1:D:1073:TRP:CZ3	2.56	0.41
1:G:270:ARG:HG2	1:G:284:LEU:CD2	2.51	0.41
2:H:824:LEU:HD23	2:H:829:VAL:CG1	2.51	0.41
1:A:311:ALA:HB2	1:A:324:VAL:HG13	2.02	0.41
2:B:722:ARG:NH1	2:B:791:GLU:OE2	2.54	0.41
1:D:170:LEU:HD23	1:D:170:LEU:HA	1.91	0.41
1:G:69:PRO:HG2	1:G:72:GLU:HG3	2.03	0.41
1:G:790:ASN:HA	1:G:805:HIS:O	2.20	0.41
1:G:886:SER:O	1:G:908:ASN:HB2	2.21	0.41
1:G:1011:SER:OG	1:G:1013:VAL:HG22	2.21	0.41
2:H:778:LEU:HD21	2:H:878:PHE:CD1	2.56	0.41
1:A:92:LYS:HB2	1:A:101:ILE:HD11	2.03	0.41
2:B:789:MET:HE2	2:B:813:PHE:CZ	2.56	0.41
2:B:858:ARG:HH12	2:B:882:ARG:HD3	1.86	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:1035:HIS:O	2:B:1038:ASP:HB2	2.21	0.41
1:D:1057:ARG:HD3	1:D:1108:VAL:O	2.21	0.41
1:D:1126:ALA:O	1:D:1130:ILE:HG13	2.21	0.41
1:A:775:THR:O	1:A:775:THR:CG2	2.69	0.40
1:G:771:PHE:CZ	1:G:847:ARG:HG3	2.56	0.40
1:G:944:GLU:OE1	2:H:732:ILE:HG22	2.22	0.40
1:A:844:LYS:HD3	1:A:844:LYS:HA	1.90	0.40
1:G:275:ASP:OD1	1:G:275:ASP:C	2.58	0.40
1:G:365:VAL:HG11	1:G:733:PHE:CZ	2.56	0.40
2:H:1027:LYS:O	2:H:1028:MET:C	2.59	0.40
1:A:392:ASN:OD1	1:A:710:LEU:HD22	2.20	0.40
1:D:36:ASN:ND2	1:D:1001:GLY:O	2.51	0.40
1:D:58:TYR:CE2	1:D:1070:HIS:HB2	2.56	0.40
1:D:170:LEU:HD11	1:D:179:CYS:HB2	2.04	0.40
1:D:387:LEU:HG	1:D:717:LEU:HD11	2.04	0.40
2:E:908:LEU:HB2	2:E:966:LEU:HD13	2.02	0.40
3:I:121:ARG:HD2	3:I:121:ARG:HA	1.95	0.40
3:C:174:ASP:OD2	3:C:177:LYS:HG3	2.21	0.40
1:D:184:ASP:HB2	1:D:185:PRO:HD2	2.04	0.40
1:G:223:PRO:HD2	1:G:268:GLY:HA3	2.04	0.40
1:G:364:VAL:HG22	1:G:375:LEU:HD13	2.03	0.40
1:A:1024:THR:HB	1:A:1041:THR:HG21	2.04	0.40
2:B:739:GLY:HA3	2:B:757:LYS:O	2.21	0.40
2:E:899:LEU:O	2:E:944:GLN:NE2	2.54	0.40
1:G:322:VAL:HG21	1:G:336:LEU:HD11	2.03	0.40
1:G:794:ILE:HG22	1:G:799:PHE:HA	2.04	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:A:1118:SER:OG	1:G:290:GLN:OE1[2_565]	2.00	0.20

## 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%)	802 (98%)	20 (2%)	0	100	100
1	D	823/840 (98%)	807 (98%)	16 (2%)	0	100	100
1	G	822/840 (98%)	801 (97%)	21 (3%)	0	100	100
2	B	326/344 (95%)	315 (97%)	11 (3%)	0	100	100
2	E	322/344 (94%)	312 (97%)	10 (3%)	0	100	100
2	H	327/344 (95%)	318 (97%)	8 (2%)	1 (0%)	41	73
3	C	246/271 (91%)	243 (99%)	3 (1%)	0	100	100
3	F	246/271 (91%)	242 (98%)	4 (2%)	0	100	100
3	I	246/271 (91%)	242 (98%)	4 (2%)	0	100	100
All	All	4180/4365 (96%)	4082 (98%)	97 (2%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	1028	MET

### 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%)	718 (100%)	3 (0%)	91	96
1	D	722/728 (99%)	721 (100%)	1 (0%)	93	98
1	G	721/728 (99%)	715 (99%)	6 (1%)	81	92
2	B	296/308 (96%)	288 (97%)	8 (3%)	44	74
2	E	292/308 (95%)	287 (98%)	5 (2%)	60	83
2	H	297/308 (96%)	290 (98%)	7 (2%)	49	76
3	C	223/242 (92%)	221 (99%)	2 (1%)	78	91
3	F	223/242 (92%)	221 (99%)	2 (1%)	78	91

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	I	223/242 (92%)	222 (100%)	1 (0%)	91	96
All	All	3718/3834 (97%)	3683 (99%)	35 (1%)	78	91

All (35) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	118	THR
1	A	290	GLN
1	A	1014	MET
2	B	860	ILE
2	B	897	ILE
2	B	905	GLU
2	B	991	SER
2	B	1025	LEU
2	B	1033	LEU
2	B	1036	TRP
2	B	1039	CYS
3	C	231	TYR
3	C	257	LEU
1	D	766	SER
2	E	728	ASP
2	E	805	ASP
2	E	860	ILE
2	E	1035	HIS
2	E	1036	TRP
3	F	142	VAL
3	F	231	TYR
1	G	186	GLN
1	G	291	MET
1	G	292	ASP
1	G	296	THR
1	G	817	VAL
1	G	1120	MET
2	H	860	ILE
2	H	863	SER
2	H	888	GLU
2	H	897	ILE
2	H	1033	LEU
2	H	1036	TRP
2	H	1039	CYS
3	I	231	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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	B	893	2	8,10,11	1.63	1 (12%)	10,14,16	0.98	0
2	TPO	E	893	2	8,10,11	1.79	2 (25%)	10,14,16	1.09	0
2	TPO	H	893	2	8,10,11	1.71	1 (12%)	10,14,16	1.46	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	B	893	2	-	0/9/11/13	-
2	TPO	E	893	2	-	5/9/11/13	-
2	TPO	H	893	2	-	4/9/11/13	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	893	TPO	CB-CA	3.49	1.61	1.53
2	E	893	TPO	P-O1P	3.48	1.61	1.50
2	B	893	TPO	P-O1P	3.35	1.61	1.50
2	E	893	TPO	P-OG1	2.10	1.63	1.59

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	893	TPO	CG2-CB-CA	-3.01	107.22	113.16

There are no chirality outliers.

All (9) torsion outliers are listed below:

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

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](#)

17 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	D	1204	-	4,4,4	0.29	0	6,6,6	0.07	0
4	SO4	D	1202	-	4,4,4	0.28	0	6,6,6	0.09	0
4	SO4	A	1202	-	4,4,4	0.26	0	6,6,6	0.09	0



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	SO4	F	301	-	4,4,4	0.25	0	6,6,6	0.09	0
5	RQL	E	1101	-	31,38,38	0.94	2 (6%)	31,55,55	1.21	4 (12%)
4	SO4	D	1201	-	4,4,4	0.25	0	6,6,6	0.05	0
4	SO4	C	301	-	4,4,4	0.31	0	6,6,6	0.07	0
4	SO4	G	1202	-	4,4,4	0.33	0	6,6,6	0.06	0
4	SO4	F	302	-	4,4,4	0.20	0	6,6,6	0.10	0
5	RQL	H	1101	-	31,38,38	1.03	1 (3%)	31,55,55	1.05	2 (6%)
4	SO4	G	1201	-	4,4,4	0.21	0	6,6,6	0.06	0
4	SO4	B	1102	-	4,4,4	0.33	0	6,6,6	0.06	0
4	SO4	D	1203	-	4,4,4	0.27	0	6,6,6	0.13	0
4	SO4	I	301	-	4,4,4	0.26	0	6,6,6	0.09	0
4	SO4	A	1201	-	4,4,4	0.18	0	6,6,6	0.05	0
4	SO4	A	1203	-	4,4,4	0.30	0	6,6,6	0.11	0
5	RQL	B	1101	-	31,38,38	1.02	1 (3%)	31,55,55	1.05	2 (6%)

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	RQL	H	1101	-	-	4/11/17/17	0/5/5/5
5	RQL	B	1101	-	-	2/11/17/17	0/5/5/5
5	RQL	E	1101	-	-	3/11/17/17	0/5/5/5

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	1101	RQL	C18-N7	-2.92	1.40	1.44
5	H	1101	RQL	C18-N7	-2.68	1.41	1.44
5	E	1101	RQL	C18-N7	-2.28	1.41	1.44
5	E	1101	RQL	C17-N6	-2.01	1.31	1.34

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	H	1101	RQL	C16-C9-N3	-3.28	118.09	120.81
5	E	1101	RQL	C16-C9-N3	-3.19	118.16	120.81
5	B	1101	RQL	C16-C9-N3	-2.93	118.38	120.81
5	B	1101	RQL	C2-C3-C6	-2.92	116.86	119.70
5	E	1101	RQL	C2-C3-C6	-2.84	116.93	119.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	H	1101	RQL	C2-C3-C6	-2.74	117.03	119.70
5	E	1101	RQL	C10-N4-C11	2.46	128.47	124.31
5	E	1101	RQL	C17-N7-C18	-2.01	121.82	125.23

There are no chirality outliers.

All (9) torsion outliers are listed below:

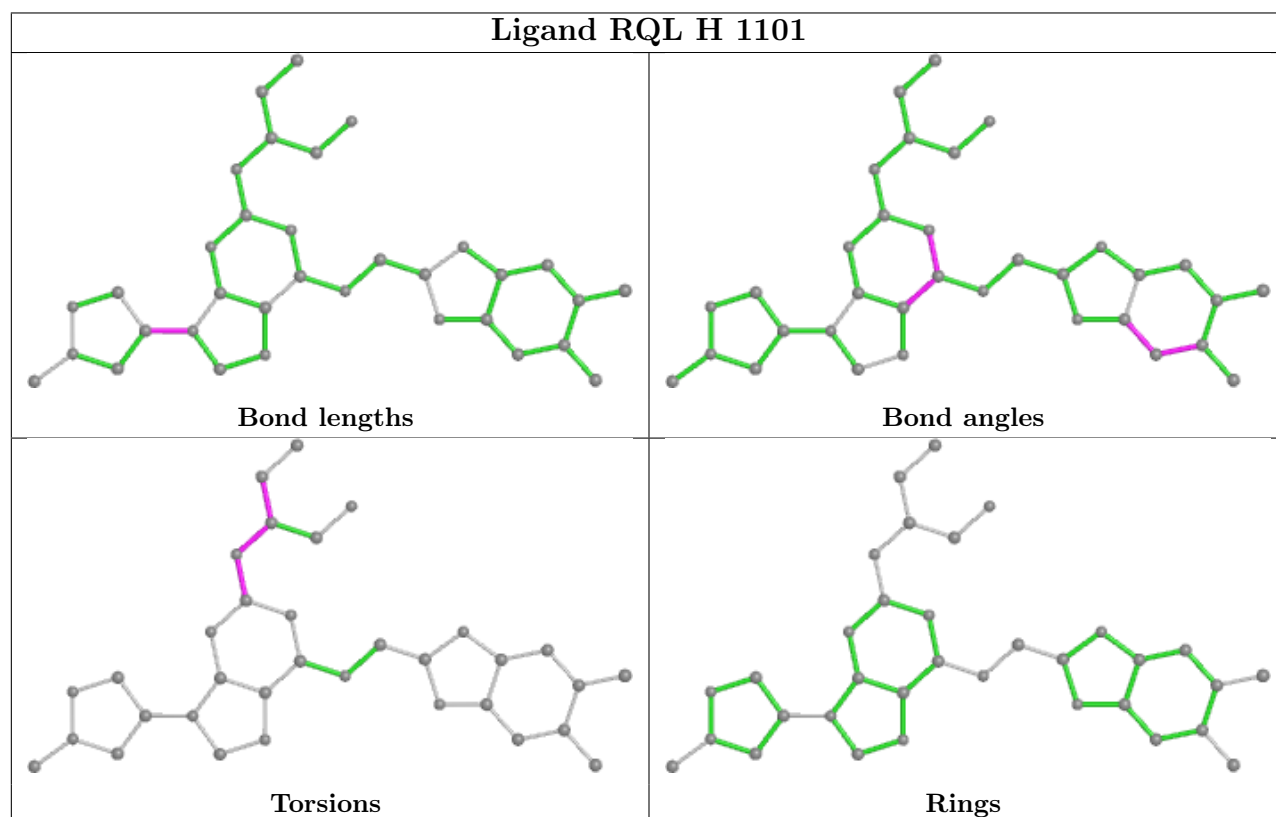
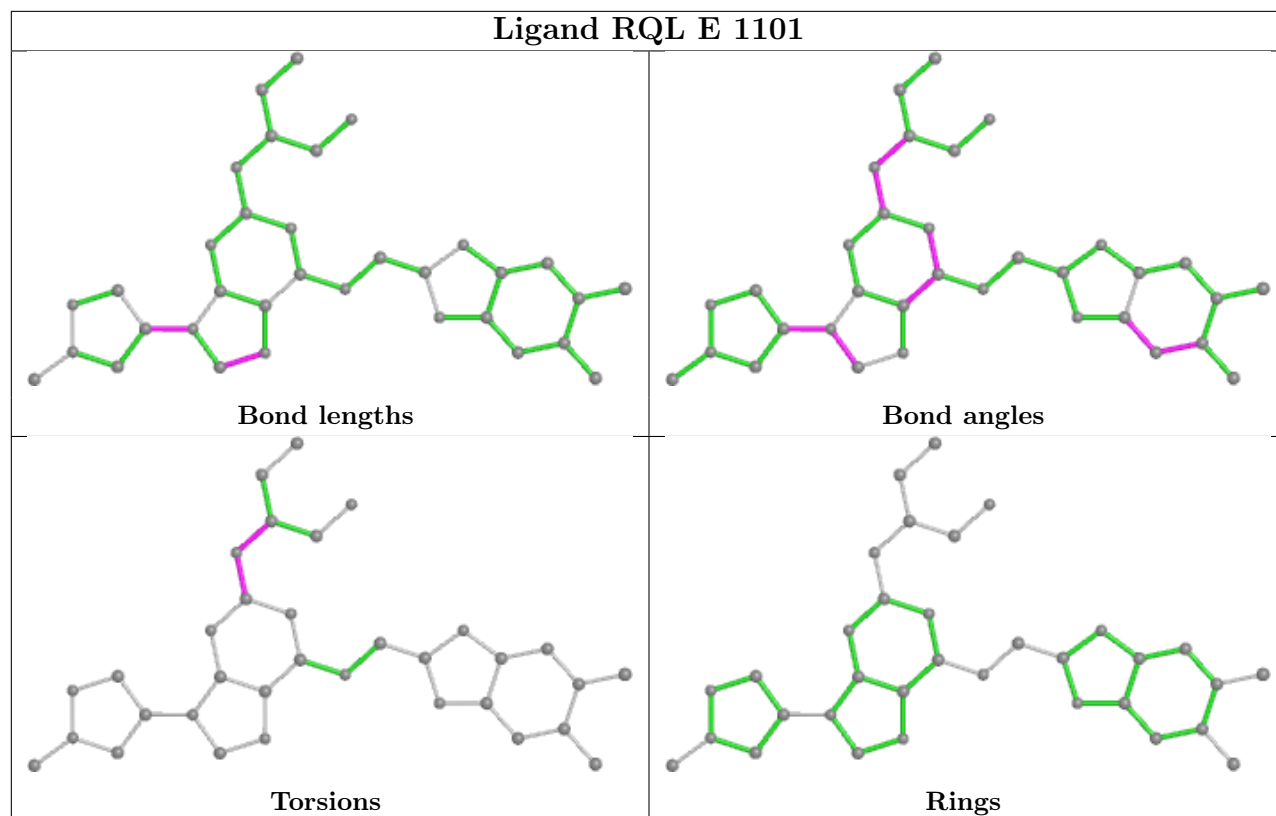
Mol	Chain	Res	Type	Atoms
5	B	1101	RQL	N3-C10-N4-C11
5	B	1101	RQL	N5-C10-N4-C11
5	E	1101	RQL	N3-C10-N4-C11
5	E	1101	RQL	N5-C10-N4-C11
5	E	1101	RQL	C12-C11-N4-C10
5	H	1101	RQL	N3-C10-N4-C11
5	H	1101	RQL	N5-C10-N4-C11
5	H	1101	RQL	C12-C11-N4-C10
5	H	1101	RQL	C14-C11-C12-C13

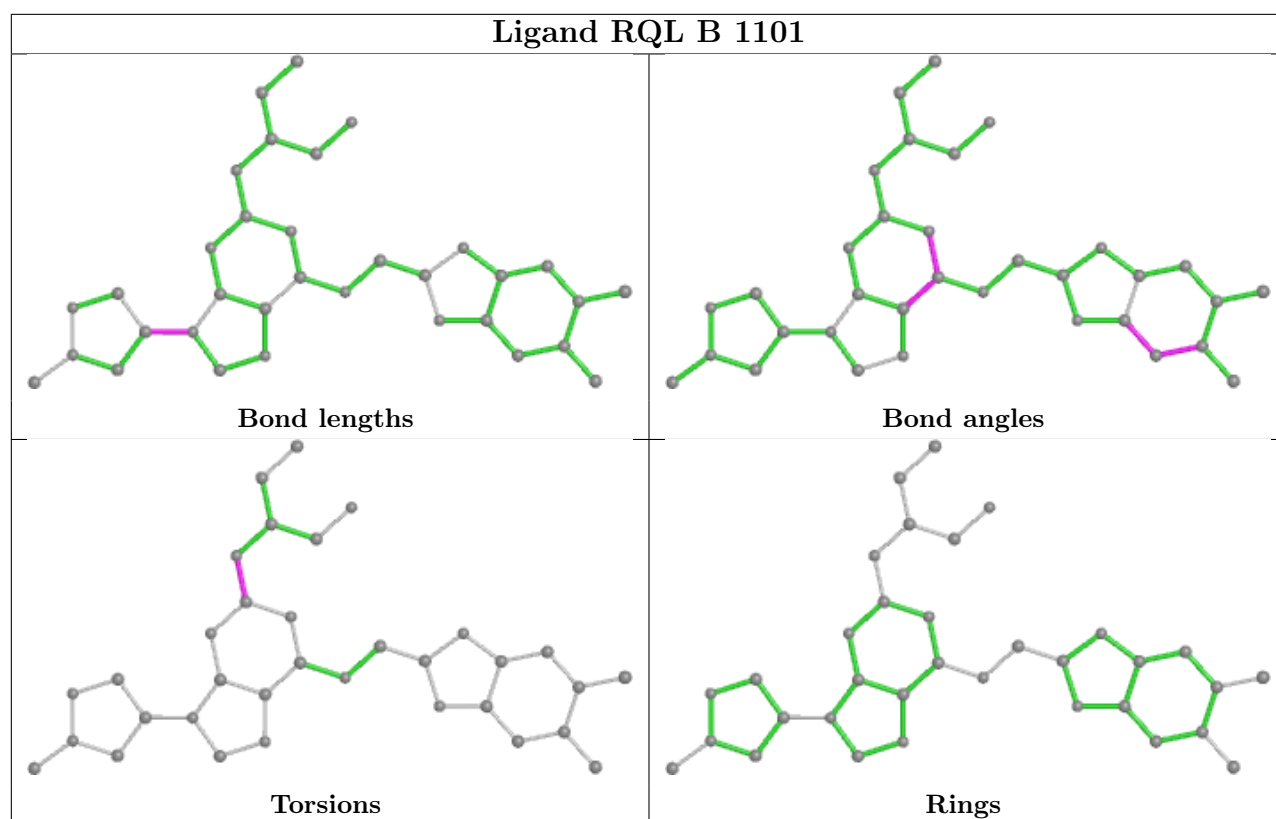
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	E	1101	RQL	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, 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	A	820/840 (97%)	0.48	35 (4%) 35 17	78, 115, 193, 277	0
1	D	827/840 (98%)	0.49	30 (3%) 42 22	73, 112, 189, 258	0
1	G	826/840 (98%)	0.56	58 (7%) 16 7	80, 127, 212, 295	0
2	B	328/344 (95%)	0.76	32 (9%) 7 2	93, 121, 194, 232	0
2	E	324/344 (94%)	0.60	15 (4%) 32 16	78, 111, 185, 231	0
2	H	329/344 (95%)	0.70	22 (6%) 17 7	67, 96, 180, 247	0
3	C	248/271 (91%)	0.47	10 (4%) 38 19	87, 111, 153, 211	0
3	F	248/271 (91%)	0.52	2 (0%) 86 72	69, 86, 126, 210	0
3	I	248/271 (91%)	0.48	4 (1%) 72 51	73, 93, 137, 224	0
All	All	4198/4365 (96%)	0.55	208 (4%) 28 13	67, 112, 194, 295	0

All (208) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	1043	TRP	11.5
2	H	1044	SER	7.2
2	B	1034	PRO	6.2
2	H	1041	GLU	5.7
2	B	802	PHE	4.9
1	A	1097	PHE	4.5
1	A	1129	LEU	4.1
2	B	800	LEU	4.1
2	B	1041	GLU	4.0
1	G	295	VAL	4.0
2	H	1040	HIS	4.0
2	H	1034	PRO	4.0
2	E	896	VAL	3.9
1	G	49	LEU	3.9
2	H	1039	CYS	3.9

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
3	I	267	HIS	3.9
2	H	1043	TRP	3.9
1	A	708	GLN	3.7
1	D	367	LEU	3.7
1	G	131	ILE	3.7
1	G	132	GLY	3.7
2	H	715	THR	3.6
1	G	1097	PHE	3.6
1	A	1118	SER	3.6
1	G	300	LEU	3.6
2	B	798	ASP	3.6
1	D	100	ILE	3.5
2	E	1036	TRP	3.5
1	D	91	TYR	3.4
2	B	797	GLN	3.4
2	B	896	VAL	3.4
1	A	297	LEU	3.3
1	A	39	LEU	3.3
2	E	897	ILE	3.3
1	A	1115	ASP	3.3
3	C	267	HIS	3.2
1	G	253	ILE	3.2
2	H	887	GLU	3.2
2	B	720	GLY	3.2
1	G	302	VAL	3.1
1	G	394	ILE	3.1
1	G	1129	LEU	3.1
1	A	926	LEU	3.1
1	A	131	ILE	3.0
1	G	297	LEU	3.0
3	F	263	GLN	3.0
1	A	61	ILE	2.9
1	D	295	VAL	2.9
1	G	1119	GLY	2.9
2	E	1039	CYS	2.8
2	B	887	GLU	2.8
1	G	77	LEU	2.8
1	D	297	LEU	2.8
1	G	280	LEU	2.8
1	A	356	LEU	2.8
1	G	237	ILE	2.7
2	B	875	LEU	2.7

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Mol	Chain	Res	Type	RSRZ
2	E	802	PHE	2.7
2	B	876	ALA	2.7
1	G	219	VAL	2.7
2	B	1033	LEU	2.7
1	G	1039	LEU	2.7
2	B	867	LEU	2.7
2	H	720	GLY	2.7
2	B	878	PHE	2.6
1	A	108	VAL	2.6
1	A	710	LEU	2.6
1	G	100	ILE	2.6
2	E	972	MET	2.6
2	B	1040	HIS	2.6
1	G	303	GLU	2.6
1	G	387	LEU	2.6
1	D	1114	TYR	2.6
1	G	240	HIS	2.6
1	D	1129	LEU	2.6
3	F	264	GLN	2.6
3	C	153	PHE	2.6
2	H	770	THR	2.6
2	E	997	LEU	2.6
1	G	23	PHE	2.6
1	G	315	THR	2.6
2	H	1033	LEU	2.6
1	A	1117	GLY	2.5
2	B	804	LYS	2.5
2	E	829	VAL	2.5
1	D	33	ILE	2.5
2	H	1031	PRO	2.5
1	A	777	PRO	2.5
1	D	2	SER	2.5
2	E	878	PHE	2.5
1	D	926	LEU	2.5
2	B	951	LEU	2.5
1	G	1108	VAL	2.5
3	C	147	LEU	2.5
1	G	143	ILE	2.5
1	A	32	LEU	2.5
1	A	1114	TYR	2.5
1	G	124	ILE	2.5
1	D	1117	GLY	2.4

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
2	H	881	ALA	2.4
2	B	799	ALA	2.4
1	G	133	LEU	2.4
3	C	262	LYS	2.4
1	A	1108	VAL	2.4
1	A	1136	LEU	2.4
1	G	289	GLU	2.4
2	H	1036	TRP	2.4
1	A	33	ILE	2.4
1	G	1040	VAL	2.4
1	G	97	SER	2.4
1	G	333	LEU	2.4
1	G	1120	MET	2.3
1	D	778	HIS	2.3
1	D	1113	GLN	2.3
1	G	78	PHE	2.3
1	G	306	GLY	2.3
1	G	64	MET	2.3
2	B	952	CYS	2.3
2	B	775	ILE	2.3
1	G	317	LEU	2.3
2	E	867	LEU	2.3
1	G	276	MET	2.3
2	B	839	PHE	2.3
2	H	812	VAL	2.3
3	C	146	ILE	2.3
1	G	195	VAL	2.3
1	G	1017	LEU	2.3
1	G	272	LEU	2.3
2	B	865	ILE	2.3
1	G	41	ILE	2.3
2	B	860	ILE	2.3
1	G	202	PHE	2.3
1	D	293	GLY	2.3
2	B	884	TYR	2.3
2	H	890	ARG	2.2
2	H	964	ILE	2.2
2	H	798	ASP	2.2
1	G	775	THR	2.2
1	G	32	LEU	2.2
1	A	1120	MET	2.2
1	D	195	VAL	2.2

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Mol	Chain	Res	Type	RSRZ
1	G	167	VAL	2.2
2	E	890	ARG	2.2
1	G	79	ILE	2.2
1	A	49	LEU	2.2
1	D	133	LEU	2.2
2	B	899	LEU	2.2
1	D	1097	PHE	2.2
2	H	721	LYS	2.2
1	A	1094	ILE	2.2
1	D	390	ILE	2.2
1	A	776	ALA	2.2
1	D	178	ILE	2.2
1	G	288	GLU	2.2
1	A	1100	ILE	2.2
1	A	1029	LEU	2.2
1	D	237	ILE	2.2
1	G	321	VAL	2.2
2	E	1035	HIS	2.2
1	G	139	LEU	2.1
1	A	9	ALA	2.1
1	A	291	MET	2.1
1	G	922	LEU	2.1
1	G	1088	PHE	2.1
2	B	932	LYS	2.1
2	H	803	LYS	2.1
1	G	933	LEU	2.1
2	B	811	LEU	2.1
1	D	131	ILE	2.1
1	G	1037	ILE	2.1
1	G	305	LEU	2.1
1	A	927	MET	2.1
3	C	149	GLN	2.1
2	E	988	PHE	2.1
1	D	158	ARG	2.1
1	D	197	LEU	2.1
1	D	317	LEU	2.1
1	A	23	PHE	2.1
1	D	5	TYR	2.1
1	A	336	LEU	2.1
3	C	164	LEU	2.1
2	H	828	LEU	2.1
3	C	100	LEU	2.1

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Mol	Chain	Res	Type	RSRZ
1	D	49	LEU	2.1
3	I	257	LEU	2.1
1	D	1054	MET	2.1
1	A	1126	ALA	2.1
2	B	904	PRO	2.1
2	H	829	VAL	2.1
1	A	100	ILE	2.1
1	A	709	LYS	2.0
3	I	264	GLN	2.0
1	G	327	ARG	2.0
3	I	265	MET	2.0
1	D	124	ILE	2.0
1	G	242	GLY	2.0
1	G	1043	LEU	2.0
3	C	53	GLY	2.0
2	B	886	SER	2.0
1	G	232	ILE	2.0
2	B	1042	LEU	2.0
2	E	865	ILE	2.0
2	E	873	ILE	2.0
3	C	239	VAL	2.0
1	A	133	LEU	2.0
1	D	246	LEU	2.0
2	B	809	PHE	2.0
1	D	174	GLN	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, 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.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	TPO	B	893	11/12	0.74	0.25	193,201,240,240	6
2	TPO	H	893	11/12	0.82	0.24	113,132,156,156	5
2	TPO	E	893	11/12	0.84	0.16	160,166,201,201	6

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands

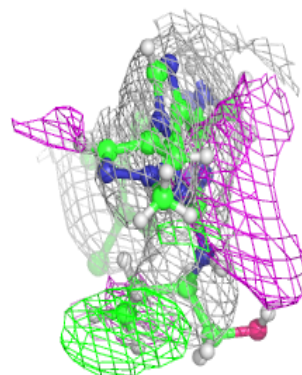
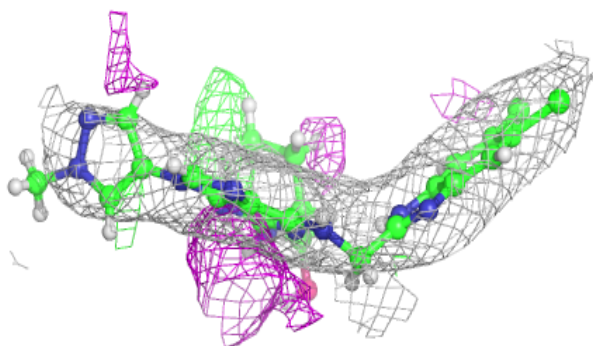
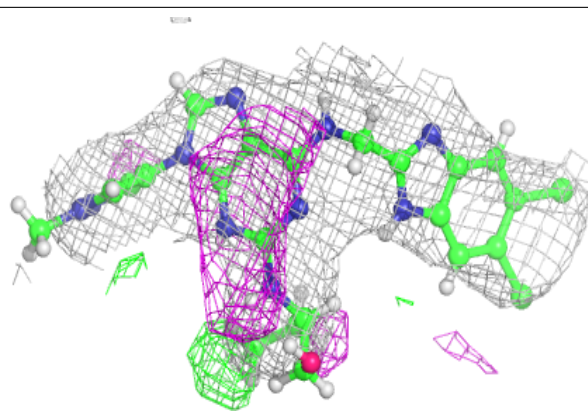
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	SO4	A	1202	5/5	0.77	0.16	113,122,128,182	0
4	SO4	C	301	5/5	0.78	0.16	137,141,150,205	0
4	SO4	I	301	5/5	0.81	0.20	123,125,135,173	0
4	SO4	A	1203	5/5	0.83	0.28	108,114,115,177	0
4	SO4	D	1202	5/5	0.85	0.13	116,126,129,185	0
4	SO4	D	1204	5/5	0.86	0.18	136,136,145,196	0
4	SO4	F	301	5/5	0.87	0.19	122,132,136,189	0
4	SO4	B	1102	5/5	0.87	0.15	154,157,163,230	0
4	SO4	G	1202	5/5	0.89	0.16	140,141,150,217	0
4	SO4	G	1201	5/5	0.89	0.19	134,136,142,169	0
4	SO4	F	302	5/5	0.90	0.17	109,109,121,149	0
5	RQL	B	1101	34/34	0.90	0.37	94,111,135,189	22
4	SO4	D	1203	5/5	0.91	0.20	111,120,124,184	0
4	SO4	D	1201	5/5	0.91	0.19	123,124,129,158	0
5	RQL	E	1101	34/34	0.91	0.38	87,102,121,151	22
4	SO4	A	1201	5/5	0.92	0.16	118,119,121,132	0
5	RQL	H	1101	34/34	0.92	0.36	83,94,112,156	22

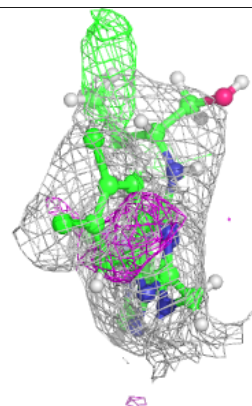
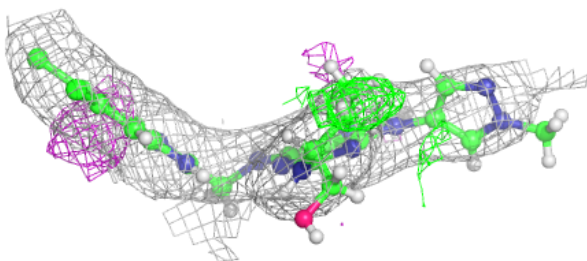
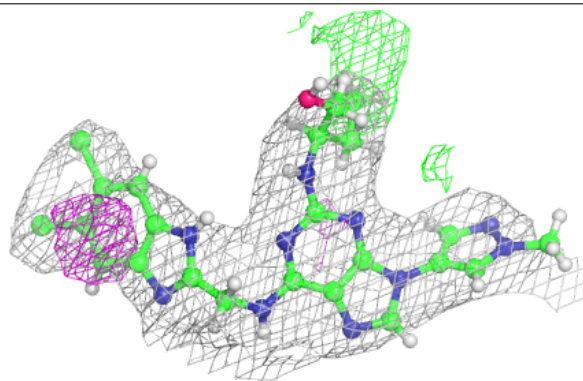
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

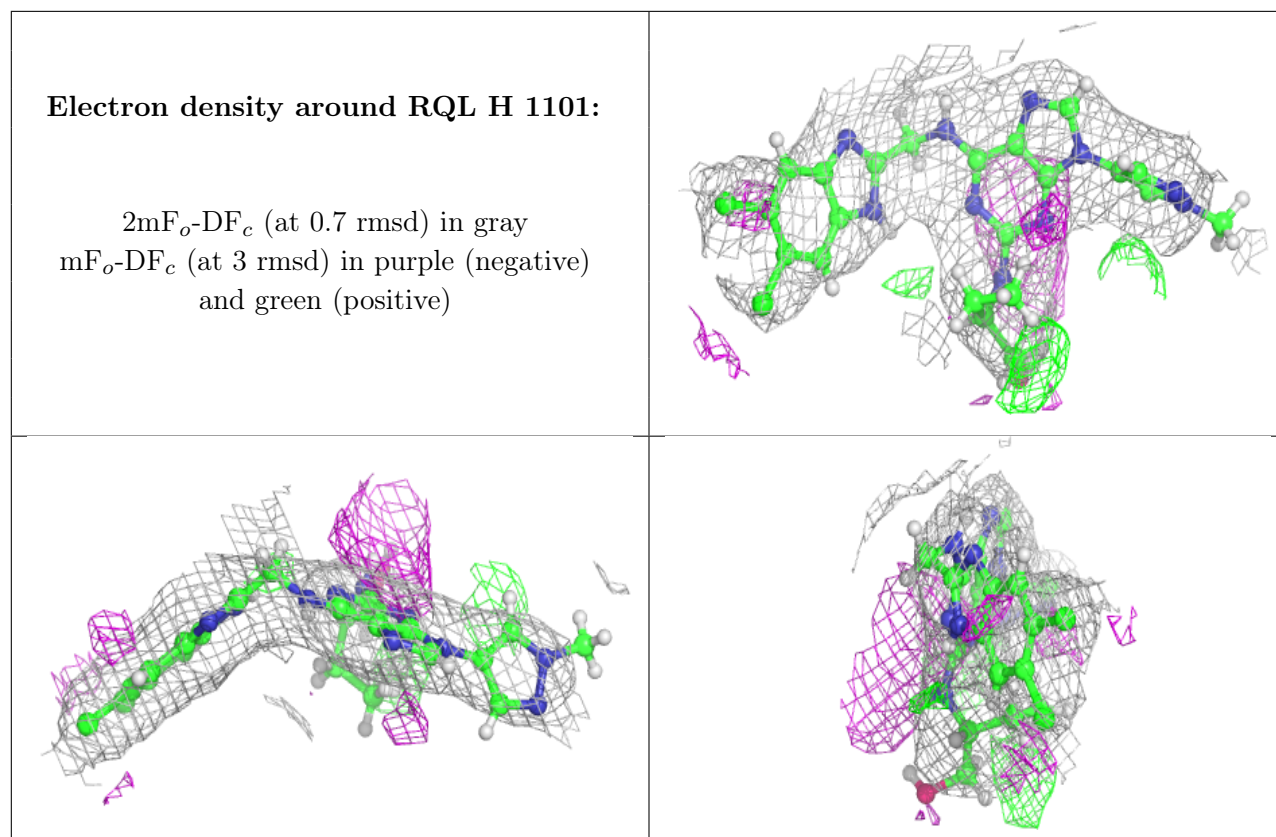
**Electron density around RQL B 1101:**

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

**Electron density around RQL E 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.