



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 05:53 PM UTC

PDB ID : 5CYI / pdb_00005cyi
Title : CDK2/Cyclin A covalent complex with 6-(cyclohexylmethoxy)-N-(4-(vinylsulfonyl)phenyl)-9H-purin-2-amine (NU6300)
Authors : Anscombe, E.; Meschini, E.; Vidal, R.M.; Martin, M.P.; Staunton, D.; Geitmann, M.; Danielson, U.H.; Stanley, W.A.; Wang, L.Z.; Reuillon, T.; Golding, B.T.; Cano, C.; Newell, D.R.; Noble, M.E.M.; Wedge, S.R.; Endicott, J.A.; Griffin, R.J.
Deposited on : 2015-07-30
Resolution : 2.00 Å(reported)

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

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A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

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

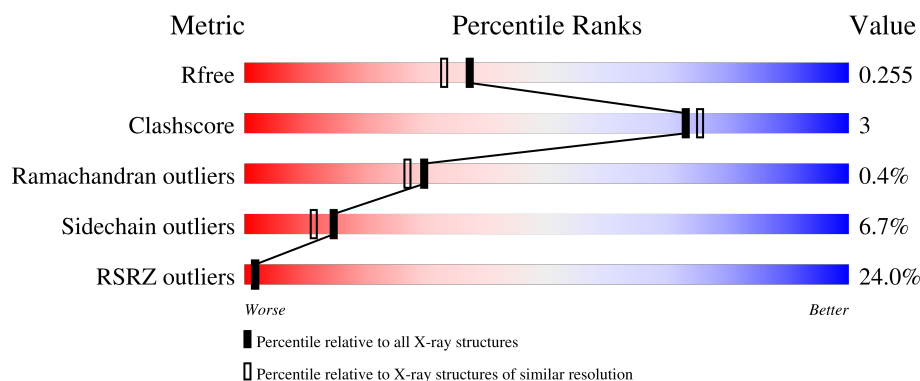
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	303	7% 82% 13% ..
1	C	303	41% 85% 12% ..
2	B	260	3% 90% 8% ..

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Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

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Mol	Chain	Length	Quality of chain
2	D	260	44% 91% 7%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 9513 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Cyclin-dependent kinase 2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	299	Total	C	N	O	P	S	0	1	0
			2414	1567	410	428	1	8			
1	C	297	Total	C	N	O	P	S	0	1	0
			2397	1555	405	428	1	8			

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-4	GLY	-	expression tag	UNP P24941
A	-3	PRO	-	expression tag	UNP P24941
A	-2	LEU	-	expression tag	UNP P24941
A	-1	GLY	-	expression tag	UNP P24941
A	0	SER	-	expression tag	UNP P24941
C	-4	GLY	-	expression tag	UNP P24941
C	-3	PRO	-	expression tag	UNP P24941
C	-2	LEU	-	expression tag	UNP P24941
C	-1	GLY	-	expression tag	UNP P24941
C	0	SER	-	expression tag	UNP P24941

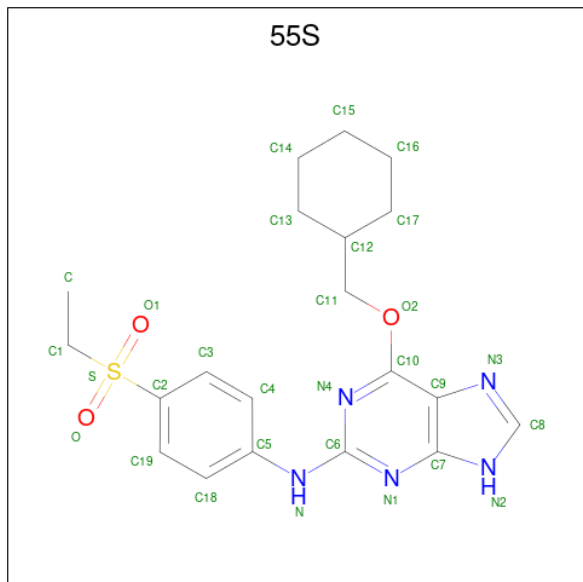
- Molecule 2 is a protein called Cyclin-A2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	B	258	Total	C	N	O	S		0	0	0
			2083	1350	339	383	11				
2	D	256	Total	C	N	O	S		0	0	0
			2069	1340	337	381	11				

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	173	MET	-	initiating methionine	UNP P20248
D	173	MET	-	initiating methionine	UNP P20248

- Molecule 3 is 6-(cyclohexylmethoxy)-N-[4-(ethylsulfonyl)phenyl]-9H-purin-2-amine (CCD ID: 55S) (formula: C₂₀H₂₅N₅O₃S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	S	0	0
			29	20	5	3	1		
3	C	1	Total	C	N	O	S	0	0
			29	20	5	3	1		

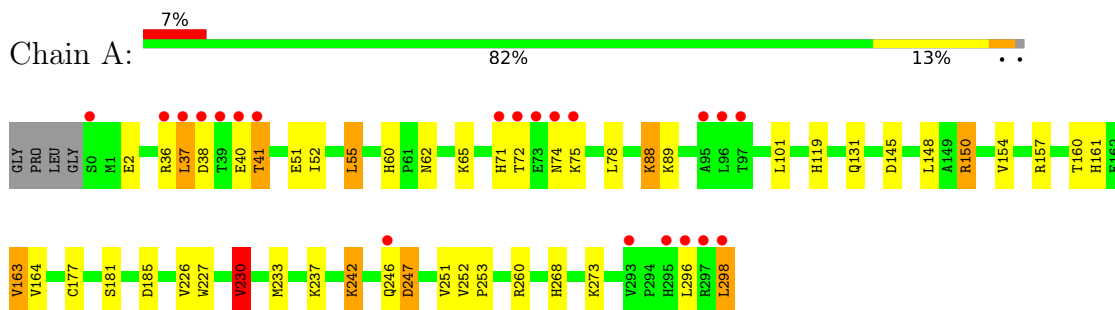
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	224	Total	O	0	0
			224	224		
4	B	166	Total	O	0	0
			166	166		
4	C	64	Total	O	0	0
			64	64		
4	D	38	Total	O	0	0
			38	38		

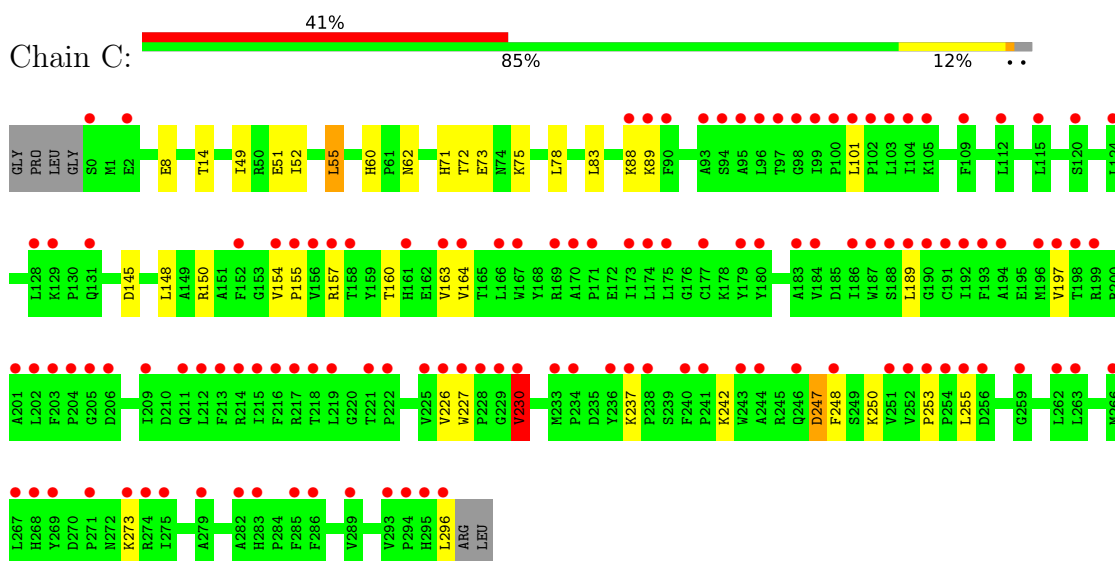
3 Residue-property plots [i](#)

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.

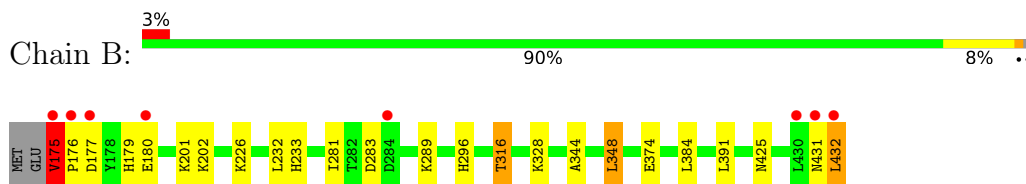
• Molecule 1: Cyclin-dependent kinase 2



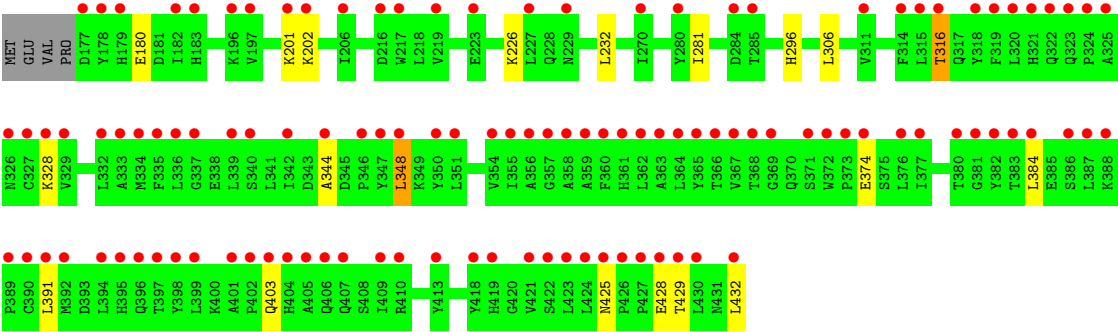
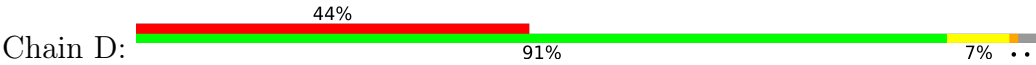
• Molecule 1: Cyclin-dependent kinase 2



• Molecule 2: Cyclin-A2



• Molecule 2: Cyclin-A2



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	74.29Å 135.29Å 148.67Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	74.34 – 2.00 74.34 – 2.00	Depositor EDS
% Data completeness (in resolution range)	99.8 (74.34-2.00) 99.9 (74.34-2.00)	Depositor EDS
R_{merge}	0.18	Depositor
R_{sym}	0.17	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.53 (at 2.00Å)	Xtriage
Refinement program	REFMAC 5.8.0123	Depositor
R, R_{free}	0.227 , 0.255 0.227 , 0.255	Depositor DCC
R_{free} test set	4914 reflections (4.83%)	wwPDB-VP
Wilson B-factor (Å ²)	34.1	Xtriage
Anisotropy	0.258	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 43.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9513	wwPDB-VP
Average B, all atoms (Å ²)	52.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.40% 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: TPO, 55S

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	1.01	0/2464	1.11	8/3343 (0.2%)
1	C	0.95	0/2447	1.08	8/3320 (0.2%)
2	B	0.86	0/2133	1.04	6/2897 (0.2%)
2	D	0.79	0/2118	0.98	2/2875 (0.1%)
All	All	0.91	0/9162	1.06	24/12435 (0.2%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2

There are no bond length outliers.

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	C	230	VAL	CB-CA-C	-10.38	98.60	111.88
1	A	230	VAL	CB-CA-C	-10.17	98.87	111.88
1	C	230	VAL	N-CA-CB	9.56	121.12	110.51
1	A	230	VAL	N-CA-CB	8.98	120.47	110.51
1	A	41	THR	CB-CA-C	8.73	124.53	111.17
2	B	177	ASP	N-CA-C	6.95	119.70	111.71
1	A	247	ASP	CB-CA-C	6.65	120.53	109.89
2	B	425	ASN	CA-C-N	-6.44	115.02	119.66
2	B	425	ASN	C-N-CA	-6.44	115.02	119.66
1	C	248	PHE	N-CA-C	6.30	120.06	112.38
1	C	253	PRO	N-CA-C	6.20	118.27	110.70
2	B	175	VAL	CA-C-N	6.17	126.62	119.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	175	VAL	C-N-CA	6.17	126.62	119.47
1	A	253	PRO	N-CA-C	5.83	117.81	110.70
2	D	425	ASN	CA-C-N	-5.74	115.53	119.66
2	D	425	ASN	C-N-CA	-5.74	115.53	119.66
1	A	41	THR	N-CA-C	-5.71	106.91	112.97
2	B	177	ASP	N-CA-CB	-5.58	101.62	110.22
1	A	150	ARG	N-CA-C	5.37	117.23	109.07
1	C	247	ASP	CB-CA-C	5.29	118.36	109.89
1	A	72	THR	N-CA-C	-5.16	101.56	109.41
1	C	253	PRO	CA-C-N	-5.15	114.51	119.87
1	C	253	PRO	C-N-CA	-5.15	114.51	119.87
1	C	72	THR	N-CA-C	-5.12	101.63	109.41

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	40	GLU	Peptide
1	A	41	THR	Peptide

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	2414	0	2459	35	0
1	C	2397	0	2432	15	1
2	B	2083	0	2107	13	0
2	D	2069	0	2091	7	1
3	A	29	0	23	0	0
3	C	29	0	24	0	0
4	A	224	0	0	10	0
4	B	166	0	0	4	0
4	C	64	0	0	0	0
4	D	38	0	0	0	0
All	All	9513	0	9136	58	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 3.

All (58) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:230:VAL:HA	1:A:233:MET:HE3	1.17	1.09
1:A:148:LEU:HD22	4:A:497:HOH:O	1.76	0.83
1:A:71:HIS:HD2	2:B:296:HIS:NE2	1.80	0.80
1:A:154:VAL:O	2:B:316:THR:CG2	2.40	0.69
1:A:71:HIS:CD2	2:B:296:HIS:NE2	2.59	0.69
1:A:227:TRP:CE2	1:A:233:MET:HE1	2.31	0.65
1:A:246:GLN:NE2	4:A:401:HOH:O	2.25	0.65
1:A:242:LYS:HD2	4:A:431:HOH:O	1.97	0.64
1:A:161:HIS:HD2	4:A:607:HOH:O	1.80	0.64
1:C:227:TRP:O	1:C:230:VAL:HG22	2.00	0.62
2:B:316:THR:HG21	4:B:648:HOH:O	1.99	0.61
2:D:428:GLU:HG3	2:D:429:THR:HG23	1.82	0.61
1:A:268:HIS:CD2	4:A:478:HOH:O	2.54	0.60
1:A:60:HIS:HD2	1:A:62:ASN:H	1.49	0.59
1:C:154:VAL:O	2:D:316:THR:CG2	2.51	0.58
1:A:227:TRP:O	1:A:230:VAL:HG22	2.04	0.57
1:A:296:LEU:HD13	1:A:298:LEU:HD11	1.86	0.57
1:A:60:HIS:CD2	1:A:62:ASN:H	2.23	0.57
1:A:181:SER:HB3	4:A:553:HOH:O	2.04	0.57
1:C:71:HIS:HD2	2:D:296:HIS:NE2	2.02	0.56
1:A:154:VAL:O	2:B:316:THR:HG23	2.05	0.56
1:C:155:PRO:HD2	2:D:316:THR:HG23	1.88	0.55
1:A:119:HIS:HD2	4:B:546:HOH:O	1.89	0.55
1:A:227:TRP:CZ2	1:A:233:MET:HE1	2.40	0.55
1:A:52:ILE:HD11	1:A:78:LEU:HD21	1.88	0.55
2:B:176:PRO:HA	2:B:179:HIS:CG	2.42	0.55
1:C:52:ILE:HD11	1:C:78:LEU:HD21	1.88	0.54
1:A:230:VAL:CA	1:A:233:MET:HE3	2.13	0.53
1:C:60:HIS:CD2	1:C:62:ASN:H	2.27	0.52
1:A:51:GLU:O	1:A:55:LEU:HB2	2.09	0.52
1:C:60:HIS:HD2	1:C:62:ASN:H	1.56	0.52
1:A:154:VAL:O	2:B:316:THR:HG22	2.10	0.52
1:C:51:GLU:O	1:C:55:LEU:HB2	2.11	0.51
1:A:163:VAL:CG2	4:A:497:HOH:O	2.58	0.51
1:C:154:VAL:O	2:D:316:THR:HG22	2.10	0.50
1:A:227:TRP:CE3	1:A:230:VAL:HG13	2.47	0.49
2:B:233:HIS:HD2	4:B:607:HOH:O	1.94	0.49
1:A:296:LEU:HD13	1:A:298:LEU:CD1	2.43	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:65:LYS:NZ	4:A:407:HOH:O	2.47	0.48
1:A:252:VAL:HB	4:A:403:HOH:O	2.12	0.48
1:A:2:GLU:OE2	1:C:73:GLU:CG	2.61	0.48
1:A:177:CYS:SG	1:A:233:MET:SD	3.12	0.48
2:B:344:ALA:HB1	2:B:348:LEU:HD22	1.97	0.47
1:C:49:ILE:HG23	2:D:306:LEU:HD12	1.96	0.47
1:C:227:TRP:CE3	1:C:230:VAL:HG13	2.50	0.47
2:B:176:PRO:HA	2:B:179:HIS:CD2	2.51	0.46
2:B:175:VAL:HG13	2:B:175:VAL:O	2.16	0.46
2:D:344:ALA:HB1	2:D:348:LEU:HD22	1.98	0.45
1:A:88:LYS:HG2	1:A:131:GLN:NE2	2.32	0.44
1:A:2:GLU:OE2	1:C:73:GLU:HG3	2.17	0.44
1:A:37:LEU:HD13	1:A:37:LEU:N	2.33	0.43
1:A:260:ARG:HD3	4:A:473:HOH:O	2.19	0.43
1:C:189:LEU:HD23	1:C:189:LEU:HA	1.89	0.42
2:B:289:LYS:HE2	4:B:532:HOH:O	2.21	0.41
1:C:197:VAL:HG21	1:C:255:LEU:HD13	2.02	0.41
2:B:431:ASN:C	2:B:432:LEU:HG	2.46	0.41
1:A:251:VAL:HG12	1:A:252:VAL:HG23	2.03	0.40
1:A:119:HIS:HE1	1:A:185:ASP:OD2	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:C:8:GLU:OE1	2:D:403:GLN:OE1[3_655]	2.18	0.02

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	297/303 (98%)	288 (97%)	7 (2%)	2 (1%)	18 14

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	295/303 (97%)	288 (98%)	5 (2%)	2 (1%)	18	14
2	B	256/260 (98%)	255 (100%)	1 (0%)	0	100	100
2	D	254/260 (98%)	253 (100%)	1 (0%)	0	100	100
All	All	1102/1126 (98%)	1084 (98%)	14 (1%)	4 (0%)	30	27

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	164	VAL
1	C	164	VAL
1	A	145	ASP
1	C	145	ASP

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	264/265 (100%)	245 (93%)	19 (7%)	13	10
1	C	262/265 (99%)	243 (93%)	19 (7%)	13	9
2	B	232/234 (99%)	217 (94%)	15 (6%)	15	12
2	D	230/234 (98%)	217 (94%)	13 (6%)	18	15
All	All	988/998 (99%)	922 (93%)	66 (7%)	15	11

All (66) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	36	ARG
1	A	37	LEU
1	A	38	ASP
1	A	55	LEU
1	A	74	ASN
1	A	75	LYS
1	A	88	LYS

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Mol	Chain	Res	Type
1	A	89	LYS
1	A	101	LEU
1	A	150	ARG
1	A	157	ARG
1	A	163	VAL
1	A	226	VAL
1	A	230	VAL
1	A	237	LYS
1	A	242	LYS
1	A	247	ASP
1	A	273	LYS
1	A	298	LEU
2	B	175	VAL
2	B	180	GLU
2	B	201	LYS
2	B	202	LYS
2	B	226	LYS
2	B	232	LEU
2	B	281	ILE
2	B	283	ASP
2	B	316	THR
2	B	328	LYS
2	B	348	LEU
2	B	374	GLU
2	B	384	LEU
2	B	391	LEU
2	B	432	LEU
1	C	14	THR
1	C	55	LEU
1	C	75	LYS
1	C	83	LEU
1	C	88	LYS
1	C	89	LYS
1	C	101	LEU
1	C	148	LEU
1	C	150	ARG
1	C	157	ARG
1	C	163	VAL
1	C	226	VAL
1	C	230	VAL
1	C	237	LYS
1	C	242	LYS

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Mol	Chain	Res	Type
1	C	247	ASP
1	C	250	LYS
1	C	273	LYS
1	C	296	LEU
2	D	180	GLU
2	D	201	LYS
2	D	202	LYS
2	D	226	LYS
2	D	232	LEU
2	D	281	ILE
2	D	316	THR
2	D	328	LYS
2	D	348	LEU
2	D	374	GLU
2	D	384	LEU
2	D	391	LEU
2	D	432	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (22) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	3	ASN
1	A	60	HIS
1	A	71	HIS
1	A	119	HIS
1	A	161	HIS
1	A	265	GLN
1	A	268	HIS
2	B	179	HIS
2	B	183	HIS
2	B	228	GLN
2	B	233	HIS
2	B	254	GLN
2	B	317	GLN
2	B	395	HIS
2	B	425	ASN
1	C	3	ASN
1	C	60	HIS
1	C	71	HIS
1	C	119	HIS
1	C	265	GLN
2	D	254	GLN

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Mol	Chain	Res	Type
2	D	395	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

2 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	$\# Z > 2$
1	TPO	C	160	1	8,10,11	1.06	1 (12%)	10,14,16	1.23	1 (10%)
1	TPO	A	160	1	8,10,11	1.49	1 (12%)	10,14,16	1.30	2 (20%)

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
1	TPO	C	160	1	-	0/9/11/13	-
1	TPO	A	160	1	-	0/9/11/13	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	160	TPO	P-OG1	3.20	1.65	1.59
1	C	160	TPO	P-OG1	2.27	1.63	1.59

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	160	TPO	O3P-P-O1P	2.71	121.39	110.83
1	A	160	TPO	O3P-P-O1P	2.23	119.51	110.83
1	A	160	TPO	O-C-CA	-2.09	119.39	124.77

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

2 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	55S	C	301	1	31,32,32	0.83	2 (6%)	43,45,45	0.78	2 (4%)
3	55S	A	301	1	31,32,32	0.91	2 (6%)	43,45,45	0.81	2 (4%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	55S	C	301	1	-	5/18/26/26	0/4/4/4
3	55S	A	301	1	-	3/18/26/26	0/4/4/4

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	301	55S	C9-N3	-2.75	1.34	1.39
3	A	301	55S	O2-C10	2.68	1.38	1.34
3	C	301	55S	C9-N3	-2.19	1.35	1.39
3	C	301	55S	C5-N	2.12	1.45	1.40

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	301	55S	C9-C10-N4	-2.58	120.04	123.49
3	A	301	55S	C6-N4-C10	2.17	119.12	115.38
3	C	301	55S	C9-C10-N4	-2.13	120.64	123.49
3	C	301	55S	C9-C7-N1	-2.00	124.59	126.55

There are no chirality outliers.

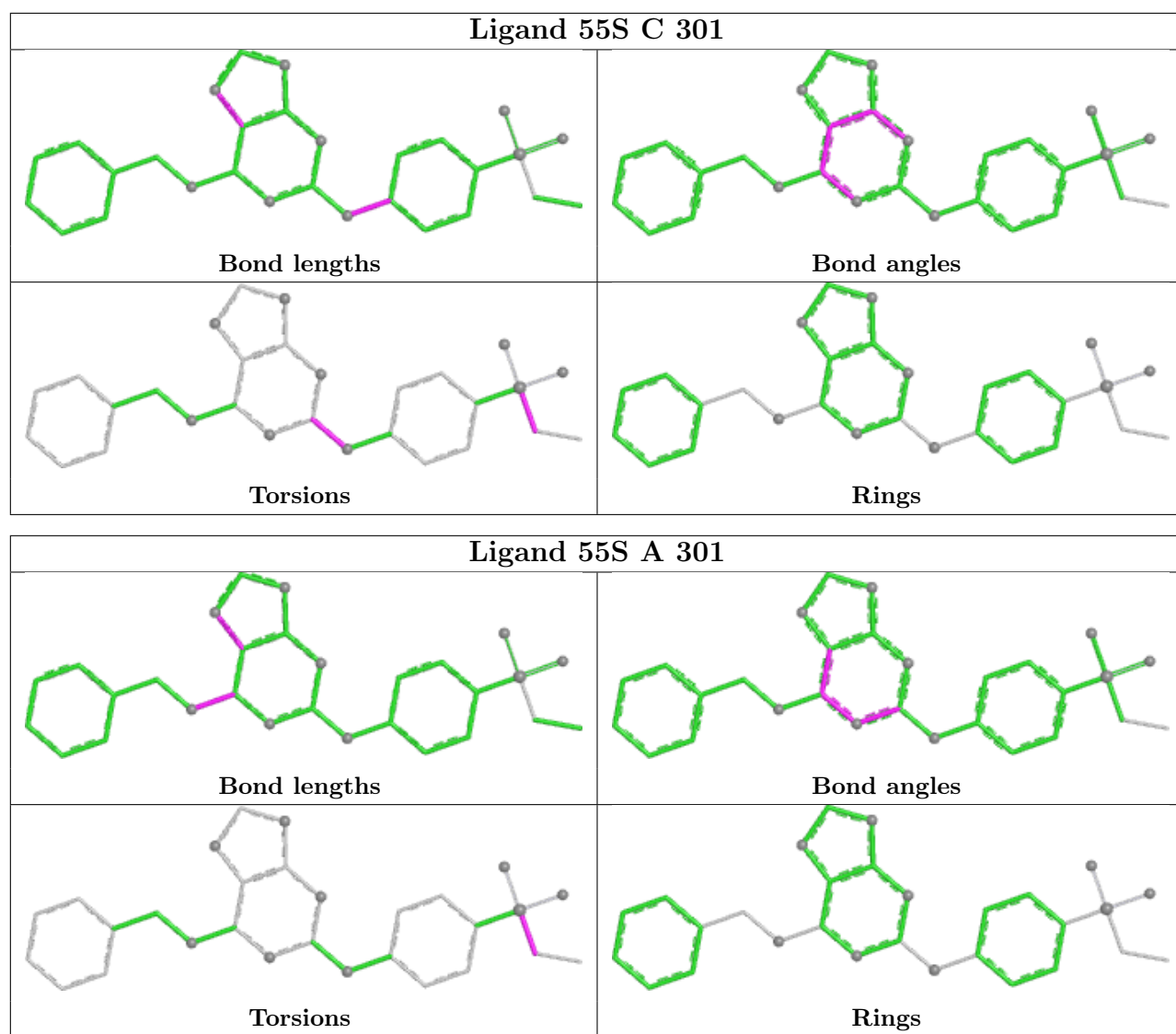
All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	301	55S	C-C1-S-O1
3	A	301	55S	C-C1-S-O
3	A	301	55S	C-C1-S-C2
3	C	301	55S	C-C1-S-O1
3	C	301	55S	C-C1-S-O
3	C	301	55S	C-C1-S-C2
3	C	301	55S	N1-C6-N-C5
3	C	301	55S	N4-C6-N-C5

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for 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	298/303 (98%)	0.17	21 (7%) 22 21	15, 32, 76, 119	1 (0%)
1	C	296/303 (97%)	1.83	123 (41%) 0 1	20, 62, 96, 118	1 (0%)
2	B	258/260 (99%)	0.09	8 (3%) 51 50	22, 34, 63, 118	0
2	D	256/260 (98%)	1.93	114 (44%) 0 1	31, 69, 118, 139	0
All	All	1108/1126 (98%)	1.00	266 (24%) 2 2	15, 46, 100, 139	2 (0%)

All (266) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	432	LEU	7.3
1	C	213	PHE	6.7
2	D	372	TRP	6.6
1	A	72	THR	6.2
2	D	329	VAL	5.8
2	D	399	LEU	5.5
1	C	173	ILE	5.4
1	C	180	TYR	5.4
1	C	166	LEU	5.3
2	D	424	LEU	5.3
1	C	209	ILE	5.3
1	C	99	ILE	5.1
2	D	364	LEU	5.1
1	C	215	ILE	5.1
1	C	187	TRP	5.0
2	D	366	THR	5.0
1	A	96	LEU	5.0
2	D	430	LEU	5.0
1	C	202	LEU	4.9
1	C	203	PHE	4.8
1	C	243	TRP	4.8

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Mol	Chain	Res	Type	RSRZ
1	A	295	HIS	4.8
1	C	226	VAL	4.7
1	A	41	THR	4.7
2	D	327	CYS	4.6
2	D	314	PHE	4.6
2	D	360	PHE	4.6
1	C	212	LEU	4.6
1	C	201	ALA	4.6
2	D	418	TYR	4.6
1	C	174	LEU	4.5
2	D	377	ILE	4.5
1	A	296	LEU	4.4
2	D	362	LEU	4.4
2	D	333	ALA	4.4
1	C	252	VAL	4.3
2	D	339	LEU	4.3
2	D	423	LEU	4.3
1	C	163	VAL	4.2
1	C	197	VAL	4.2
1	C	296	LEU	4.2
1	C	275	ILE	4.2
1	C	271	PRO	4.2
1	C	282	ALA	4.1
2	D	391	LEU	4.1
2	D	384	LEU	4.1
2	D	367	VAL	4.1
2	D	337	GLY	4.0
2	D	332	LEU	4.0
1	A	71	HIS	4.0
2	D	325	ALA	3.9
1	C	219	LEU	3.9
2	D	395	HIS	3.9
1	A	37	LEU	3.9
2	D	403	GLN	3.9
2	D	405	ALA	3.8
1	C	248	PHE	3.8
2	D	413	TYR	3.8
2	D	432	LEU	3.8
1	C	199	ARG	3.8
2	D	359	ALA	3.7
2	D	387	LEU	3.7
1	C	205	GLY	3.7

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Mol	Chain	Res	Type	RSRZ
2	D	409	ILE	3.7
1	C	170	ALA	3.7
1	C	218	THR	3.7
2	D	429	THR	3.7
2	D	398	TYR	3.7
1	C	204	PRO	3.6
2	D	376	LEU	3.6
1	C	211	GLN	3.6
1	C	104	ILE	3.6
1	C	198	THR	3.6
1	C	234	PRO	3.6
2	B	175	VAL	3.5
1	C	186	ILE	3.5
2	D	320	LEU	3.5
1	C	177	CYS	3.5
2	D	321	HIS	3.5
2	D	328	LYS	3.5
2	D	382	TYR	3.5
1	C	253	PRO	3.5
2	D	227	LEU	3.5
2	D	336	LEU	3.5
2	D	334	MET	3.5
2	D	410	ARG	3.5
2	D	402	PRO	3.4
1	C	259	GLY	3.4
1	C	216	PHE	3.4
1	C	236	TYR	3.4
2	D	357	GLY	3.4
1	C	194	ALA	3.4
1	C	285	PHE	3.4
2	D	365	TYR	3.3
1	A	74	ASN	3.3
2	D	323	GLN	3.3
1	C	175	LEU	3.3
2	D	324	PRO	3.3
1	C	262	LEU	3.3
1	C	161	HIS	3.2
2	B	180	GLU	3.2
1	C	190	GLY	3.2
1	C	268	HIS	3.2
2	B	176	PRO	3.2
2	D	373	PRO	3.2

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Mol	Chain	Res	Type	RSRZ
2	D	389	PRO	3.2
1	C	154	VAL	3.2
2	D	421	VAL	3.2
2	D	401	ALA	3.2
1	A	36	ARG	3.2
1	C	286	PHE	3.2
2	B	431	ASN	3.2
2	D	358	ALA	3.1
2	D	270	ILE	3.1
1	A	95	ALA	3.1
1	C	255	LEU	3.1
1	C	263	LEU	3.1
2	D	427	PRO	3.1
2	B	177	ASP	3.1
1	C	251	VAL	3.1
2	D	179	HIS	3.1
1	C	233	MET	3.1
1	A	97	THR	3.1
1	A	246	GLN	3.1
1	C	279	ALA	3.1
1	A	293	VAL	3.1
1	A	298	LEU	3.1
1	C	101	LEU	3.1
1	C	169	ARG	3.0
1	C	191	CYS	3.0
2	D	315	LEU	3.0
2	D	371	SER	3.0
1	C	228	PRO	3.0
2	D	369	GLY	3.0
2	D	368	THR	3.0
1	C	241	PRO	3.0
2	D	347	TYR	3.0
1	C	230	VAL	3.0
2	D	426	PRO	3.0
1	C	269	TYR	3.0
1	C	183	ALA	2.9
2	B	430	LEU	2.9
1	C	225	VAL	2.9
1	C	266	MET	2.9
2	D	381	GLY	2.9
1	C	254	PRO	2.9
1	C	214	ARG	2.9

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Mol	Chain	Res	Type	RSRZ
2	D	202	LYS	2.9
1	C	244	ALA	2.9
1	A	0	SER	2.9
2	D	422	SER	2.9
1	C	189	LEU	2.8
1	C	157	ARG	2.8
2	D	363	ALA	2.8
2	D	354	VAL	2.8
1	C	240	PHE	2.8
2	D	335	PHE	2.8
1	C	97	THR	2.8
1	C	227	TRP	2.8
2	D	319	PHE	2.8
1	C	128	LEU	2.8
2	D	316	THR	2.8
2	D	219	VAL	2.8
2	D	397	THR	2.7
1	C	222	PRO	2.7
1	C	2	GLU	2.7
2	D	394	LEU	2.7
1	C	192	ILE	2.7
2	D	390	CYS	2.7
1	C	98	GLY	2.7
1	C	158	THR	2.7
2	D	350	TYR	2.7
1	C	94	SER	2.7
2	D	326	ASN	2.6
2	D	318	TYR	2.6
2	D	407	GLN	2.6
2	D	201	LYS	2.6
2	D	388	LYS	2.6
2	D	311	VAL	2.6
2	D	380	THR	2.6
2	D	383	THR	2.6
1	C	96	LEU	2.6
2	D	346	PRO	2.6
2	D	351	LEU	2.6
1	C	131	GLN	2.6
1	C	156	VAL	2.6
2	D	355	ILE	2.6
2	D	392	MET	2.6
2	D	342	ILE	2.5

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Mol	Chain	Res	Type	RSRZ
2	D	280	TYR	2.5
1	C	221	THR	2.5
1	C	293	VAL	2.5
1	C	179	TYR	2.5
2	D	284	ASP	2.5
2	D	340	SER	2.5
1	C	103	LEU	2.5
2	D	419	HIS	2.5
1	C	206	ASP	2.5
2	B	284	ASP	2.5
2	D	177	ASP	2.5
2	D	348	LEU	2.5
2	D	361	HIS	2.5
1	C	294	PRO	2.4
1	C	112	LEU	2.4
1	C	164	VAL	2.4
1	C	109	PHE	2.4
1	A	38	ASP	2.4
2	D	197	VAL	2.4
1	C	0	SER	2.4
1	A	39	THR	2.4
1	A	297	ARG	2.4
1	C	171	PRO	2.4
1	C	95	ALA	2.4
2	D	356	ALA	2.4
2	D	322	GLN	2.4
2	D	406	GLN	2.4
1	C	90	PHE	2.4
1	C	193	PHE	2.4
1	C	184	VAL	2.3
1	A	40	GLU	2.3
2	D	223	GLU	2.3
2	D	344	ALA	2.3
1	C	256	ASP	2.3
1	C	105	LYS	2.3
1	C	267	LEU	2.3
1	C	188	SER	2.3
1	C	238	PRO	2.3
1	C	274	ARG	2.3
1	A	73	GLU	2.2
1	C	295	HIS	2.2
2	D	374	GLU	2.2

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Mol	Chain	Res	Type	RSRZ
2	D	404	HIS	2.2
1	C	196	MET	2.2
1	C	246	GLN	2.2
1	C	152	PHE	2.2
1	C	89	LYS	2.2
1	C	237	LYS	2.2
2	D	206	ILE	2.2
1	C	93	ALA	2.2
2	D	386	SER	2.2
1	C	88	LYS	2.2
1	C	100	PRO	2.1
1	C	155	PRO	2.1
2	D	285	THR	2.2
2	D	182	ILE	2.1
2	D	396	GLN	2.1
1	C	283	HIS	2.1
2	D	183	HIS	2.1
1	C	273	LYS	2.1
2	D	216	ASP	2.1
2	D	428	GLU	2.1
1	C	167	TRP	2.1
1	C	289	VAL	2.1
1	C	124	LEU	2.1
1	C	217	ARG	2.1
1	C	129	LYS	2.1
1	C	115	LEU	2.1
2	D	229	ASN	2.1
1	A	75	LYS	2.1
2	D	196	LYS	2.1
2	D	217	TRP	2.1
1	C	120	SER	2.1
2	D	425	ASN	2.0
1	C	102	PRO	2.0
1	C	229	GLY	2.0
2	D	178	TYR	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($\text{\AA}^2$)	Q<0.9
1	TPO	C	160	11/12	0.89	0.14	45,59,67,70	0
1	TPO	A	160	11/12	0.99	0.04	22,27,29,29	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

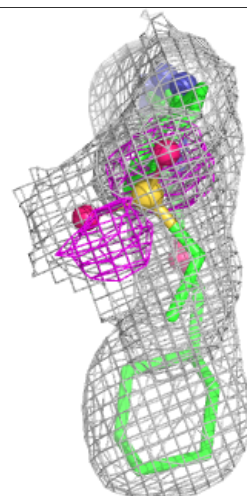
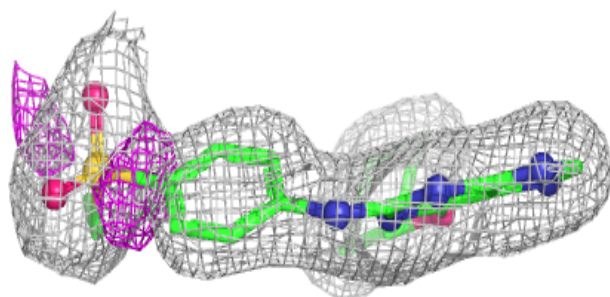
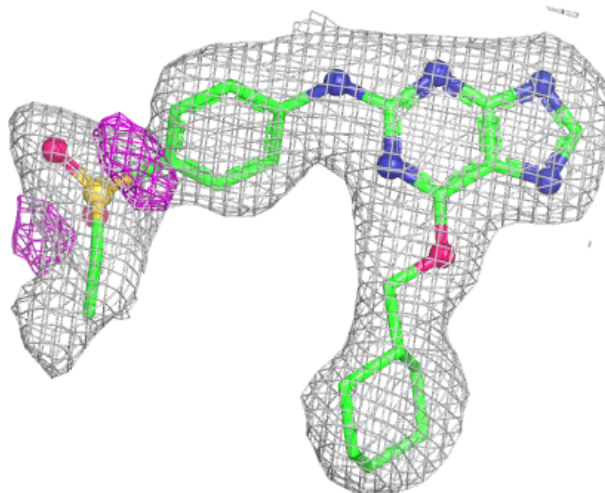
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	55S	C	301	29/29	0.93	0.11	38,48,64,72	0
3	55S	A	301	29/29	0.95	0.08	35,40,63,67	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.

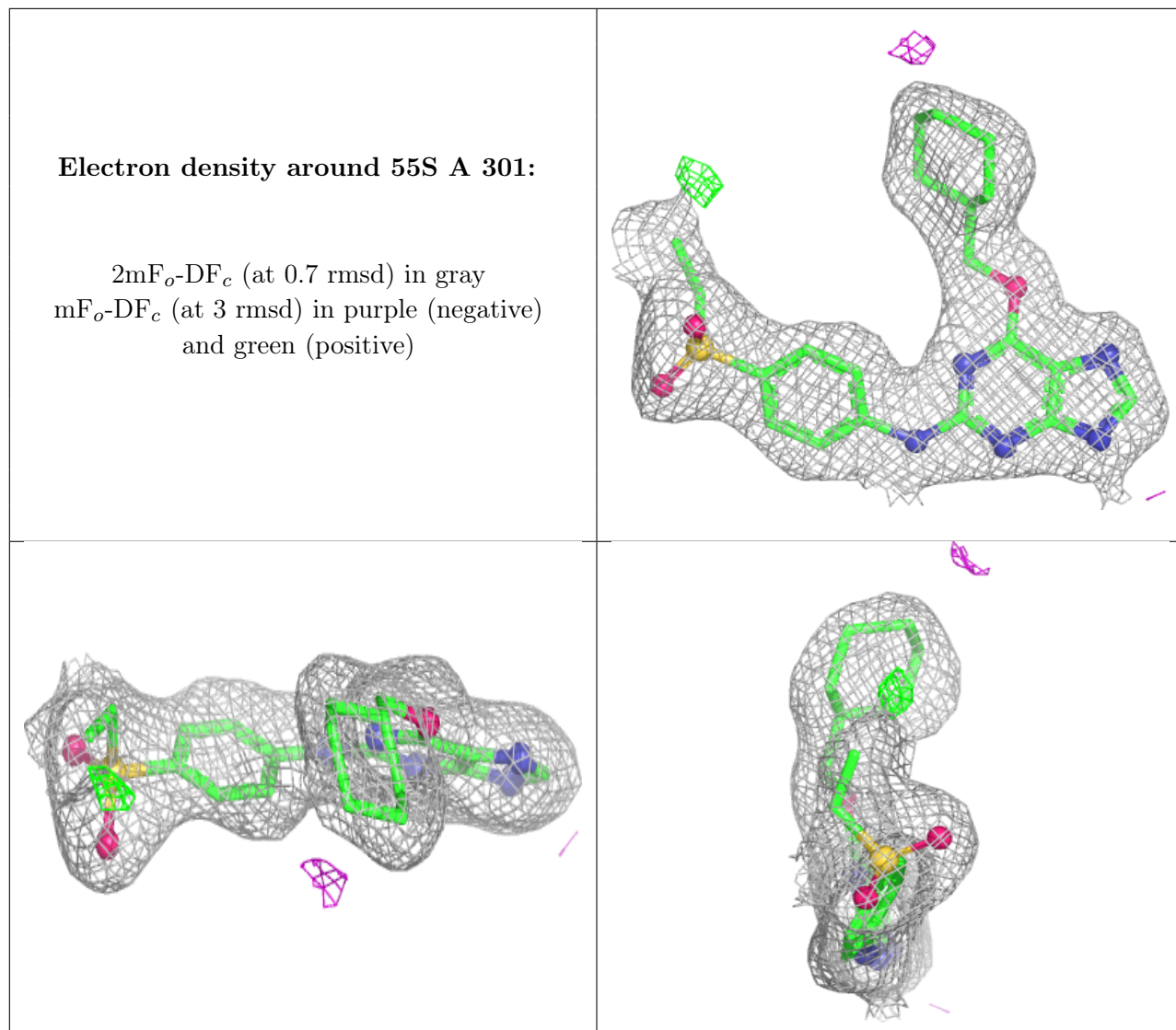
Electron density around 55S C 301:

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



Electron density around 55S A 301:

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



6.5 Other polymers ⓘ

There are no such residues in this entry.