Full wwPDB X-ray Structure Validation Report (i)

Feb 25, 2024 – 05:16 AM EST

PDB ID	:	7K7L
Title	:	Structure of a hit for G Protein Coupled Receptor Kinase 2 (GRK2) Inhibitor for the Potential Treatment of Heart Failure
Authors	:	Spurlino, J.C.; Milligan, C.
Deposited on	:	2020-09-23
Resolution	:	2.54 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 (i) 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 (i)) were used in the production of this report:

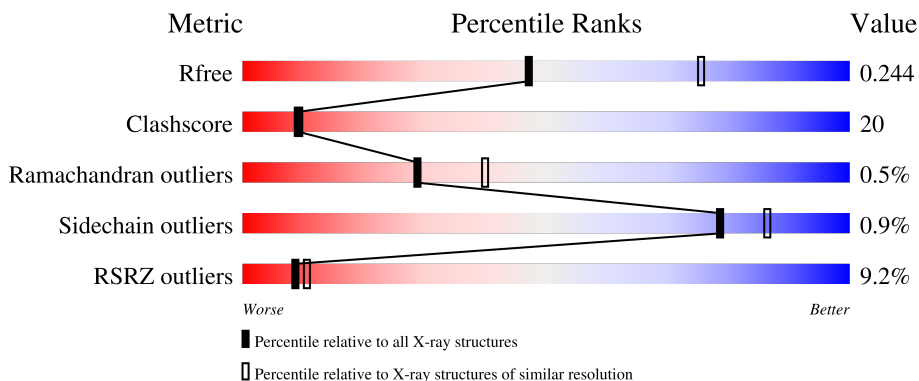|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 2.54 Å.

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

Metric	Percentile Ranks	Value
Rfree		0.244
Clashscore		20
Ramachandran outliers		0.5%
Sidechain outliers		0.9%
RSRZ outliers		9.2%

Worse *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1284 (2.56-2.52)
Clashscore	141614	1332 (2.56-2.52)
Ramachandran outliers	138981	1315 (2.56-2.52)
Sidechain outliers	138945	1315 (2.56-2.52)
RSRZ outliers	127900	1272 (2.56-2.52)

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

Mol	Chain	Length	Quality of chain
1	A	640	13% / 61% / 34% / · ·
2	B	339	.% / 68% / 32%
3	G	59	5% / 76% / 20% / ·

2　Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 8152 atoms, of which 14 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 Beta-adrenergic receptor kinase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	616	Total	C	N	O	S	0	0	0
			5053	3221	884	913	35			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	669	ALA	-	expression tag	UNP P25098

- Molecule 2 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1.

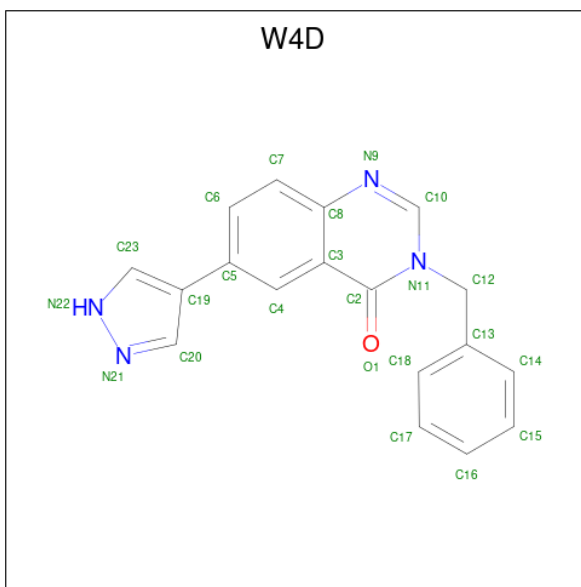| Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	339	Total	C	N	O	S	0	2	0
			2619	1613	470	513	23			

- Molecule 3 is a protein called Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	G	57	Total	C	N	O	S	0	0	0
			442	277	78	84	3			

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Mg	1	0
			1	1		

- Molecule 5 is 3-benzyl-6-(1H-pyrazol-4-yl)quinazolin-4(3H)-one (three-letter code: W4D) (formula: $C_{18}H_{14}N_4O$) (labeled as "Ligand of Interest" by depositor).
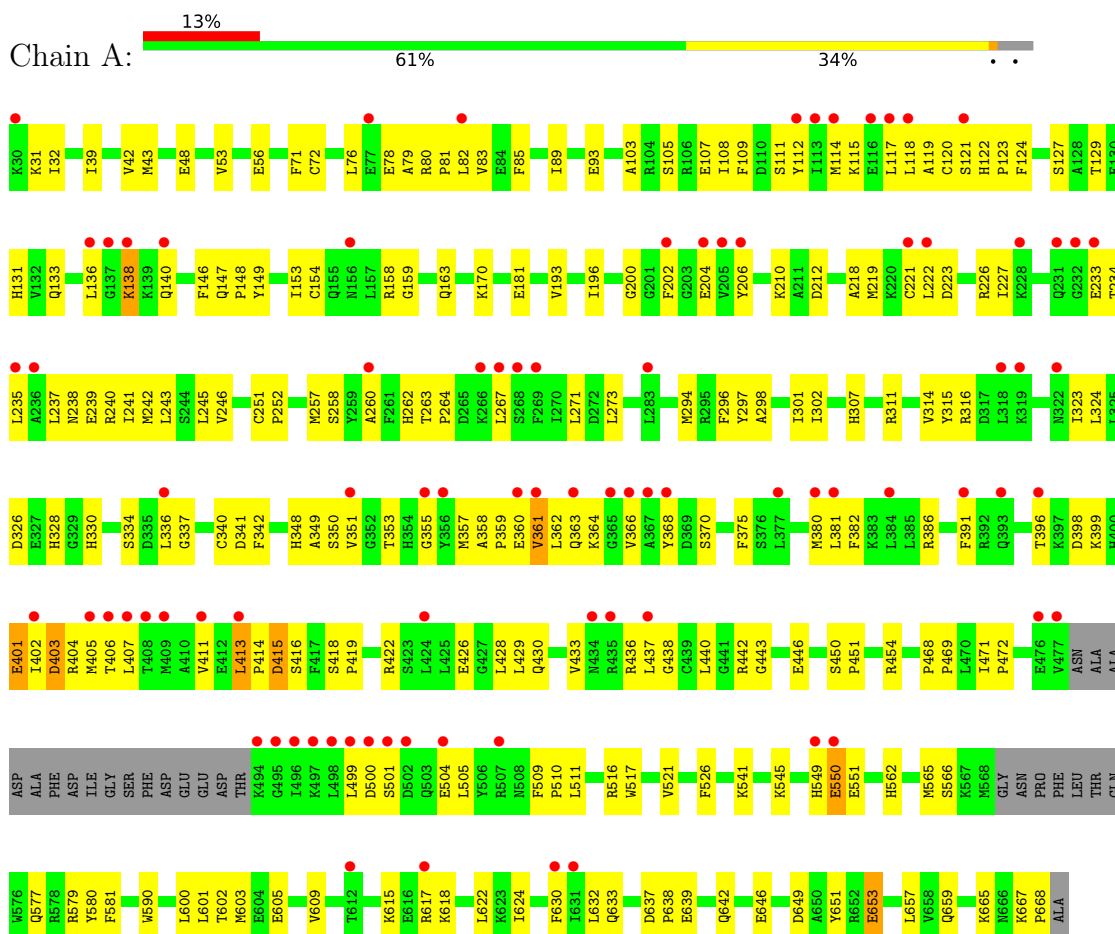
W4D

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	H	N	O		
5	A	1	37	18	14	4	1	0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

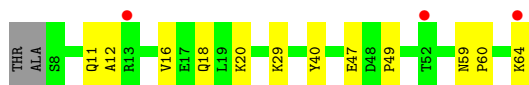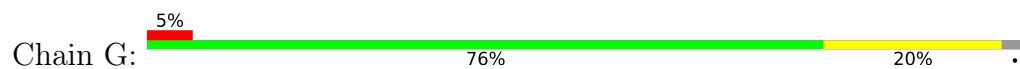• Molecule 1: Beta-adrenergic receptor kinase 1

• Molecule 2: Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1

T249 D254 L255 E260 L261 M262 T263 D267 C271 G272 I273 T274 S275 V276 L286 Y289 D290 D291 F292 N293 C294 A302 A305 L308 A309 G310 N313 R314 V315 L318 G319 V320 T321 M325 A326 V327 A328 S331 W332 D333 L336 K337 I338 W339 N340

• Molecule 3: Guanine nucleotide-binding protein G(I)/G(S)/G(O) subunit gamma-2

Chain G:

5%

76%

20%

THR ALA S8 Q11 A12 R13 V16 E17 Q18 L19 K20 K29 Y40 E47 D48 P49 T52 N59 P60 K64

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	194.40Å 70.77Å 111.24Å 90.00° 110.58° 90.00°	Depositor
Resolution (Å)	33.50 – 2.54 48.40 – 2.54	Depositor EDS
% Data completeness (in resolution range)	91.8 (33.50-2.54) 86.2 (48.40-2.54)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.38 (at 2.54Å)	Xtriage
Refinement program	PHENIX dev_1838	Depositor
R, R_{free}	0.201 , 0.244 0.201 , 0.244	Depositor DCC
R_{free} test set	2000 reflections (4.63%)	wwPDB-VP
Wilson B-factor (Å^2)	46.4	Xtriage
Anisotropy	0.741	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 49.3	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	8152	wwPDB-VP
Average B, all atoms (Å^2)	71.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.72% of the height of the origin peak. No significant pseudotranslation is detected.*

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

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: W4D, MG

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	0.22	0/5166	0.38	0/6938
2	B	0.21	0/2666	0.39	0/3613
3	G	0.20	0/448	0.35	0/603
All	All	0.22	0/8280	0.38	0/11154

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	5053	0	5048	230	0
2	B	2619	0	2518	86	0
3	G	442	0	455	9	0
4	A	1	0	0	0	0
5	A	23	14	0	1	0
All	All	8138	14	8021	320	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 20.

All (320) 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:363:GLN:O	1:A:366:VAL:HG22	1.47	1.14
1:A:348:HIS:O	1:A:368:TYR:HE2	1.27	1.13
1:A:549:HIS:HA	1:A:550:GLU:HB3	1.25	1.11
1:A:363:GLN:O	1:A:366:VAL:CG2	2.00	1.08
1:A:413:LEU:HD22	1:A:422:ARG:HD3	1.46	0.97
1:A:348:HIS:O	1:A:368:TYR:CE2	2.19	0.95
1:A:363:GLN:HB3	1:A:366:VAL:HG11	1.49	0.94
1:A:617:ARG:HH21	1:A:633:GLN:HG2	1.32	0.92
1:A:549:HIS:HA	1:A:550:GLU:CB	2.03	0.88
1:A:565:MET:HE2	1:A:632:LEU:HB3	1.52	0.88
1:A:234:THR:HG23	1:A:235:LEU:HD12	1.56	0.84
1:A:499:LEU:HD23	1:A:501:SER:H	1.41	0.84
1:A:451:PRO:HA	1:A:454:ARG:HG3	1.59	0.83
1:A:363:GLN:CB	1:A:366:VAL:HG11	2.08	0.83
1:A:366:VAL:O	1:A:368:TYR:HD2	1.62	0.82
1:A:348:HIS:C	1:A:368:TYR:HE2	1.84	0.80
2:B:95:LEU:HD13	2:B:100:VAL:HG21	1.62	0.80
1:A:366:VAL:O	1:A:366:VAL:HG23	1.80	0.78
1:A:363:GLN:O	1:A:366:VAL:HG21	1.84	0.78
1:A:413:LEU:CD2	1:A:422:ARG:HD3	2.13	0.78
2:B:262:MET:SD	2:B:302:ALA:HB2	2.24	0.77
1:A:605:GLU:HG2	1:A:624:ILE:HG23	1.67	0.76
1:A:349:ALA:O	1:A:368:TYR:OH	2.00	0.76
1:A:355:GLY:HA2	1:A:402:ILE:HG21	1.66	0.76
1:A:112:TYR:CD1	1:A:115:LYS:HE3	2.21	0.75
1:A:549:HIS:CA	1:A:550:GLU:HB3	2.11	0.75
1:A:361:VAL:HB	1:A:368:TYR:CE1	2.22	0.73
1:A:391:PHE:CB	1:A:402:ILE:HG23	2.19	0.73
1:A:196:ILE:HD12	1:A:196:ILE:H	1.54	0.73
1:A:263:THR:HB	1:A:264:PRO:HD2	1.69	0.73
2:B:146:LEU:HD11	2:B:159:THR:HB	1.70	0.72
1:A:350:SER:HB3	1:A:364:LYS:HE2	1.71	0.72
2:B:43:ILE:HG12	2:B:305:ALA:HB1	1.72	0.71
1:A:355:GLY:CA	1:A:402:ILE:HD13	2.21	0.71
1:A:366:VAL:O	1:A:368:TYR:CD2	2.44	0.71
1:A:401:GLU:O	1:A:404:ARG:HG2	1.90	0.70
1:A:138:LYS:HB3	1:A:140:GLN:OE1	1.92	0.69
2:B:95:LEU:CD1	2:B:100:VAL:HG21	2.23	0.69
2:B:112:VAL:HG13	2:B:126:LEU:HD11	1.74	0.69
1:A:239:GLU:HB2	1:A:337:GLY:HA2	1.75	0.69
1:A:549:HIS:CA	1:A:550:GLU:CB	2.71	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:375:PHE:HB2	1:A:436:ARG:NH1	2.09	0.68
1:A:242:MET:HE2	1:A:242:MET:HA	1.76	0.67
1:A:263:THR:HB	1:A:264:PRO:CD	2.24	0.67
1:A:323:ILE:HG13	1:A:380:MET:CE	2.25	0.67
1:A:667:LYS:HB3	1:A:668:PRO:HD2	1.77	0.66
2:B:325:MET:O	2:B:340:ASN:ND2	2.29	0.66
1:A:418:SER:HB2	1:A:419:PRO:HD2	1.78	0.65
1:A:257:MET:HA	1:A:271:LEU:HD23	1.77	0.65
1:A:363:GLN:HB3	1:A:366:VAL:CG1	2.25	0.65
2:B:6:GLN:O	2:B:10:GLU:N	2.17	0.65
1:A:375:PHE:HB2	1:A:436:ARG:HH11	1.61	0.65
2:B:152:LEU:HD23	2:B:192:LEU:HD13	1.78	0.65
1:A:348:HIS:C	1:A:368:TYR:CE2	2.67	0.65
1:A:413:LEU:HD13	1:A:422:ARG:NE	2.12	0.64
1:A:243:LEU:HD23	1:A:336:LEU:HD12	1.79	0.64
2:B:2:SER:HB3	2:B:5:ASP:HB3	1.80	0.64
2:B:73:ALA:HB1	2:B:100:VAL:HG11	1.78	0.64
1:A:382:PHE:CZ	1:A:386:ARG:HG3	2.33	0.64
1:A:609:VAL:HG22	1:A:622:LEU:CD2	2.27	0.64
2:B:163:ASP:O	2:B:164:THR:HB	1.98	0.63
2:B:230:ASN:ND2	2:B:246:ASP:OD1	2.24	0.63
2:B:320:VAL:HG22	2:B:327:VAL:HG22	1.80	0.62
1:A:361:VAL:HG13	1:A:362:LEU:H	1.64	0.62
1:A:118:LEU:HA	1:A:123:PRO:HB3	1.81	0.62
1:A:112:TYR:CE1	1:A:115:LYS:HE3	2.34	0.62
2:B:217:MET:HE3	2:B:219:ARG:HD3	1.82	0.62
1:A:405:MET:HE2	1:A:405:MET:HA	1.82	0.61
1:A:222:LEU:HB2	1:A:267:LEU:HB2	1.81	0.61
1:A:391:PHE:HB2	1:A:402:ILE:HG23	1.83	0.61
1:A:314:VAL:HG13	1:A:342:PHE:CE2	2.35	0.61
1:A:404:ARG:HG3	1:A:405:MET:HG2	1.83	0.61
1:A:603:MET:HB3	1:A:651:TYR:HA	1.82	0.60
1:A:234:THR:HG23	1:A:235:LEU:CD1	2.29	0.60
1:A:71:PHE:HB2	1:A:170:LYS:HG3	1.83	0.60
1:A:622:LEU:HB2	1:A:630:PHE:HB3	1.83	0.60
1:A:413:LEU:HD13	1:A:422:ARG:HE	1.66	0.59
1:A:323:ILE:HG13	1:A:380:MET:HE3	1.85	0.59
1:A:565:MET:HB2	1:A:581:PHE:CE1	2.37	0.59
1:A:499:LEU:HD23	1:A:500:ASP:N	2.17	0.59
1:A:118:LEU:HD11	1:A:124:PHE:CD2	2.38	0.59
1:A:366:VAL:CG2	1:A:366:VAL:O	2.49	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:398:ASP:C	1:A:401:GLU:HB2	2.24	0.58
1:A:401:GLU:HG3	1:A:402:ILE:HG13	1.85	0.58
1:A:509:PHE:HB3	1:A:510:PRO:HD3	1.85	0.58
1:A:324:LEU:HD23	1:A:334:SER:CB	2.33	0.58
1:A:413:LEU:HD22	1:A:422:ARG:CD	2.29	0.58
2:B:73:ALA:HB1	2:B:100:VAL:CG1	2.33	0.58
1:A:350:SER:CB	1:A:364:LYS:HE2	2.34	0.58
2:B:217:MET:CE	2:B:219:ARG:HD3	2.34	0.58
2:B:294:CYS:HB3	2:B:308:LEU:HB2	1.86	0.57
1:A:499:LEU:CD2	1:A:501:SER:H	2.14	0.57
1:A:242:MET:HE2	1:A:245:LEU:HD12	1.86	0.57
2:B:235:PHE:CG	2:B:236:PRO:HD2	2.40	0.57
1:A:222:LEU:HB3	1:A:227:ILE:HD11	1.86	0.57
1:A:202:PHE:O	1:A:226:ARG:HD2	2.05	0.57
2:B:340:ASN:OD1	3:G:59:ASN:ND2	2.36	0.57
1:A:401:GLU:HG3	1:A:402:ILE:N	2.20	0.57
1:A:418:SER:O	1:A:422:ARG:HG3	2.05	0.56
3:G:47:GLU:O	3:G:49:PRO:HD3	2.04	0.56
1:A:245:LEU:O	1:A:311:ARG:HD3	2.05	0.56
1:A:630:PHE:HE2	1:A:632:LEU:HD21	1.70	0.56
1:A:411:VAL:HG21	1:A:429:LEU:HD13	1.88	0.56
1:A:140:GLN:O	1:A:140:GLN:HG2	2.06	0.56
1:A:637:ASP:HB2	1:A:638:PRO:HD3	1.89	0.55
1:A:359:PRO:HB3	1:A:407:LEU:HD23	1.88	0.55
1:A:603:MET:HA	1:A:603:MET:HE2	1.89	0.55
1:A:108:ILE:O	1:A:111:SER:HB2	2.07	0.55
1:A:294:MET:SD	1:A:381:LEU:HD22	2.47	0.54
2:B:134:ARG:HG3	2:B:135:VAL:N	2.22	0.54
2:B:160:SER:HB2	2:B:187:VAL:CG1	2.36	0.54
1:A:323:ILE:HG13	1:A:380:MET:HE1	1.89	0.54
1:A:360:GLU:O	1:A:363:GLN:O	2.25	0.54
1:A:500:ASP:O	1:A:504:GLU:HG2	2.08	0.54
2:B:120:ILE:HD11	2:B:122:SER:OG	2.07	0.54
1:A:118:LEU:HA	1:A:123:PRO:CB	2.36	0.54
1:A:251:CYS:HB2	1:A:307:HIS:CE1	2.42	0.54
1:A:80:ARG:N	1:A:81:PRO:HD2	2.23	0.54
1:A:541:LYS:O	1:A:545:LYS:HG2	2.06	0.54
1:A:237:LEU:O	1:A:241:ILE:HG12	2.07	0.53
1:A:361:VAL:O	1:A:363:GLN:O	2.25	0.53
1:A:605:GLU:HG2	1:A:624:ILE:CG2	2.36	0.53
2:B:160:SER:HB3	2:B:190:LEU:HD23	1.89	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:3:GLU:O	2:B:7:LEU:HD13	2.09	0.53
1:A:260:ALA:O	1:A:510:PRO:HA	2.08	0.53
2:B:127:LYS:O	2:B:128:THR:HG22	2.09	0.53
1:A:111:SER:O	1:A:114:MET:HB3	2.08	0.53
1:A:566:SER:OG	1:A:633:GLN:HB3	2.09	0.53
1:A:56:GLU:HG3	1:A:158:ARG:HH22	1.72	0.53
1:A:324:LEU:HD23	1:A:334:SER:HB3	1.90	0.53
1:A:405:MET:HE2	1:A:405:MET:CA	2.39	0.53
2:B:271[A]:CYS:HB2	2:B:290:ASP:HB3	1.90	0.53
1:A:398:ASP:O	1:A:401:GLU:HB2	2.09	0.53
1:A:72:CYS:CB	1:A:83:VAL:HG21	2.39	0.52
1:A:314:VAL:CG2	1:A:340:CYS:HB3	2.39	0.52
2:B:271[B]:CYS:HB3	2:B:290:ASP:HB3	1.90	0.52
1:A:360:GLU:HG3	1:A:433:VAL:CG2	2.39	0.52
2:B:180:PHE:CE2	2:B:216:GLY:HA2	2.44	0.52
1:A:39:ILE:HG13	1:A:43:MET:HG2	1.91	0.52
1:A:129:THR:O	1:A:133:GLN:HG2	2.08	0.52
2:B:231:ALA:CB	2:B:275:SER:HA	2.39	0.52
1:A:565:MET:CE	1:A:632:LEU:HB3	2.34	0.52
1:A:159:GLY:O	1:A:163:GLN:HG2	2.11	0.51
1:A:391:PHE:HB3	1:A:402:ILE:HG23	1.91	0.51
2:B:235:PHE:CD1	2:B:236:PRO:HD2	2.46	0.51
2:B:99:TRP:O	2:B:116:GLY:HA3	2.10	0.51
2:B:146:LEU:CD1	2:B:159:THR:HB	2.40	0.51
1:A:32:ILE:HG13	1:A:212:ASP:HB2	1.92	0.51
1:A:549:HIS:ND1	1:A:551:GLU:OE2	2.44	0.51
1:A:89:ILE:O	1:A:93:GLU:HG3	2.10	0.51
1:A:181:GLU:HB2	1:A:517:TRP:CZ3	2.46	0.51
1:A:415:ASP:OD1	1:A:415:ASP:N	2.44	0.51
1:A:107:GLU:O	1:A:111:SER:OG	2.14	0.50
1:A:316:ARG:CZ	1:A:351:VAL:HG11	2.41	0.50
1:A:601:LEU:HD11	1:A:624:ILE:HD12	1.93	0.50
1:A:326:ASP:OD1	1:A:330:HIS:N	2.43	0.50
1:A:340:CYS:SG	1:A:341:ASP:N	2.84	0.50
1:A:56:GLU:CG	1:A:158:ARG:HH22	2.24	0.50
1:A:223:ASP:O	1:A:227:ILE:HG13	2.11	0.50
1:A:298:ALA:O	1:A:302:ILE:HG13	2.12	0.50
2:B:274:THR:OG1	2:B:315:VAL:O	2.28	0.50
2:B:79:LEU:HD11	2:B:114:CYS:SG	2.52	0.50
1:A:149:TYR:O	1:A:153:ILE:HG13	2.12	0.50
1:A:314:VAL:HG23	1:A:340:CYS:HB3	1.94	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:6:GLN:HA	2:B:9:GLN:HB3	1.94	0.50
2:B:254:ASP:HB2	2:B:261:LEU:HD11	1.93	0.50
1:A:549:HIS:HB3	1:A:551:GLU:OE2	2.12	0.49
2:B:13:GLN:O	2:B:17:GLN:HG3	2.12	0.49
2:B:49:ARG:HD2	2:B:87:THR:CG2	2.42	0.49
1:A:404:ARG:C	1:A:405:MET:HE2	2.32	0.49
1:A:154:CYS:O	1:A:158:ARG:HG2	2.12	0.49
2:B:286:LEU:CD2	2:B:327:VAL:HG21	2.43	0.49
1:A:82:LEU:HD11	1:A:122:HIS:CE1	2.48	0.48
2:B:233[B]:CYS:SG	2:B:276:VAL:HG23	2.53	0.48
1:A:396:THR:HB	1:A:401:GLU:OE1	2.13	0.48
1:A:219:MET:HG2	1:A:221:CYS:SG	2.53	0.48
1:A:657:LEU:HD21	2:B:117:LEU:HD13	1.95	0.48
1:A:361:VAL:HB	1:A:368:TYR:CD1	2.49	0.48
1:A:426:GLU:O	1:A:430:GLN:NE2	2.46	0.48
1:A:438:GLY:HA2	1:A:443:GLY:O	2.13	0.48
1:A:565:MET:HE2	1:A:632:LEU:CB	2.33	0.48
2:B:134:ARG:HG3	2:B:135:VAL:H	1.79	0.48
1:A:316:ARG:CZ	1:A:340:CYS:HB2	2.44	0.47
1:A:649:ASP:O	1:A:653:GLU:HB2	2.13	0.47
1:A:42:VAL:HG11	1:A:639:GLU:HG2	1.96	0.47
1:A:238:ASN:O	1:A:242:MET:HG2	2.13	0.47
1:A:243:LEU:HD13	1:A:257:MET:HB2	1.96	0.47
1:A:328:HIS:O	1:A:468:PRO:HG2	2.14	0.47
1:A:451:PRO:HA	1:A:454:ARG:CG	2.38	0.47
1:A:609:VAL:HG22	1:A:622:LEU:HD23	1.96	0.47
1:A:127:SER:O	1:A:131:HIS:ND1	2.48	0.47
1:A:403:ASP:OD1	1:A:403:ASP:N	2.47	0.47
1:A:404:ARG:HG3	1:A:405:MET:N	2.29	0.47
1:A:240:ARG:HH21	1:A:511:LEU:HB2	1.79	0.47
1:A:617:ARG:NH2	1:A:633:GLN:HG2	2.15	0.47
1:A:433:VAL:HG22	1:A:436:ARG:HH21	1.80	0.46
1:A:428:LEU:HD23	1:A:437:LEU:HB3	1.98	0.46
1:A:85:PHE:O	1:A:89:ILE:HG13	2.15	0.46
1:A:565:MET:HB2	1:A:581:PHE:CD1	2.50	0.46
2:B:86:THR:O	2:B:87:THR:OG1	2.28	0.46
1:A:85:PHE:CE2	1:A:89:ILE:HD11	2.51	0.46
1:A:251:CYS:HA	1:A:252:PRO:HD3	1.79	0.46
1:A:109:PHE:CZ	1:A:133:GLN:HB3	2.51	0.46
1:A:577:GLN:HB3	1:A:579:ARG:NH1	2.31	0.46
1:A:667:LYS:HB3	1:A:668:PRO:CD	2.46	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:210:LEU:HD22	2:B:255:LEU:HD22	1.98	0.46
1:A:72:CYS:HB3	1:A:83:VAL:HG21	1.98	0.46
2:B:286:LEU:HD22	2:B:327:VAL:HG21	1.98	0.46
3:G:11:GLN:OE1	3:G:11:GLN:N	2.49	0.46
1:A:361:VAL:HG23	1:A:368:TYR:CZ	2.52	0.45
2:B:271[A]:CYS:SG	2:B:289:TYR:HB3	2.56	0.45
1:A:242:MET:CE	1:A:245:LEU:HD12	2.46	0.45
1:A:223:ASP:HB3	1:A:226:ARG:HG2	1.98	0.45
2:B:124:TYR:CE2	2:B:135:VAL:HG22	2.50	0.45
1:A:602:THR:OG1	1:A:605:GLU:HB2	2.15	0.45
2:B:49:ARG:HB2	2:B:338:ILE:CG1	2.46	0.45
2:B:58:ILE:HD13	2:B:336:LEU:HG	1.99	0.45
1:A:314:VAL:HG12	1:A:370:SER:HA	1.98	0.45
2:B:48:ARG:HG3	2:B:340:ASN:HB3	1.98	0.45
2:B:247:ASP:O	2:B:249:THR:HG23	2.16	0.45
2:B:292:PHE:N	2:B:292:PHE:CD1	2.84	0.45
1:A:204:GLU:OE1	1:A:204:GLU:N	2.50	0.45
2:B:51:LEU:HB2	2:B:336:LEU:HB2	1.99	0.45
2:B:273:ILE:HD12	2:B:273:ILE:N	2.32	0.45
1:A:642:GLN:O	1:A:646:GLU:HG2	2.17	0.45
1:A:262:HIS:HD2	1:A:509:PHE:HB3	1.81	0.44
1:A:399:LYS:HA	1:A:399:LYS:HD3	1.71	0.44
1:A:521:VAL:HG12	1:A:526:PHE:HB2	1.99	0.44
2:B:286:LEU:N	2:B:286:LEU:HD12	2.31	0.44
1:A:551:GLU:O	1:A:551:GLU:HG2	2.17	0.44
1:A:82:LEU:HD23	1:A:117:LEU:HD22	1.99	0.44
1:A:200:GLY:HA3	5:A:702:W4D:C15	2.47	0.44
1:A:316:ARG:HD2	1:A:351:VAL:HG13	1.99	0.44
1:A:48:GLU:HG3	1:A:53:VAL:HG21	2.00	0.44
1:A:218:ALA:HB2	1:A:273:LEU:HA	1.99	0.44
1:A:659:GLN:O	1:A:665:LYS:HD3	2.18	0.44
2:B:236:PRO:HB2	3:G:40:TYR:CE2	2.52	0.44
1:A:138:LYS:HE2	1:A:138:LYS:HB2	1.75	0.44
2:B:99:TRP:CD2	2:B:117:LEU:HD12	2.52	0.44
2:B:231:ALA:HB2	2:B:275:SER:HA	2.00	0.44
2:B:292:PHE:CE1	2:B:313:ASN:HA	2.53	0.44
1:A:413:LEU:HD13	1:A:422:ARG:CD	2.48	0.44
1:A:615:LYS:O	1:A:615:LYS:HG2	2.18	0.44
2:B:56:ALA:CB	2:B:75:GLN:HB3	2.48	0.44
1:A:258:SER:HA	1:A:516:ARG:HG3	2.00	0.44
1:A:618:LYS:HB2	1:A:618:LYS:NZ	2.33	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:48:ARG:HE	2:B:340:ASN:HB3	1.83	0.43
1:A:103:ALA:O	1:A:107:GLU:HG3	2.18	0.43
1:A:499:LEU:HD22	1:A:501:SER:OG	2.18	0.43
2:B:56:ALA:HB3	2:B:75:GLN:HB3	2.00	0.43
2:B:201:SER:O	2:B:208:ALA:HA	2.19	0.43
1:A:581:PHE:CD2	1:A:590:TRP:HB3	2.52	0.43
2:B:120:ILE:HD12	2:B:121:CYS:C	2.38	0.43
1:A:360:GLU:HG3	1:A:433:VAL:HG21	2.00	0.43
1:A:79:ALA:O	1:A:83:VAL:HG23	2.19	0.43
1:A:81:PRO:HB2	1:A:117:LEU:HD21	2.00	0.43
1:A:630:PHE:CE2	1:A:632:LEU:HD21	2.53	0.43
1:A:402:ILE:HG22	1:A:406:THR:HG23	2.01	0.43
2:B:48:ARG:CG	2:B:340:ASN:HB3	2.49	0.43
1:A:196:ILE:HD12	1:A:196:ILE:N	2.29	0.42
2:B:313:ASN:OD1	2:B:314:ARG:N	2.43	0.42
1:A:617:ARG:HH21	1:A:633:GLN:CG	2.17	0.42
2:B:152:LEU:HD23	2:B:192:LEU:CD1	2.46	0.42
1:A:31:LYS:HG2	1:A:32:ILE:N	2.35	0.42
1:A:147:GLN:N	1:A:148:PRO:CD	2.83	0.42
1:A:210:LYS:HG2	1:A:212:ASP:OD2	2.19	0.42
1:A:391:PHE:CE1	1:A:406:THR:HA	2.54	0.42
1:A:414:PRO:C	1:A:416:SER:H	2.22	0.42
2:B:74:SER:HB3	2:B:76:ASP:OD1	2.20	0.42
2:B:99:TRP:HB3	2:B:117:LEU:HG	2.00	0.42
1:A:440:LEU:HG	1:A:446:GLU:OE1	2.19	0.42
2:B:90:VAL:HG12	2:B:91:HIS:ND1	2.35	0.42
1:A:296:PHE:CD1	1:A:469:PRO:HD3	2.54	0.42
1:A:433:VAL:HG22	1:A:436:ARG:NH2	2.34	0.42
2:B:49:ARG:HB2	2:B:338:ILE:HG12	2.01	0.42
2:B:260:GLU:OE2	2:B:263:THR:OG1	2.38	0.42
1:A:76:LEU:HG	1:A:78:GLU:HG2	2.01	0.42
1:A:297:TYR:O	1:A:301:ILE:HG13	2.19	0.42
1:A:402:ILE:CG2	1:A:406:THR:HG23	2.50	0.42
1:A:600:LEU:HD12	1:A:600:LEU:C	2.40	0.42
1:A:120:CYS:SG	1:A:121:SER:N	2.93	0.42
3:G:60:PRO:HA	3:G:64:LYS:HB2	2.02	0.42
3:G:12:ALA:O	3:G:16:VAL:HG13	2.20	0.42
1:A:115:LYS:O	1:A:119:ALA:HB3	2.20	0.42
1:A:118:LEU:HD11	1:A:124:PHE:HD2	1.84	0.42
1:A:233:GLU:HG3	1:A:505:LEU:HD13	2.02	0.41
1:A:363:GLN:HB2	1:A:366:VAL:HG11	1.95	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:180:PHE:HE2	2:B:216:GLY:HA2	1.83	0.41
2:B:29:THR:O	2:B:33:ILE:HG12	2.20	0.41
2:B:95:LEU:HD13	2:B:100:VAL:CG2	2.43	0.41
2:B:120:ILE:HD12	2:B:121:CYS:N	2.34	0.41
2:B:318:LEU:HA	2:B:328:ALA:O	2.21	0.41
2:B:331:SER:HB3	2:B:333:ASP:OD1	2.20	0.41
1:A:315:TYR:OH	1:A:334:SER:O	2.30	0.41
2:B:24:ALA:O	3:G:29:LYS:NZ	2.51	0.41
1:A:147:GLN:HB3	1:A:148:PRO:HD3	2.03	0.41
1:A:314:VAL:HG13	1:A:342:PHE:CD2	2.56	0.41
1:A:358:ALA:HB2	1:A:375:PHE:HB3	2.02	0.41
1:A:353:THR:O	1:A:357:MET:HG3	2.20	0.41
1:A:355:GLY:HA3	1:A:402:ILE:HD13	2.02	0.41
1:A:562:HIS:ND1	1:A:580:TYR:OH	2.52	0.41
2:B:218:CYS:HB3	3:G:18:GLN:NE2	2.36	0.41
1:A:193:VAL:HG13	1:A:206:TYR:HB3	2.03	0.41
1:A:242:MET:HA	1:A:242:MET:CE	2.47	0.41
1:A:360:GLU:HB3	1:A:368:TYR:CB	2.51	0.40
2:B:63:TRP:CD2	2:B:321:THR:HG22	2.56	0.40
2:B:70:LEU:HD12	2:B:70:LEU:O	2.21	0.40
1:A:105:SER:HB2	1:A:136:LEU:HD13	2.03	0.40
1:A:450:SER:OG	1:A:451:PRO:HD2	2.21	0.40
1:A:471:ILE:HA	1:A:472:PRO:HD3	1.90	0.40
1:A:637:ASP:N	1:A:638:PRO:CD	2.84	0.40
2:B:118:ASP:O	2:B:120:ILE:HG23	2.21	0.40
2:B:161:SER:HB3	2:B:163:ASP:OD1	2.21	0.40
3:G:16:VAL:O	3:G:20:LYS:HG3	2.21	0.40
1:A:89:ILE:HG23	1:A:146:PHE:HB2	2.03	0.40
1:A:405:MET:HE2	1:A:405:MET:N	2.37	0.40
1:A:422:ARG:O	1:A:426:GLU:HG2	2.21	0.40
1:A:442:ARG:HB2	1:A:446:GLU:HG3	2.04	0.40
1:A:509:PHE:N	1:A:510:PRO:CD	2.83	0.40
2:B:190:LEU:HD12	2:B:190:LEU:C	2.41	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	610/640 (95%)	573 (94%)	33 (5%)	4 (1%)	22	30
2	B	339/339 (100%)	322 (95%)	16 (5%)	1 (0%)	41	51
3	G	55/59 (93%)	53 (96%)	2 (4%)	0	100	100
All	All	1004/1038 (97%)	948 (94%)	51 (5%)	5 (0%)	29	40

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	401	GLU
2	B	131	GLY
1	A	415	ASP
1	A	550	GLU
1	A	413	LEU

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	552/570 (97%)	547 (99%)	5 (1%)	78	86
2	B	284/282 (101%)	281 (99%)	3 (1%)	73	83
3	G	47/48 (98%)	47 (100%)	0	100	100
All	All	883/900 (98%)	875 (99%)	8 (1%)	78	86

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	138	LYS
1	A	246	VAL
1	A	361	VAL
1	A	403	ASP
1	A	653	GLU
2	B	105	TYR
2	B	120	ILE
2	B	267	ASP

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

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
5	W4D	A	702	-	24,26,26	1.02	1 (4%)	31,36,36	1.23	3 (9%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	W4D	A	702	-	-	0/8/8/8	0/4/4/4

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	702	W4D	C19-C5	-2.05	1.43	1.49

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	702	W4D	O1-C2-N11	4.18	126.08	120.78
5	A	702	W4D	C20-C19-C5	2.78	131.38	127.74
5	A	702	W4D	C23-C19-C5	-2.24	124.81	127.74

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	702	W4D	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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand W4D A 702

Bond lengths

Bond angles

Torsions

Rings
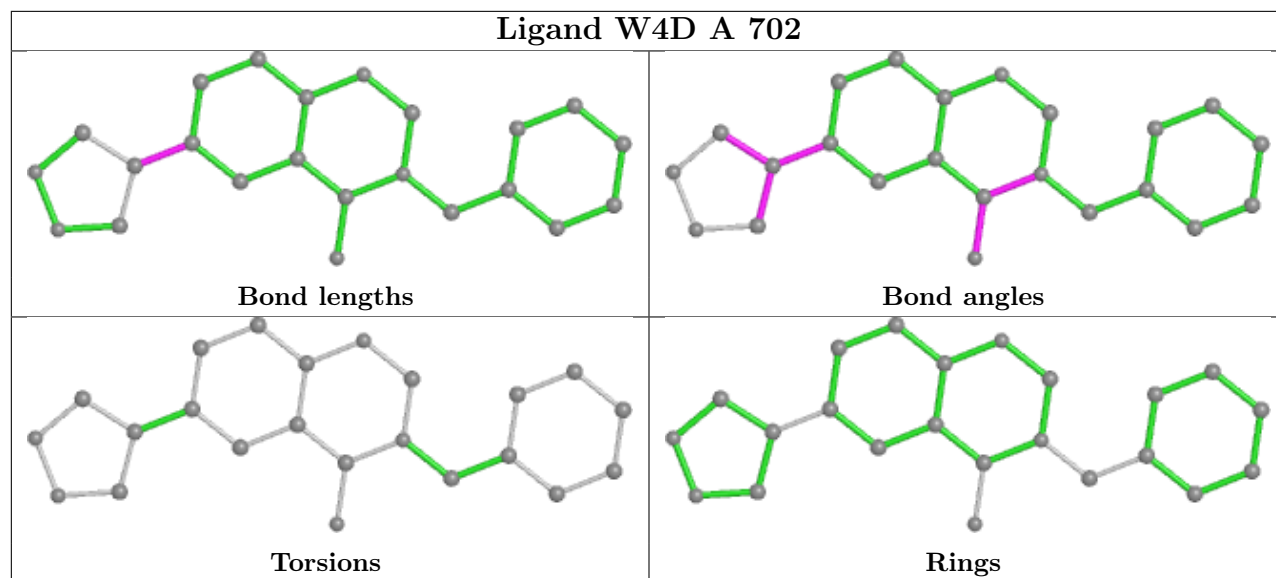
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å²)	Q<0.9
1	A	616/640 (96%)	0.80	85 (13%)	2	3	34, 75, 143, 181	0
2	B	339/339 (100%)	0.37	5 (1%)	73	79	27, 46, 88, 162	0
3	G	57/59 (96%)	0.37	3 (5%)	26	31	43, 63, 108, 118	0
All	All	1012/1038 (97%)	0.63	93 (9%)	9	10	27, 62, 133, 181	0

All (93) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	112	TYR	9.4
1	A	118	LEU	8.7
1	A	365	GLY	7.1
1	A	411	VAL	5.7
1	A	496	ILE	5.7
1	A	113	ILE	5.6
2	B	129	ARG	5.6
1	A	407	LEU	5.4
1	A	498	LEU	5.3
1	A	117	LEU	5.0
1	A	549	HIS	4.5
1	A	477	VAL	4.3
1	A	355	GLY	4.2
3	G	52	THR	4.2
1	A	368	TYR	4.0
1	A	114	MET	4.0
1	A	494	LYS	3.9
1	A	235	LEU	3.9
1	A	222	LEU	3.8
1	A	391	PHE	3.8
1	A	351	VAL	3.7
1	A	381	LEU	3.7
1	A	497	LYS	3.6

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Mol	Chain	Res	Type	RSRZ
1	A	406	THR	3.5
1	A	228	LYS	3.5
2	B	130	GLU	3.4
1	A	232	GLY	3.4
1	A	361	VAL	3.4
3	G	13	ARG	3.3
1	A	202	PHE	3.3
1	A	500	ASP	3.2
1	A	393	GLN	3.2
1	A	233	GLU	3.2
1	A	360	GLU	3.2
1	A	336	LEU	3.2
1	A	495	GLY	3.2
1	A	402	ILE	3.1
1	A	367	ALA	3.0
1	A	267	LEU	3.0
1	A	377	LEU	3.0
1	A	260	ALA	3.0
1	A	380	MET	3.0
1	A	269	PHE	2.9
1	A	501	SER	2.9
2	B	271[A]	CYS	2.9
1	A	504	GLU	2.8
1	A	630	PHE	2.8
1	A	318	LEU	2.8
1	A	437	LEU	2.8
1	A	366	VAL	2.8
1	A	363	GLN	2.8
1	A	137	GLY	2.7
1	A	82	LEU	2.7
1	A	409	MET	2.7
1	A	499	LEU	2.7
1	A	507	ARG	2.7
1	A	136	LEU	2.6
1	A	631	ILE	2.6
1	A	322	ASN	2.6
1	A	408	THR	2.6
3	G	64	LYS	2.5
1	A	476	GLU	2.5
1	A	121	SER	2.4
1	A	617	ARG	2.4
1	A	405	MET	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	231	GLN	2.4
1	A	221	CYS	2.4
1	A	356	TYR	2.3
1	A	77	GLU	2.3
1	A	156	ASN	2.3
1	A	413	LEU	2.3
1	A	434	ASN	2.3
1	A	396	THR	2.3
1	A	204	GLU	2.3
1	A	236	ALA	2.3
2	B	5	ASP	2.3
1	A	424	LEU	2.3
1	A	268	SER	2.2
1	A	384	LEU	2.2
1	A	550	GLU	2.2
1	A	205	VAL	2.2
1	A	435	ARG	2.2
1	A	116	GLU	2.2
1	A	266	LYS	2.2
1	A	612	THR	2.2
1	A	502	ASP	2.1
1	A	140	GLN	2.1
1	A	206	TYR	2.1
1	A	138	LYS	2.1
1	A	30	LYS	2.1
1	A	319	LYS	2.1
2	B	310	GLY	2.0
1	A	283	LEU	2.0

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

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

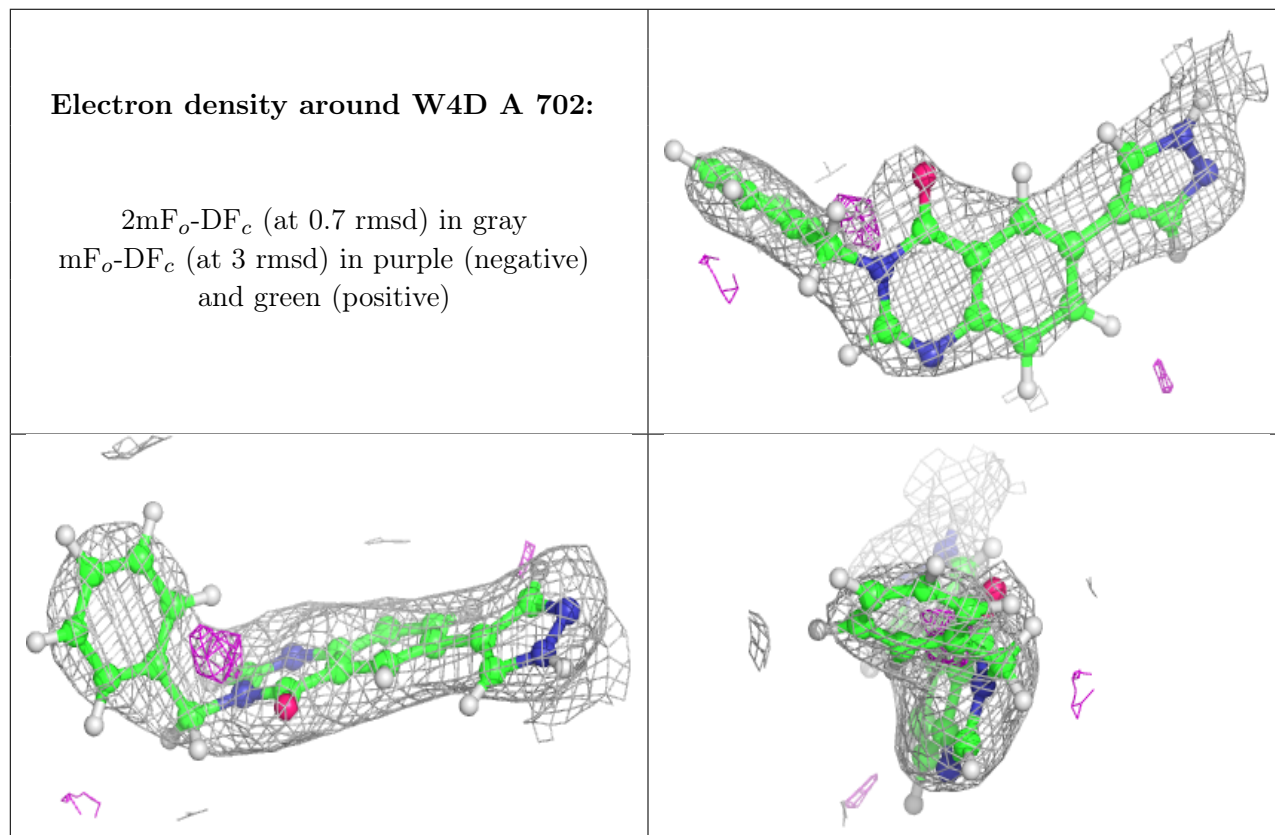## 6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum,

median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($Å^2$)	Q<0.9
5	W4D	A	702	23/23	0.92	0.29	63,91,114,116	0
4	MG	A	701	1/1	-	-	76,76,76,76	1

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 W4D A 702:

$2mF_o$-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.