Full wwPDB X-ray Structure Validation Report ⓘ

Oct 3, 2021 – 06:39 AM EDT

PDB ID	:	3LUT
Title	:	A Structural Model for the Full-length Shaker Potassium Channel Kv1.2
Authors	:	Chen, X.; Ni, F.; Wang, Q.; Ma, J.
Deposited on	:	2010-02-18
Resolution	:	2.90 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

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

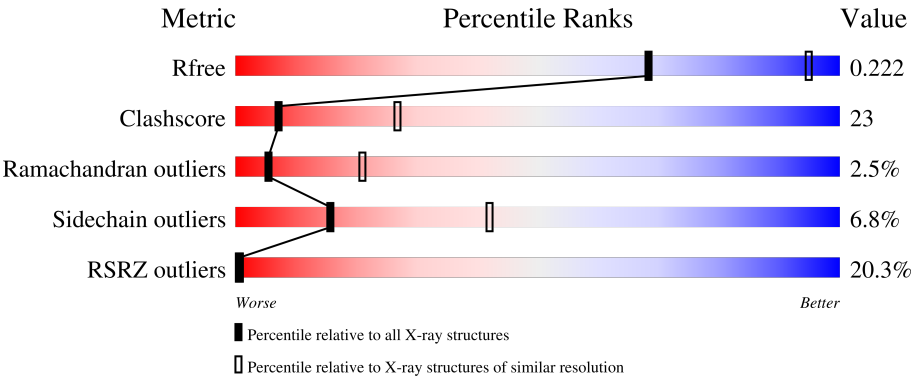
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.23.2
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.23.2

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

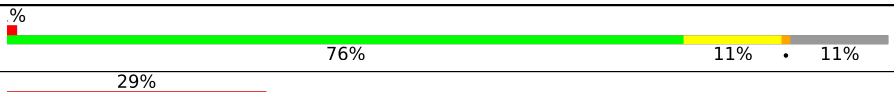
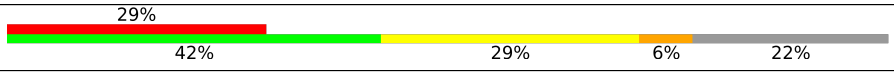
The reported resolution of this entry is 2.90 Å.

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	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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	367	
2	B	499	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	K	B	501	-	-	-	X
4	K	B	504	-	-	-	X
4	K	B	505	-	-	-	X

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 5848 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 Voltage-gated potassium channel subunit beta-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	326	Total	C	N	O	S	0	0	0
			2556	1627	443	470	16			

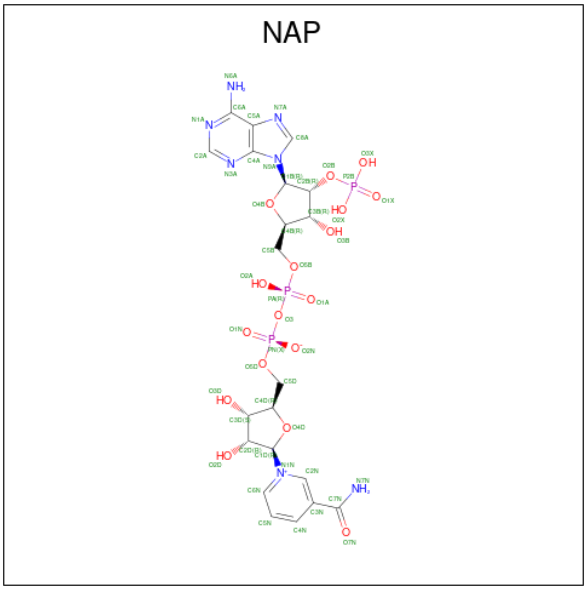
- Molecule 2 is a protein called Potassium voltage-gated channel subfamily A member 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	390	Total	C	N	O	S	0	0	0
			3152	2060	509	568	15			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	207	GLN	ASN	engineered mutation	UNP P63142

- Molecule 3 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NAP) (formula: $C_{21}H_{28}N_7O_{17}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

- Molecule 4 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	6	Total	K	0	0
			6	6		

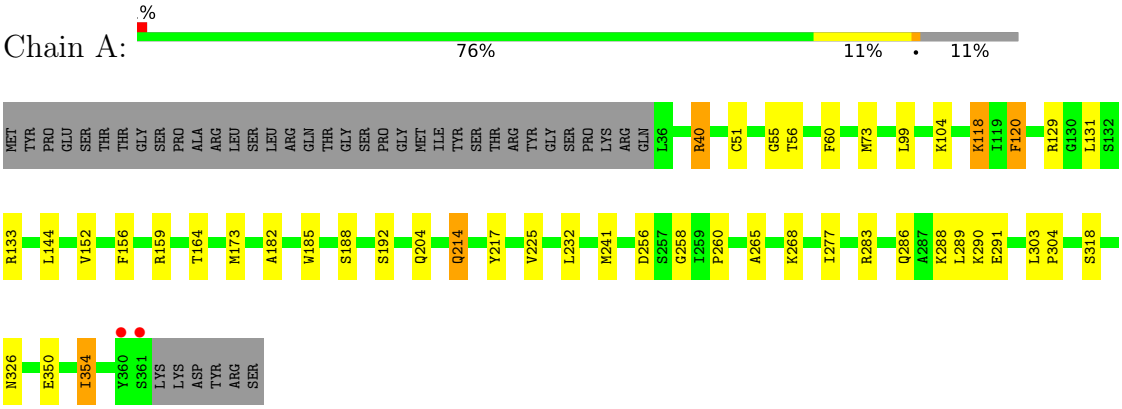
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	72	Total	O	0	0
			72	72		
5	B	14	Total	O	0	0
			14	14		

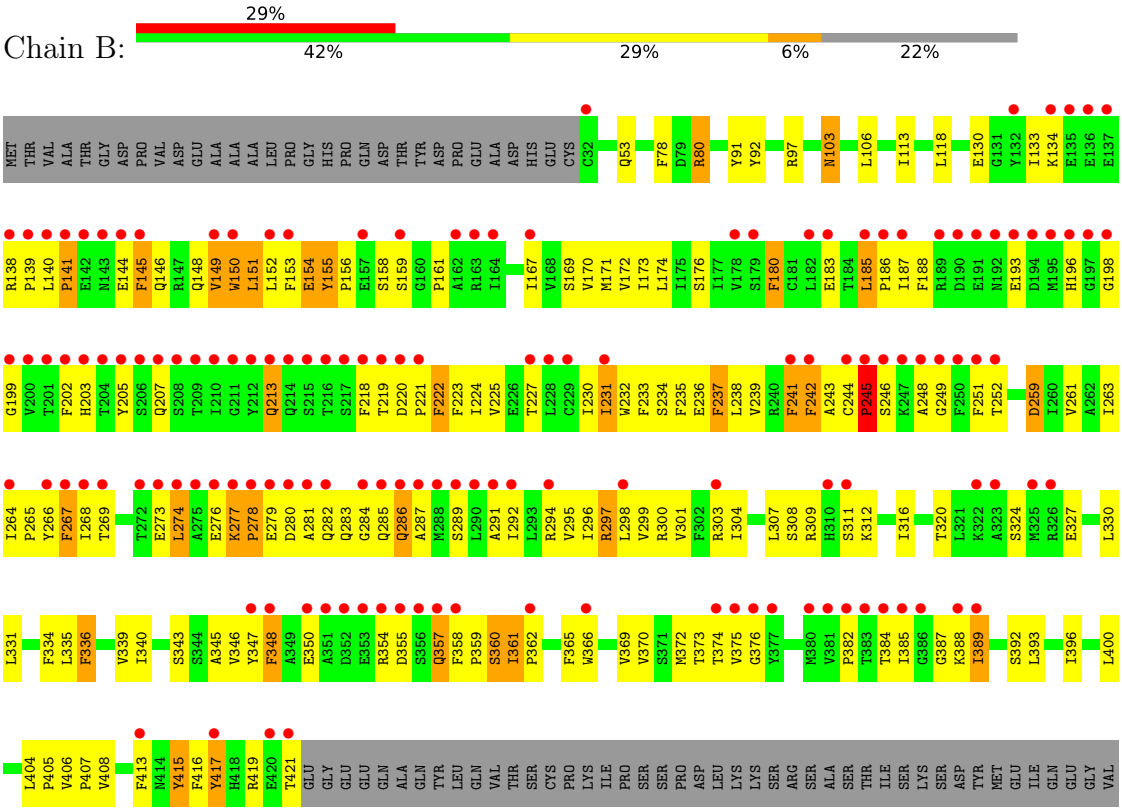
3 Residue-property plots (i)

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: Voltage-gated potassium channel subunit beta-2



• Molecule 2: Potassium voltage-gated channel subfamily A member 2



ASN ASN SER ASN GLU ASP PHE ARG GLU GLU ASN LEU LYS THR ALA ASN CYS THR LEU ALA ASN THR ASN TYR VAL ASN ILE THR LYS MET LEU THR ASP VAL

4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 4	Depositor
Cell constants a, b, c, α, β, γ	113.61Å 113.61Å 260.47Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.48 – 2.90 30.63 – 2.80	Depositor EDS
% Data completeness (in resolution range)	100.0 (29.48-2.90) 89.9 (30.63-2.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.20 (at 2.81Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.211 , 0.221 0.210 , 0.222	Depositor DCC
R_{free} test set	1952 reflections (5.37%)	wwPDB-VP
Wilson B-factor (Å^2)	51.5	Xtriage
Anisotropy	0.711	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 94.8	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.035 for h,-k,-l	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	5848	wwPDB-VP
Average B, all atoms (Å^2)	123.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.25% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: NAP, K

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	0.38	0/2608	0.51	0/3524
2	B	0.50	2/3234 (0.1%)	0.62	0/4385
All	All	0.45	2/5842 (0.0%)	0.57	0/7909

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	245	PRO	N-CD	8.41	1.59	1.47
2	B	289	SER	CB-OG	5.22	1.49	1.42

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	2556	0	2582	27	0
2	B	3152	0	3116	234	1
3	A	48	0	25	1	0
4	B	6	0	0	0	0
5	A	72	0	0	2	0
5	B	14	0	0	0	0
All	All	5848	0	5723	261	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 23.

All (261) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:199:GLY:O	2:B:205:TYR:HB2	1.52	1.10
2:B:277:LYS:HB2	2:B:278:PRO:HD3	1.31	1.06
2:B:145:PHE:CZ	2:B:155:TYR:HE1	1.75	1.05
2:B:185:LEU:HB2	2:B:186:PRO:CD	1.89	1.01
2:B:278:PRO:HG2	2:B:281:ALA:HB3	1.42	1.00
2:B:185:LEU:HB2	2:B:186:PRO:HD3	1.03	0.99
2:B:266:TYR:CE2	2:B:300:ARG:HG2	2.01	0.96
1:A:129:ARG:HD3	5:A:438:HOH:O	1.66	0.94
1:A:40:ARG:HD2	1:A:318:SER:O	1.70	0.91
2:B:415:TYR:OH	2:B:419:ARG:NH2	2.04	0.91
2:B:219:THR:HB	2:B:222:PHE:CE2	2.06	0.91
2:B:221:PRO:HA	2:B:224:ILE:HD12	1.53	0.90
2:B:265:PRO:HB2	2:B:299:VAL:HG11	1.51	0.90
2:B:199:GLY:O	2:B:205:TYR:CB	2.18	0.90
2:B:185:LEU:CB	2:B:186:PRO:HD3	1.97	0.90
2:B:277:LYS:HB2	2:B:278:PRO:CD	2.00	0.90
2:B:198:GLY:HA2	2:B:205:TYR:CE1	2.06	0.90
2:B:277:LYS:CB	2:B:278:PRO:HD3	2.03	0.89
2:B:153:PHE:C	2:B:156:PRO:HD2	1.94	0.88
2:B:286:GLN:HG3	2:B:287:ALA:H	1.39	0.87
2:B:140:LEU:H	2:B:141:PRO:HD2	1.39	0.86
2:B:266:TYR:HE2	2:B:300:ARG:HG2	1.36	0.86
2:B:278:PRO:HG2	2:B:281:ALA:CB	2.05	0.86
2:B:138:ARG:HB3	2:B:141:PRO:CG	2.07	0.84
2:B:155:TYR:HA	2:B:158:SER:HB2	1.60	0.83
2:B:259:ASP:OD2	2:B:309:ARG:NH2	2.10	0.83
2:B:265:PRO:CB	2:B:299:VAL:HG11	2.09	0.83
2:B:219:THR:HB	2:B:222:PHE:CD2	2.14	0.83
2:B:146:GLN:HG2	2:B:151:LEU:HB3	1.61	0.82
2:B:140:LEU:N	2:B:141:PRO:HD2	1.93	0.82
2:B:278:PRO:CG	2:B:281:ALA:HB3	2.10	0.81
1:A:118:LYS:HG3	1:A:156:PHE:HB2	1.63	0.80
2:B:234:SER:O	2:B:238:LEU:HB2	1.81	0.80
2:B:145:PHE:CZ	2:B:155:TYR:CE1	2.67	0.79
2:B:277:LYS:HE2	2:B:291:ALA:HB2	1.65	0.79
2:B:292:ILE:HG23	2:B:296:ILE:HG21	1.63	0.78
2:B:263:ILE:HG13	2:B:264:ILE:N	1.99	0.78

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:220:ASP:O	2:B:224:ILE:HG13	1.85	0.77
2:B:320:THR:HG22	2:B:416:PHE:HD1	1.49	0.77
2:B:144:GLU:HA	2:B:144:GLU:OE1	1.85	0.76
2:B:153:PHE:HA	2:B:156:PRO:HG2	1.67	0.76
2:B:266:TYR:O	2:B:269:THR:HG22	1.86	0.75
2:B:308:SER:HA	2:B:311:SER:HB3	1.67	0.75
2:B:292:ILE:O	2:B:296:ILE:HG12	1.87	0.74
2:B:146:GLN:HE21	2:B:151:LEU:HD13	1.52	0.74
2:B:146:GLN:HG2	2:B:151:LEU:CB	2.18	0.74
2:B:138:ARG:HB3	2:B:141:PRO:HG3	1.69	0.73
2:B:372:MET:C	2:B:374:THR:H	1.87	0.73
2:B:286:GLN:HG3	2:B:287:ALA:N	2.02	0.73
2:B:404:LEU:HB2	2:B:405:PRO:HD3	1.68	0.73
2:B:138:ARG:HB3	2:B:141:PRO:HG2	1.70	0.72
2:B:266:TYR:HE2	2:B:300:ARG:CG	2.03	0.72
2:B:370:VAL:HG12	2:B:376:GLY:H	1.55	0.72
2:B:331:LEU:HB2	2:B:405:PRO:HG2	1.72	0.71
1:A:133:ARG:HD2	5:A:372:HOH:O	1.89	0.71
2:B:372:MET:C	2:B:374:THR:N	2.44	0.71
2:B:156:PRO:HA	2:B:161:PRO:HG2	1.73	0.71
2:B:330:LEU:HG	2:B:334:PHE:HE1	1.55	0.69
2:B:366:TRP:O	2:B:370:VAL:HG23	1.91	0.69
1:A:291:GLU:HB2	1:A:354:ILE:HD13	1.73	0.69
2:B:297:ARG:O	2:B:301:VAL:HG23	1.93	0.69
2:B:202:PHE:CE2	2:B:203:HIS:HD2	2.11	0.68
2:B:330:LEU:HG	2:B:334:PHE:CE1	2.28	0.68
2:B:265:PRO:HG2	2:B:299:VAL:CG1	2.24	0.68
2:B:219:THR:HB	2:B:222:PHE:HE2	1.57	0.68
2:B:241:PHE:C	2:B:243:ALA:H	1.97	0.67
2:B:223:PHE:CZ	2:B:227:THR:HG21	2.30	0.67
2:B:286:GLN:CG	2:B:287:ALA:N	2.58	0.66
2:B:213:GLN:O	2:B:213:GLN:HG2	1.95	0.66
2:B:170:VAL:O	2:B:174:LEU:HG	1.94	0.66
2:B:372:MET:O	2:B:374:THR:HG23	1.94	0.66
2:B:148:GLN:HB3	2:B:151:LEU:HB2	1.77	0.65
2:B:346:VAL:O	2:B:350:GLU:HG2	1.96	0.65
1:A:40:ARG:HE	1:A:51:CYS:HB3	1.62	0.65
2:B:149:VAL:HG23	2:B:150:TRP:CE3	2.32	0.65
2:B:274:LEU:O	2:B:274:LEU:HG	1.96	0.64
2:B:320:THR:HG22	2:B:416:PHE:CD1	2.32	0.64
2:B:205:TYR:O	2:B:205:TYR:CD1	2.51	0.64

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:169:SER:O	2:B:172:VAL:HG22	1.98	0.64
2:B:276:GLU:HB3	2:B:282:GLN:OE1	1.98	0.64
2:B:361:ILE:HD13	2:B:361:ILE:H	1.62	0.63
2:B:279:GLU:HG3	2:B:280:ASP:H	1.63	0.63
2:B:304:ILE:O	2:B:307:LEU:HG	1.98	0.63
2:B:278:PRO:CD	2:B:281:ALA:HB3	2.29	0.62
2:B:264:ILE:O	2:B:268:ILE:HG13	1.99	0.62
2:B:279:GLU:HG3	2:B:280:ASP:N	2.15	0.61
2:B:266:TYR:CZ	2:B:300:ARG:HG2	2.35	0.61
2:B:370:VAL:HG12	2:B:376:GLY:N	2.15	0.61
2:B:202:PHE:CE2	2:B:203:HIS:CD2	2.88	0.61
2:B:149:VAL:C	2:B:150:TRP:HE3	2.05	0.60
2:B:146:GLN:NE2	2:B:151:LEU:HD13	2.17	0.59
2:B:336:PHE:O	2:B:340:ILE:HG12	2.02	0.59
2:B:145:PHE:CE2	2:B:155:TYR:HE1	2.19	0.59
2:B:140:LEU:N	2:B:141:PRO:CD	2.66	0.59
2:B:155:TYR:CD2	2:B:158:SER:HB2	2.37	0.59
2:B:198:GLY:CA	2:B:205:TYR:CE1	2.85	0.58
2:B:389:ILE:HG12	2:B:393:LEU:HD23	1.84	0.58
2:B:106:LEU:HD11	2:B:130:GLU:HG2	1.86	0.58
2:B:223:PHE:O	2:B:227:THR:HG23	2.04	0.58
2:B:171:MET:HE1	2:B:174:LEU:HD12	1.86	0.58
2:B:221:PRO:O	2:B:224:ILE:HB	2.04	0.58
2:B:284:GLY:C	2:B:286:GLN:H	2.06	0.57
2:B:155:TYR:CE2	2:B:159:SER:HB3	2.40	0.57
2:B:113:ILE:HG23	2:B:118:LEU:HD12	1.87	0.57
2:B:171:MET:CE	2:B:174:LEU:HD12	2.34	0.57
2:B:357:GLN:O	2:B:357:GLN:HG3	2.05	0.57
2:B:296:ILE:O	2:B:300:ARG:HG3	2.03	0.56
2:B:384:THR:O	2:B:388:LYS:HE2	2.06	0.56
2:B:278:PRO:HD2	2:B:281:ALA:HB3	1.86	0.56
2:B:284:GLY:C	2:B:286:GLN:N	2.58	0.56
2:B:78:PHE:HB3	2:B:80:ARG:HG3	1.86	0.56
2:B:155:TYR:HD2	2:B:158:SER:HB2	1.70	0.56
2:B:198:GLY:HA2	2:B:205:TYR:CD1	2.41	0.55
2:B:350:GLU:OE2	2:B:387:GLY:HA3	2.05	0.55
2:B:167:ILE:O	2:B:171:MET:HG2	2.06	0.54
2:B:276:GLU:HA	2:B:276:GLU:OE1	2.07	0.54
2:B:286:GLN:HE21	2:B:287:ALA:HB2	1.73	0.54
2:B:155:TYR:HE2	2:B:159:SER:HB3	1.72	0.53
2:B:267:PHE:HD2	2:B:267:PHE:C	2.12	0.53

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:232:TRP:CE3	2:B:232:TRP:HA	2.43	0.53
2:B:265:PRO:CG	2:B:299:VAL:HG11	2.39	0.53
2:B:180:PHE:CD1	2:B:180:PHE:C	2.81	0.53
2:B:263:ILE:HG13	2:B:264:ILE:H	1.72	0.53
2:B:343:SER:O	2:B:346:VAL:HG12	2.09	0.53
2:B:279:GLU:CG	2:B:280:ASP:H	2.21	0.52
2:B:316:ILE:O	2:B:320:THR:HG23	2.10	0.52
2:B:286:GLN:NE2	2:B:287:ALA:HB2	2.24	0.52
2:B:372:MET:O	2:B:374:THR:N	2.43	0.52
2:B:148:GLN:O	2:B:151:LEU:N	2.42	0.52
2:B:392:SER:O	2:B:396:ILE:HG12	2.10	0.52
2:B:176:SER:HB3	2:B:303:ARG:NH1	2.25	0.52
2:B:180:PHE:HA	2:B:183:GLU:CG	2.40	0.52
2:B:265:PRO:HG2	2:B:299:VAL:HG13	1.92	0.52
2:B:292:ILE:HG23	2:B:296:ILE:CG2	2.39	0.51
2:B:145:PHE:HD2	2:B:146:GLN:H	1.58	0.51
2:B:232:TRP:CZ3	2:B:235:PHE:CD2	2.98	0.51
2:B:327:GLU:HG2	2:B:408:VAL:HG11	1.92	0.51
2:B:400:LEU:O	2:B:404:LEU:HG	2.10	0.51
2:B:233:PHE:O	2:B:237:PHE:HB3	2.11	0.51
2:B:276:GLU:HB3	2:B:282:GLN:CD	2.31	0.51
2:B:345:ALA:HA	2:B:348:PHE:HD2	1.74	0.51
2:B:180:PHE:O	2:B:183:GLU:HG3	2.11	0.51
2:B:267:PHE:C	2:B:267:PHE:CD2	2.84	0.51
2:B:265:PRO:CG	2:B:299:VAL:HG21	2.41	0.51
1:A:56:THR:HB	1:A:60:PHE:HB2	1.93	0.51
2:B:346:VAL:HG22	2:B:350:GLU:HG3	1.93	0.50
1:A:214:GLN:HA	1:A:241:MET:O	2.12	0.50
1:A:288:LYS:HG2	1:A:354:ILE:HD12	1.94	0.50
2:B:339:VAL:HG21	2:B:369:VAL:HG22	1.94	0.50
2:B:171:MET:HE2	2:B:171:MET:HA	1.94	0.50
2:B:220:ASP:HB2	2:B:221:PRO:HD3	1.94	0.49
2:B:155:TYR:N	2:B:156:PRO:CD	2.75	0.49
2:B:350:GLU:OE1	2:B:384:THR:OG1	2.22	0.49
1:A:256:ASP:OD2	1:A:290:LYS:HD3	2.11	0.49
2:B:185:LEU:CB	2:B:186:PRO:CD	2.71	0.49
2:B:279:GLU:CG	2:B:280:ASP:N	2.75	0.49
2:B:180:PHE:HA	2:B:183:GLU:HG3	1.94	0.49
1:A:217:TYR:HB2	1:A:225:VAL:HG21	1.94	0.48
2:B:154:GLU:OE2	2:B:239:VAL:CG1	2.60	0.48
2:B:265:PRO:HG2	2:B:299:VAL:CG2	2.42	0.48

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:219:THR:HB	2:B:222:PHE:HD2	1.75	0.48
2:B:264:ILE:HG13	2:B:265:PRO:HD3	1.96	0.48
2:B:266:TYR:OH	2:B:300:ARG:HG2	2.12	0.48
2:B:264:ILE:N	2:B:265:PRO:CD	2.76	0.48
2:B:145:PHE:CD2	2:B:146:GLN:N	2.81	0.48
2:B:357:GLN:O	2:B:357:GLN:CG	2.61	0.48
2:B:264:ILE:CG1	2:B:265:PRO:HD3	2.44	0.48
2:B:406:VAL:HB	2:B:407:PRO:HD3	1.96	0.47
2:B:358:PHE:N	2:B:358:PHE:CD1	2.82	0.47
2:B:230:ILE:HA	2:B:233:PHE:HD2	1.80	0.47
2:B:145:PHE:HD2	2:B:146:GLN:N	2.12	0.47
2:B:385:ILE:O	2:B:388:LYS:HG2	2.15	0.47
2:B:267:PHE:HD2	2:B:267:PHE:O	1.97	0.47
2:B:103:ASN:H	2:B:103:ASN:HD22	1.63	0.47
2:B:180:PHE:HB2	2:B:300:ARG:NH2	2.30	0.46
2:B:296:ILE:HG13	2:B:297:ARG:N	2.29	0.46
2:B:350:GLU:OE2	2:B:387:GLY:CA	2.62	0.46
2:B:359:PRO:O	2:B:360:SER:C	2.53	0.46
2:B:372:MET:O	2:B:374:THR:CG2	2.63	0.46
2:B:148:GLN:C	2:B:150:TRP:N	2.69	0.46
2:B:222:PHE:HA	2:B:225:VAL:HG23	1.98	0.46
2:B:295:VAL:HG13	2:B:299:VAL:CG2	2.45	0.46
2:B:320:THR:CG2	2:B:416:PHE:HD1	2.24	0.46
2:B:134:LYS:O	2:B:134:LYS:HG3	2.15	0.46
2:B:265:PRO:HB3	2:B:299:VAL:HG21	1.98	0.46
2:B:224:ILE:HA	2:B:227:THR:HG1	1.81	0.46
2:B:236:GLU:HA	2:B:236:GLU:OE1	2.15	0.46
2:B:320:THR:O	2:B:324:SER:N	2.49	0.46
2:B:237:PHE:CD1	2:B:237:PHE:O	2.69	0.46
1:A:159:ARG:HA	1:A:188:SER:O	2.16	0.45
2:B:241:PHE:O	2:B:243:ALA:N	2.50	0.45
2:B:148:GLN:CB	2:B:151:LEU:HD12	2.47	0.45
2:B:241:PHE:C	2:B:243:ALA:N	2.66	0.45
2:B:106:LEU:CD1	2:B:130:GLU:HG2	2.46	0.45
2:B:294:ARG:O	2:B:298:LEU:HG	2.17	0.45
2:B:417:TYR:CD1	2:B:417:TYR:C	2.90	0.45
1:A:258:GLY:O	1:A:260:PRO:HD3	2.17	0.45
2:B:173:ILE:HG21	2:B:307:LEU:CD2	2.47	0.45
2:B:173:ILE:HG21	2:B:307:LEU:HD21	1.98	0.45
2:B:230:ILE:HG13	2:B:231:ILE:N	2.32	0.45
2:B:145:PHE:CE2	2:B:155:TYR:CE1	3.01	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:242:PHE:CD1	2:B:242:PHE:N	2.85	0.44
2:B:148:GLN:HG2	2:B:151:LEU:HD12	1.98	0.44
2:B:350:GLU:OE1	2:B:350:GLU:HA	2.18	0.44
2:B:343:SER:OG	2:B:365:PHE:HD2	2.01	0.44
2:B:265:PRO:CG	2:B:299:VAL:CG1	2.94	0.44
2:B:297:ARG:HD2	2:B:297:ARG:HA	1.78	0.44
1:A:256:ASP:HA	1:A:286:GLN:HG2	1.99	0.44
2:B:145:PHE:CE1	2:B:155:TYR:HE1	2.30	0.44
2:B:148:GLN:O	2:B:150:TRP:N	2.51	0.44
2:B:292:ILE:O	2:B:296:ILE:HG23	2.18	0.44
2:B:139:PRO:HB2	2:B:140:LEU:HD23	2.00	0.44
2:B:295:VAL:HG13	2:B:299:VAL:HG21	2.00	0.44
2:B:370:VAL:HG13	2:B:375:VAL:HB	2.00	0.44
1:A:350:GLU:O	1:A:354:ILE:HG23	2.18	0.43
2:B:207:GLN:O	2:B:207:GLN:HG3	2.18	0.43
1:A:144:LEU:HD23	1:A:144:LEU:HA	1.85	0.43
2:B:278:PRO:O	2:B:282:GLN:N	2.34	0.43
1:A:192:SER:HA	1:A:232:LEU:HD11	2.01	0.43
2:B:154:GLU:N	2:B:156:PRO:HD2	2.32	0.43
2:B:316:ILE:HG21	2:B:417:TYR:HB2	2.00	0.43
2:B:360:SER:C	2:B:362:PRO:HD2	2.38	0.43
1:A:73:MET:SD	1:A:99:LEU:HD12	2.59	0.43
2:B:223:PHE:CE1	2:B:227:THR:CG2	3.02	0.43
1:A:55:GLY:HA3	3:A:368:NAP:O3D	2.19	0.42
1:A:289:LEU:HD22	1:A:303:LEU:HD21	2.00	0.42
2:B:237:PHE:CD1	2:B:237:PHE:C	2.91	0.42
2:B:282:GLN:O	2:B:283:GLN:C	2.58	0.42
2:B:91:TYR:HA	2:B:97:ARG:O	2.19	0.42
2:B:242:PHE:N	2:B:242:PHE:HD1	2.17	0.42
2:B:296:ILE:HG13	2:B:297:ARG:HD3	2.00	0.42
1:A:131:LEU:O	1:A:164:THR:HG21	2.20	0.42
2:B:264:ILE:HG13	2:B:265:PRO:CD	2.50	0.42
2:B:336:PHE:CE1	2:B:340:ILE:HD11	2.55	0.42
2:B:354:ARG:HG2	2:B:355:ASP:N	2.35	0.42
2:B:148:GLN:C	2:B:150:TRP:H	2.23	0.42
2:B:264:ILE:O	2:B:268:ILE:CG1	2.67	0.42
2:B:265:PRO:CB	2:B:299:VAL:HG21	2.50	0.42
2:B:146:GLN:HG2	2:B:151:LEU:HB2	2.00	0.42
1:A:144:LEU:HD21	1:A:152:VAL:HG13	2.02	0.41
2:B:316:ILE:HG22	2:B:413:PHE:CD1	2.55	0.41
2:B:198:GLY:HA2	2:B:205:TYR:HE1	1.73	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:265:ALA:HB2	1:A:277:ILE:HD12	2.01	0.41
2:B:138:ARG:O	2:B:141:PRO:HG2	2.20	0.41
2:B:312:LYS:H	2:B:312:LYS:HG2	1.58	0.41
2:B:261:VAL:O	2:B:261:VAL:CG1	2.69	0.41
1:A:120:PHE:O	1:A:129:ARG:HA	2.21	0.41
2:B:265:PRO:CG	2:B:299:VAL:CG2	2.97	0.41
1:A:152:VAL:O	1:A:182:ALA:HA	2.21	0.41
1:A:303:LEU:HB3	1:A:304:PRO:HD3	2.02	0.41
2:B:53:GLN:NE2	2:B:92:TYR:O	2.53	0.41
2:B:155:TYR:N	2:B:156:PRO:HD2	2.35	0.41
1:A:173:MET:HG3	1:A:185:TRP:CE3	2.56	0.40
2:B:154:GLU:O	2:B:158:SER:N	2.53	0.40
2:B:172:VAL:O	2:B:176:SER:CB	2.69	0.40
2:B:176:SER:HB3	2:B:303:ARG:CZ	2.51	0.40
2:B:244:CYS:HA	2:B:245:PRO:HD3	1.92	0.40
2:B:276:GLU:OE1	2:B:282:GLN:HG3	2.21	0.40
2:B:278:PRO:HG2	2:B:281:ALA:HB2	1.97	0.40
2:B:419:ARG:C	2:B:421:THR:H	2.24	0.40
2:B:348:PHE:CD1	2:B:348:PHE:C	2.95	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)
2:B:297:ARG:NH2	2:B:347:TYR:OH[3_755]	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	324/367 (88%)	316 (98%)	7 (2%)	1 (0%)	41 71

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
2	B	388/499 (78%)	325 (84%)	46 (12%)	17 (4%)	2 10
All	All	712/866 (82%)	641 (90%)	53 (7%)	18 (2%)	5 21

All (18) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	193	GLU
2	B	252	THR
2	B	286	GLN
1	A	120	PHE
2	B	242	PHE
2	B	245	PRO
2	B	248	ALA
2	B	373	THR
2	B	278	PRO
2	B	360	SER
2	B	141	PRO
2	B	149	VAL
2	B	249	GLY
2	B	357	GLN
2	B	274	LEU
2	B	277	LYS
2	B	185	LEU
2	B	382	PRO

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	273/309 (88%)	264 (97%)	9 (3%)	38 72
2	B	342/441 (78%)	309 (90%)	33 (10%)	8 25
All	All	615/750 (82%)	573 (93%)	42 (7%)	16 42

All (42) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	40	ARG
1	A	104	LYS
1	A	118	LYS
1	A	204	GLN
1	A	214	GLN
1	A	268	LYS
1	A	283	ARG
1	A	326	ASN
1	A	354	ILE
2	B	80	ARG
2	B	103	ASN
2	B	133	ILE
2	B	145	PHE
2	B	150	TRP
2	B	151	LEU
2	B	152	LEU
2	B	154	GLU
2	B	155	TYR
2	B	180	PHE
2	B	187	ILE
2	B	188	PHE
2	B	196	HIS
2	B	213	GLN
2	B	218	PHE
2	B	222	PHE
2	B	231	ILE
2	B	237	PHE
2	B	241	PHE
2	B	246	SER
2	B	251	PHE
2	B	259	ASP
2	B	267	PHE
2	B	273	GLU
2	B	285	GLN
2	B	297	ARG
2	B	335	LEU
2	B	336	PHE
2	B	348	PHE
2	B	361	ILE
2	B	389	ILE
2	B	415	TYR
2	B	417	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11)

such sidechains are listed below:

Mol	Chain	Res	Type
1	A	37	GLN
1	A	163	ASN
1	A	333	ASN
2	B	47	GLN
2	B	103	ASN
2	B	146	GLN
2	B	203	HIS
2	B	286	GLN
2	B	357	GLN
2	B	412	ASN
2	B	414	ASN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 7 ligands modelled in this entry, 6 are 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	$\#\|Z\| > 2$
3	NAP	A	368	-	45,52,52	1.74	3 (6%)	56,80,80	1.16	3 (5%)

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	NAP	A	368	-	-	4/31/67/67	0/5/5/5

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	368	NAP	O7N-C7N	9.15	1.41	1.24
3	A	368	NAP	C2A-N3A	4.08	1.38	1.32
3	A	368	NAP	C2A-N1A	2.63	1.38	1.33

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	368	NAP	N3A-C2A-N1A	-5.36	120.29	128.68
3	A	368	NAP	O2B-C2B-C1B	2.72	119.91	110.10
3	A	368	NAP	C3D-C2D-C1D	2.00	104.00	100.98

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	368	NAP	C1B-C2B-O2B-P2B
3	A	368	NAP	O4D-C1D-N1N-C6N
3	A	368	NAP	O4D-C4D-C5D-O5D
3	A	368	NAP	C3D-C4D-C5D-O5D

There are no ring outliers.

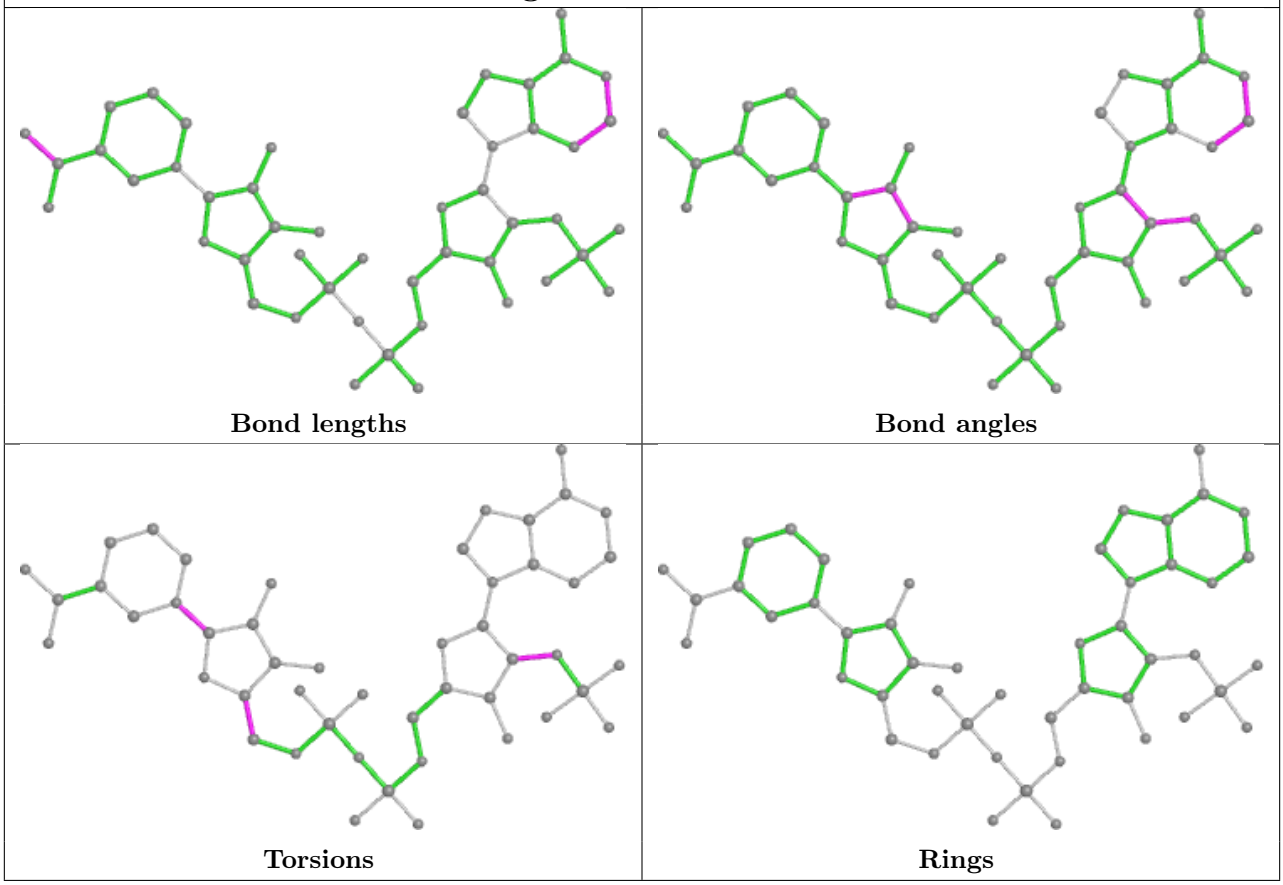
1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	368	NAP	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 NAP A 368



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^{th} 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	326/367 (88%)	-0.06	2 (0%) 89 89	34, 56, 98, 117	0
2	B	390/499 (78%)	1.87	143 (36%) 0 0	49, 187, 273, 349	0
All	All	716/866 (82%)	0.99	145 (20%) 1 0	34, 89, 262, 349	0

All (145) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	212	TYR	17.8
2	B	245	PRO	12.2
2	B	216	THR	9.9
2	B	217	SER	9.3
2	B	246	SER	9.2
2	B	355	ASP	9.1
2	B	194	ASP	9.0
2	B	144	GLU	8.6
2	B	182	LEU	8.6
2	B	354	ARG	8.4
2	B	356	SER	8.3
2	B	221	PRO	8.3
2	B	211	GLY	7.9
2	B	249	GLY	7.9
2	B	381	VAL	7.8
2	B	241	PHE	7.6
2	B	210	ILE	7.6
2	B	140	LEU	7.6
2	B	193	GLU	7.5
2	B	421	THR	7.5
2	B	201	THR	7.1
2	B	203	HIS	7.1
2	B	197	GLY	7.1
2	B	275	ALA	7.0

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
2	B	383	THR	6.9
2	B	248	ALA	6.8
2	B	139	PRO	6.8
2	B	287	ALA	6.5
2	B	352	ASP	6.4
2	B	192	ASN	6.3
2	B	145	PHE	6.3
2	B	202	PHE	6.2
2	B	215	SER	6.1
2	B	200	VAL	6.0
2	B	213	GLN	5.9
2	B	291	ALA	5.9
2	B	285	GLN	5.9
2	B	136	GLU	5.9
2	B	153	PHE	5.8
2	B	286	GLN	5.8
2	B	179	SER	5.8
2	B	279	GLU	5.6
2	B	420	GLU	5.5
2	B	135	GLU	5.5
2	B	195	MET	5.5
2	B	138	ARG	5.4
2	B	218	PHE	5.4
2	B	290	LEU	5.4
2	B	196	HIS	5.4
2	B	247	LYS	5.3
2	B	162	ALA	5.3
2	B	353	GLU	5.2
2	B	199	GLY	5.2
2	B	294	ARG	5.1
2	B	244	CYS	5.1
2	B	150	TRP	5.0
2	B	164	ILE	5.0
2	B	351	ALA	5.0
2	B	198	GLY	4.8
2	B	205	TYR	4.8
2	B	274	LEU	4.7
2	B	417	TYR	4.7
2	B	242	PHE	4.7
2	B	357	GLN	4.4
2	B	382	PRO	4.4
2	B	141	PRO	4.3

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
2	B	280	ASP	4.3
2	B	348	PHE	4.2
2	B	204	THR	4.2
2	B	322	LYS	4.2
2	B	292	ILE	4.2
2	B	187	ILE	4.2
2	B	358	PHE	4.2
2	B	264	ILE	4.2
2	B	143	ASN	4.1
2	B	149	VAL	4.1
2	B	284	GLY	4.1
2	B	289	SER	4.1
2	B	132	TYR	4.0
2	B	277	LYS	3.9
2	B	219	THR	3.9
2	B	278	PRO	3.9
2	B	273	GLU	3.9
2	B	251	PHE	3.8
2	B	281	ALA	3.8
2	B	267	PHE	3.8
2	B	178	VAL	3.8
2	B	157	GLU	3.7
2	B	269	THR	3.7
2	B	214	GLN	3.6
2	B	220	ASP	3.6
2	B	266	TYR	3.5
2	B	250	PHE	3.5
2	B	288	MET	3.4
2	B	252	THR	3.4
2	B	209	THR	3.4
2	B	350	GLU	3.2
2	B	191	GLU	3.2
2	B	268	ILE	3.2
2	B	311	SER	3.2
2	B	208	SER	3.1
2	B	388	LYS	3.1
2	B	272	THR	3.1
2	B	207	GLN	3.1
2	B	374	THR	3.0
2	B	163	ARG	3.0
2	B	227	THR	3.0
2	B	186	PRO	3.0

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
2	B	380	MET	3.0
2	B	276	GLU	2.9
2	B	389	ILE	2.9
2	B	206	SER	2.9
2	B	310	HIS	2.9
2	B	385	ILE	2.9
2	B	142	GLU	2.9
2	B	303	ARG	2.8
2	B	32	CYS	2.8
2	B	384	THR	2.8
2	B	282	GLN	2.7
1	A	360	TYR	2.6
2	B	377	TYR	2.6
2	B	190	ASP	2.6
2	B	326	ARG	2.5
2	B	185	LEU	2.5
2	B	137	GLU	2.5
2	B	159	SER	2.5
2	B	323	ALA	2.5
2	B	386	GLY	2.5
2	B	134	LYS	2.4
2	B	376	GLY	2.4
2	B	298	LEU	2.4
2	B	167	ILE	2.4
2	B	229	CYS	2.3
2	B	152	LEU	2.3
2	B	183	GLU	2.3
2	B	347	TYR	2.3
2	B	189	ARG	2.2
2	B	413	PHE	2.2
2	B	228	LEU	2.2
2	B	231	ILE	2.1
2	B	375	VAL	2.1
2	B	362	PRO	2.1
2	B	325	MET	2.0
1	A	361	SER	2.0
2	B	366	TRP	2.0

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

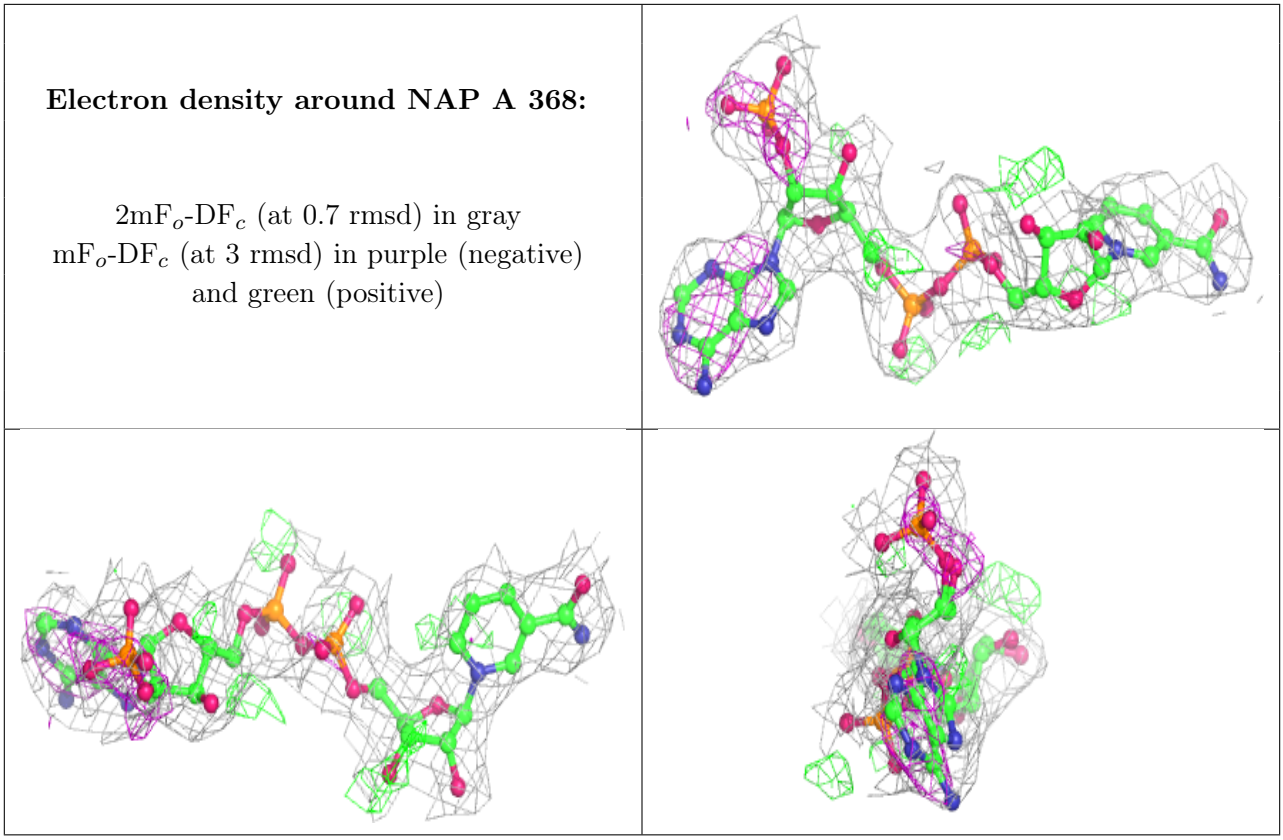
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	K	B	504	1/1	-0.41	1.24	258,258,258,258	1
4	K	B	505	1/1	0.31	4.43	165,165,165,165	1
4	K	B	501	1/1	0.65	0.49	192,192,192,192	1
4	K	B	503	1/1	0.81	0.63	226,226,226,226	1
4	K	B	502	1/1	0.86	0.50	209,209,209,209	1
3	NAP	A	368	48/48	0.95	0.19	37,42,50,51	0
4	K	B	500	1/1	0.98	0.61	173,173,173,173	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 NAP A 368:

$2mF_o$-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.