



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 9, 2023 – 08:36 AM EDT

PDB ID : 7TXH
Title : Human MRas Q71R in complex with human Shoc2 LRR domain M173I and human PP1Ca
Authors : Hauseman, Z.J.; Viscomi, J.; Dhembhi, A.; Clark, K.; King, D.A.; Fodor, M.
Deposited on : 2022-02-09
Resolution : 1.95 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35.1
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35.1

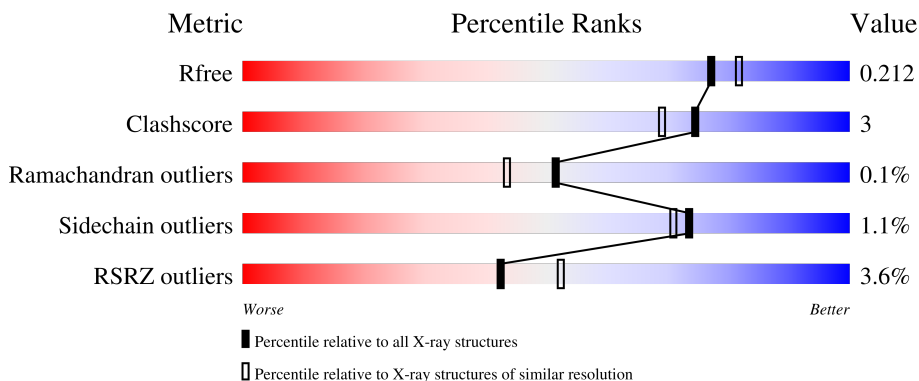
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.95 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.



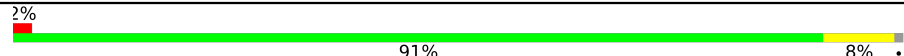
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2580 (1.96-1.96)
Clashscore	141614	2705 (1.96-1.96)
Ramachandran outliers	138981	2678 (1.96-1.96)
Sidechain outliers	138945	2678 (1.96-1.96)
RSRZ outliers	127900	2539 (1.96-1.96)

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	180	 4% (poor fit), 89% (0-3 outliers), 6% (1-2 outliers), 3% (not modelled)
1	D	180	 0% (poor fit), 89% (0-3 outliers), 6% (1-2 outliers), 5% (not modelled)
2	B	505	 2% (poor fit), 90% (0-3 outliers), 8% (1-2 outliers), 0% (not modelled)
2	E	505	 0% (poor fit), 92% (0-3 outliers), 6% (1-2 outliers), 2% (not modelled)
3	C	297	 14% (poor fit), 84% (0-3 outliers), 14% (1-2 outliers), 0% (not modelled)

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Mol	Chain	Length	Quality of chain
3	F	297	 A horizontal bar chart representing the quality of chain. The bar is primarily green, indicating a high quality score of 91%. There is a small red segment at the beginning, labeled '2%', and a small yellow segment at the end, labeled '8%'. The total length of the bar is 100%.

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
6	GOL	C	504	-	-	X	-

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 17319 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 Ras-related protein M-Ras.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	173	1405	896	241	263	5	0	0	0
1	D	169	1377	879	237	256	5	0	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP O14807
A	0	PRO	-	expression tag	UNP O14807
A	71	ARG	GLN	variant	UNP O14807
D	-1	GLY	-	expression tag	UNP O14807
D	0	PRO	-	expression tag	UNP O14807
D	71	ARG	GLN	variant	UNP O14807

- Molecule 2 is a protein called Leucine-rich repeat protein SHOC-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	496	3934	2491	677	748	18	0	5	0
2	E	496	3961	2511	680	751	19	0	11	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	78	GLY	-	expression tag	UNP Q9UQ13
B	79	PRO	-	expression tag	UNP Q9UQ13
B	173	ILE	MET	engineered mutation	UNP Q9UQ13
E	78	GLY	-	expression tag	UNP Q9UQ13
E	79	PRO	-	expression tag	UNP Q9UQ13
E	173	ILE	MET	engineered mutation	UNP Q9UQ13

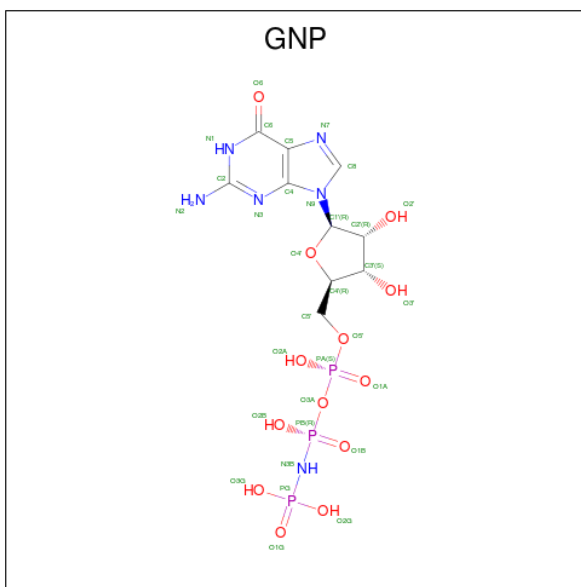
- Molecule 3 is a protein called Serine/threonine-protein phosphatase PP1-alpha catalytic subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	292	Total 2357	C 1511	N 395	O 433	S 18	0	1	0
3	F	294	Total 2384	C 1527	N 401	O 438	S 18	0	3	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	4	SER	-	expression tag	UNP P62136
C	5	ASN	-	expression tag	UNP P62136
C	6	ALA	-	expression tag	UNP P62136
F	4	SER	-	expression tag	UNP P62136
F	5	ASN	-	expression tag	UNP P62136
F	6	ALA	-	expression tag	UNP P62136

- Molecule 4 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (three-letter code: GNP) (formula: C₁₀H₁₇N₆O₁₃P₃).

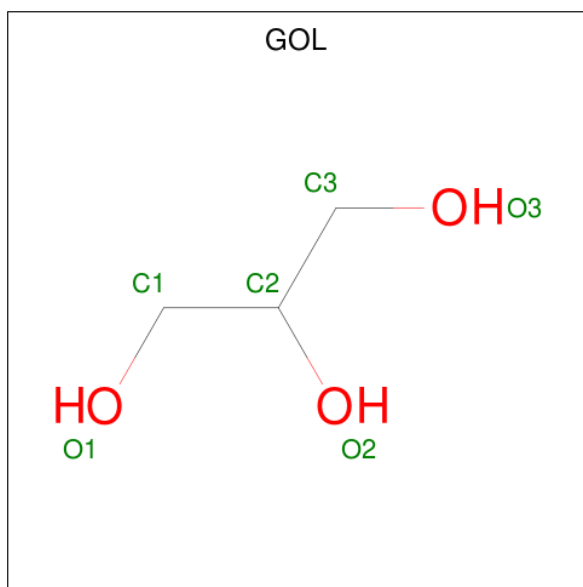


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
4	A	1	Total 32	C 10	N 6	O 13	P 3	0	0
4	D	1	Total 32	C 10	N 6	O 13	P 3	0	0

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total Mg 1 1	0	0
5	D	1	Total Mg 1 1	0	0

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C O 6 3 3	0	0
6	B	1	Total C O 6 3 3	0	0
6	B	1	Total C O 6 3 3	0	0
6	B	1	Total C O 6 3 3	0	0
6	C	1	Total C O 6 3 3	0	0
6	C	1	Total C O 6 3 3	0	0
6	D	1	Total C O 6 3 3	0	0
6	D	1	Total C O 6 3 3	0	0
6	E	1	Total C O 6 3 3	0	0
6	E	1	Total C O 6 3 3	0	0

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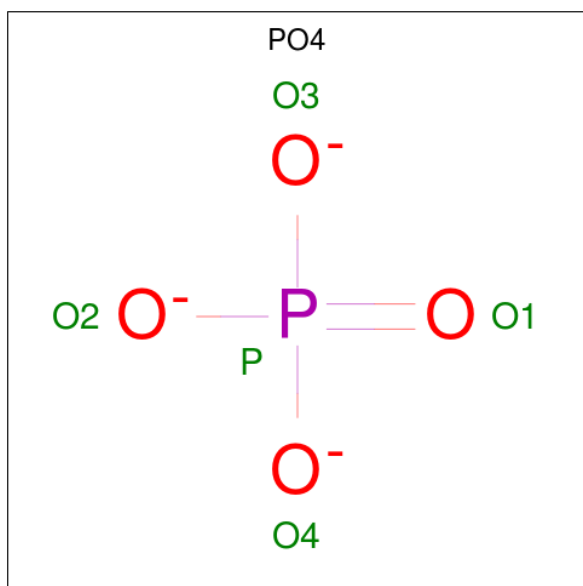
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	E	1	Total	C	O	0	0
			6	3	3		
6	E	1	Total	C	O	0	0
			6	3	3		
6	E	1	Total	C	O	0	0
			6	3	3		
6	F	1	Total	C	O	0	0
			6	3	3		
6	F	1	Total	C	O	0	0
			6	3	3		
6	F	1	Total	C	O	0	0
			6	3	3		

- Molecule 7 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	C	2	Total	Mn	0	0
			2	2		
7	F	2	Total	Mn	0	0
			2	2		

- Molecule 8 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	C	1	Total	O	P	0	0
			5	4	1		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	C	1	Total	O	P	0	0
			5	4	1		
8	E	1	Total	O	P	0	0
			5	4	1		
8	F	1	Total	O	P	0	0
			5	4	1		

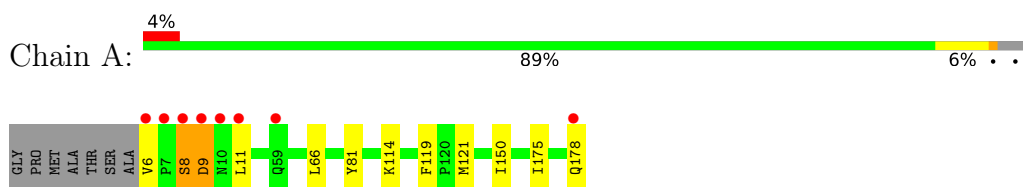
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	149	Total	O	0	0
			149	149		
9	B	402	Total	O	0	0
			402	402		
9	C	144	Total	O	0	0
			144	144		
9	D	256	Total	O	0	0
			256	256		
9	E	532	Total	O	0	0
			532	532		
9	F	232	Total	O	0	0
			232	232		

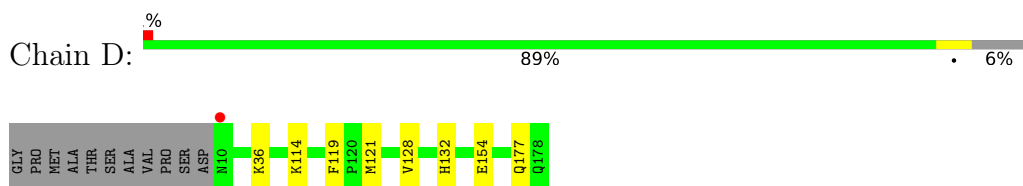
3 Residue-property plots [i](#)

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.

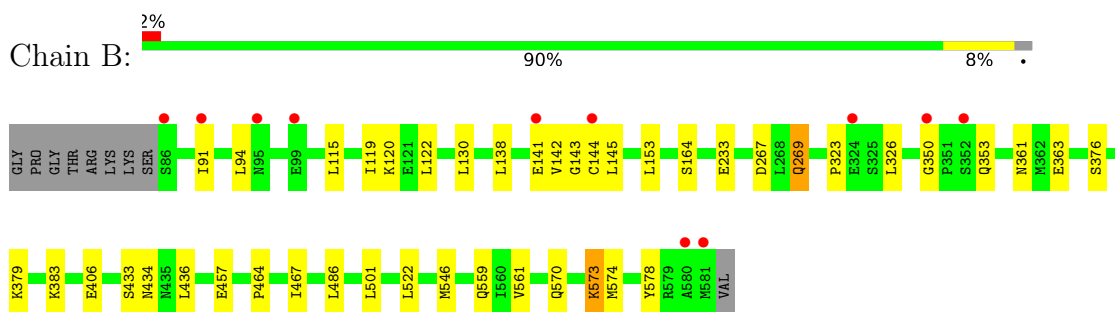
- Molecule 1: Ras-related protein M-Ras



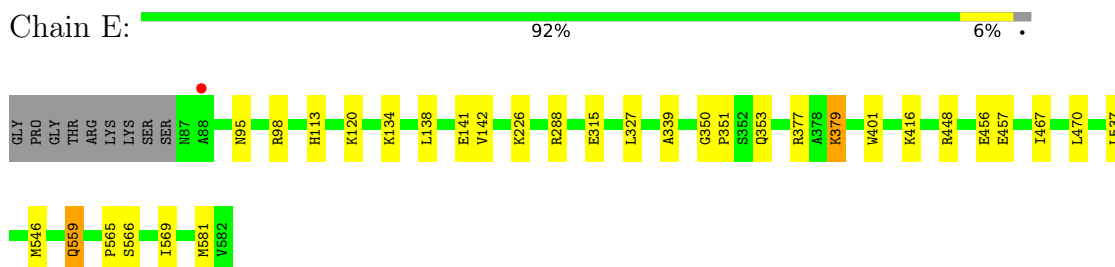
- Molecule 1: Ras-related protein M-Ras



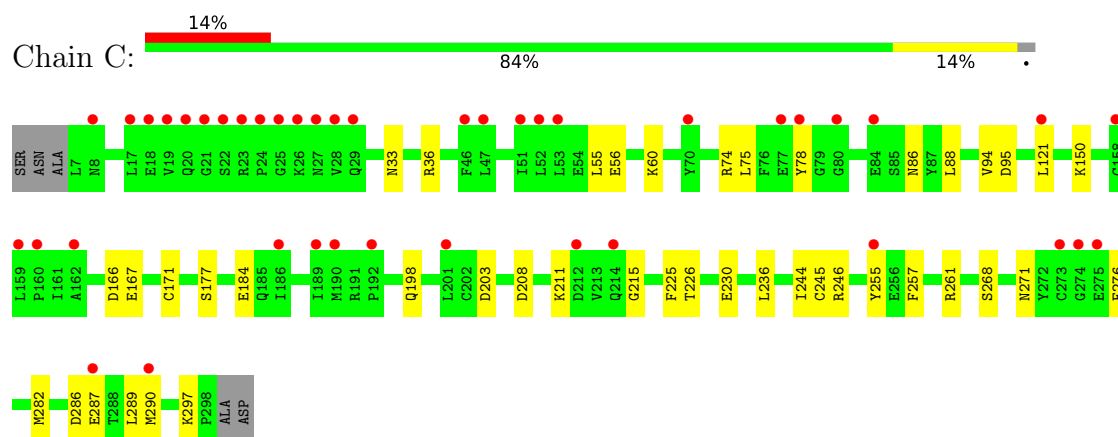
- Molecule 2: Leucine-rich repeat protein SHOC-2



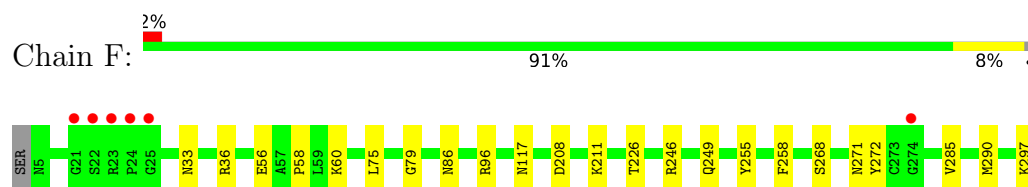
- Molecule 2: Leucine-rich repeat protein SHOC-2



- Molecule 3: Serine/threonine-protein phosphatase PP1-alpha catalytic subunit



- Molecule 3: Serine/threonine-protein phosphatase PP1-alpha catalytic subunit



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	72.96Å 115.75Å 137.80Å 90.00° 100.31° 90.00°	Depositor
Resolution (Å)	42.26 – 1.95 42.26 – 1.95	Depositor EDS
% Data completeness (in resolution range)	99.9 (42.26-1.95) 99.9 (42.26-1.95)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.14 (at 1.95Å)	Xtrriage
Refinement program	BUSTER 2.11.8, PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.167 , 0.210 0.171 , 0.212	Depositor DCC
R_{free} test set	8191 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	31.5	Xtrriage
Anisotropy	0.374	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 46.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	17319	wwPDB-VP
Average B, all atoms (Å ²)	36.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.12% 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: GNP, GOL, MN, MG, PO4

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	0.37	0/1435	0.59	0/1940
1	D	0.49	0/1406	0.64	0/1899
2	B	0.36	0/4006	0.59	0/5430
2	E	0.39	0/4048	0.61	0/5486
3	C	0.39	0/2414	0.58	0/3261
3	F	0.45	0/2447	0.63	0/3305
All	All	0.40	0/15756	0.61	0/21321

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	1405	0	1398	8	0
1	D	1377	0	1373	5	0
2	B	3934	0	4106	27	0
2	E	3961	0	4152	21	1
3	C	2357	0	2321	27	0
3	F	2384	0	2351	16	1
4	A	32	0	13	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	32	0	13	0	0
5	A	1	0	0	0	0
5	D	1	0	0	0	0
6	A	6	0	7	0	0
6	B	18	0	24	0	0
6	C	12	0	16	4	0
6	D	12	0	15	1	0
6	E	30	0	40	5	0
6	F	18	0	24	2	0
7	C	2	0	0	0	0
7	F	2	0	0	0	0
8	C	10	0	0	0	0
8	E	5	0	0	0	0
8	F	5	0	0	0	0
9	A	149	0	0	0	0
9	B	402	0	0	2	0
9	C	144	0	0	0	0
9	D	256	0	0	2	0
9	E	532	0	0	5	1
9	F	232	0	0	2	0
All	All	17319	0	15853	100	2

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 (100) 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:66:LEU:HD21	1:A:81:TYR:HB3	1.75	0.69
3:F:96:ARG:NH1	3:F:272:TYR:OH	2.27	0.68
2:B:115:LEU:HD21	2:B:119:ILE:HD13	1.77	0.65
2:E:569:ILE:HD12	6:E:604:GOL:H12	1.79	0.65
2:E:138:LEU:HG	2:E:142:VAL:HG21	1.80	0.64
2:B:323:PRO:HG2	2:B:326:LEU:HB2	1.80	0.63
1:A:8:SER:HB2	1:A:11:LEU:HD21	1.81	0.62
2:E:95[B]:ASN:OD1	2:E:98:ARG:NH1	2.28	0.62
2:E:566:SER:HA	6:E:604:GOL:H11	1.85	0.59
3:C:75:LEU:HD11	3:C:268:SER:HB3	1.84	0.58
3:C:271:ASN:ND2	3:C:276:PHE:O	2.38	0.56
2:E:226:LYS:NZ	9:E:707:HOH:O	2.34	0.56
3:F:249:GLN:HE21	6:F:506:GOL:H31	1.70	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:177:GLN:NE2	9:D:1304:HOH:O	2.35	0.56
3:C:74:ARG:NH1	3:C:297:LYS:O	2.36	0.55
2:E:351:PRO:HB2	2:E:377:ARG:HD2	1.90	0.54
2:E:327:LEU:HB2	2:E:353:GLN:HB2	1.89	0.54
2:B:434[A]:ASN:ND2	2:B:457:GLU:OE1	2.41	0.54
3:C:33:ASN:HA	3:C:36:ARG:HG2	1.90	0.54
3:F:75:LEU:HD11	3:F:268:SER:HB3	1.89	0.54
2:B:120:LYS:HB2	2:B:141:GLU:HB3	1.90	0.54
2:B:91:ILE:HA	2:B:94:LEU:HD12	1.90	0.54
2:B:376:SER:O	2:B:379:LYS:NZ	2.39	0.53
2:B:573:LYS:HE2	2:B:578:TYR:O	2.09	0.53
3:C:255:TYR:OH	3:F:255:TYR:OH	2.04	0.52
3:C:86:ASN:ND2	6:C:504:GOL:H11	2.26	0.51
2:E:559:GLN:H	2:E:559:GLN:CD	2.14	0.50
1:A:66:LEU:CD2	1:A:81:TYR:HB3	2.41	0.49
2:B:120:LYS:HG3	2:B:144:CYS:SG	2.53	0.49
3:F:86:ASN:ND2	3:F:117:ASN:HB3	2.27	0.49
2:E:448:ARG:HD2	9:E:847:HOH:O	2.12	0.49
3:C:55:LEU:HD22	6:C:504:GOL:H31	1.95	0.49
2:E:113:HIS:CE1	2:E:134:LYS:HD2	2.47	0.48
1:A:114:LYS:HD3	1:A:119:PHE:CZ	2.49	0.48
2:E:350:GLY:O	2:E:353:GLN:HG2	2.13	0.48
3:F:33:ASN:OD1	3:F:36[B]:ARG:NH2	2.46	0.48
2:B:457:GLU:OE2	3:C:150:LYS:NZ	2.32	0.48
2:B:350:GLY:O	2:B:353:GLN:HG2	2.14	0.48
3:F:211:LYS:HD3	3:F:258:PHE:HE1	1.79	0.48
2:B:138:LEU:HG	2:B:142:VAL:HG21	1.96	0.48
6:D:204:GOL:H2	9:E:1137:HOH:O	2.14	0.48
2:E:456:GLU:OE2	9:E:701:HOH:O	2.20	0.47
3:C:56:GLU:H	6:C:504:GOL:H32	1.79	0.47
3:C:215:GLY:N	3:C:230:GLU:OE2	2.36	0.47
2:E:537:LEU:HD21	2:E:546:MET:SD	2.55	0.47
2:B:486:LEU:HD11	2:B:501:LEU:HD11	1.98	0.46
3:C:255:TYR:HE2	3:C:257:PHE:CE2	2.34	0.46
2:B:267:ASP:OD1	2:B:269:GLN:NE2	2.44	0.46
3:C:177:SER:HB2	3:C:203:ASP:HB2	1.96	0.46
3:C:257:PHE:CG	3:C:261:ARG:HG2	2.49	0.46
1:A:121:MET:HG3	1:A:150:ILE:HG21	1.97	0.46
3:C:286:ASP:OD2	3:C:290:MET:HB2	2.14	0.46
1:D:128:VAL:HG11	1:D:154:GLU:HB3	1.97	0.46
2:E:288[B]:ARG:NH2	9:E:702:HOH:O	2.21	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:F:56:GLU:O	6:F:505:GOL:H31	2.16	0.45
1:A:9:ASP:N	1:A:9:ASP:OD1	2.49	0.45
3:F:211:LYS:NZ	9:F:616:HOH:O	2.48	0.45
2:E:565:PRO:HB2	6:E:604:GOL:H32	1.99	0.44
3:C:56:GLU:H	6:C:504:GOL:C3	2.31	0.44
2:E:456:GLU:HG2	2:E:457:GLU:HG3	1.99	0.44
2:B:464:PRO:O	2:B:467:ILE:HG13	2.18	0.44
2:E:120:LYS:HB3	2:E:141:GLU:HB3	2.00	0.43
2:B:143:GLY:HA3	2:B:164:SER:HB2	1.99	0.43
2:B:119:ILE:HG12	2:B:145:LEU:HD11	2.00	0.43
2:B:233:GLU:OE1	9:B:701:HOH:O	2.21	0.43
2:B:522:LEU:O	2:B:546:MET:HA	2.19	0.43
2:B:269:GLN:H	2:B:269:GLN:HG3	1.34	0.43
3:F:36[B]:ARG:HD3	9:F:712:HOH:O	2.18	0.43
2:E:401:TRP:HA	6:E:603:GOL:H12	2.01	0.42
2:B:383:LYS:HB3	2:B:383:LYS:HE2	1.56	0.42
3:C:287:GLU:OE1	3:C:287:GLU:N	2.51	0.42
3:C:166:ASP:HB2	3:C:289:LEU:HD21	2.01	0.42
3:C:261:ARG:HE	3:F:297:LYS:NZ	2.17	0.42
2:E:315:GLU:HA	2:E:339:ALA:O	2.20	0.42
3:C:94:VAL:O	3:C:95:ASP:HB2	2.20	0.42
3:C:171:CYS:HA	3:C:245:CYS:O	2.20	0.41
2:B:130:LEU:HB2	2:B:153:LEU:HD23	2.02	0.41
2:B:233:GLU:OE1	2:B:233:GLU:N	2.53	0.41
3:F:211:LYS:H	3:F:211:LYS:HG2	1.67	0.41
2:E:379:LYS:HD2	6:E:603:GOL:H32	2.01	0.41
1:A:175:ILE:O	1:A:178:GLN:HG2	2.20	0.41
2:B:267:ASP:OD1	2:B:269:GLN:HG3	2.20	0.41
2:B:379:LYS:HB2	9:B:776:HOH:O	2.19	0.41
2:E:467[B]:ILE:HG13	2:E:470:LEU:HD12	2.03	0.41
2:B:383:LYS:HG2	2:B:406:GLU:HB2	2.02	0.41
1:D:114:LYS:HE2	1:D:119:PHE:CZ	2.56	0.41
1:D:119:PHE:O	1:D:121:MET:HG3	2.20	0.41
3:F:60:LYS:HE3	3:F:79:GLY:O	2.21	0.41
3:C:78:TYR:CZ	3:F:290:MET:HB2	2.56	0.41
3:C:208:ASP:O	3:C:226:THR:HA	2.21	0.41
3:F:208:ASP:O	3:F:226:THR:HA	2.21	0.41
3:C:60:LYS:HB3	3:C:282:MET:HE3	2.02	0.40
3:C:88:LEU:HD11	3:C:121:LEU:HG	2.03	0.40
3:C:230:GLU:CD	3:C:230:GLU:H	2.25	0.40
3:F:58:PRO:HA	3:F:285:VAL:O	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:6:VAL:HA	3:C:225:PHE:HE2	1.86	0.40
3:C:236:LEU:HD21	3:C:244:ILE:HG13	2.04	0.40
2:B:570:GLN:O	2:B:574:MET:HG2	2.22	0.40
1:D:132:HIS:HD2	9:D:1527:HOH:O	2.05	0.40
2:B:361:ASN:OD1	2:B:363:GLU:HG2	2.22	0.40

All (2) 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:E:581:MET:O	3:F:36[B]:ARG:NH1[2_556]	2.19	0.01
9:E:1104:HOH:O	9:E:1181:HOH:O[2_646]	2.19	0.01

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	171/180 (95%)	167 (98%)	3 (2%)	1 (1%)	25	14
1	D	167/180 (93%)	166 (99%)	1 (1%)	0	100	100
2	B	499/505 (99%)	469 (94%)	30 (6%)	0	100	100
2	E	505/505 (100%)	479 (95%)	26 (5%)	0	100	100
3	C	291/297 (98%)	277 (95%)	14 (5%)	0	100	100
3	F	295/297 (99%)	284 (96%)	11 (4%)	0	100	100
All	All	1928/1964 (98%)	1842 (96%)	85 (4%)	1 (0%)	51	43

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	8	SER

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	156/160 (98%)	155 (99%)	1 (1%)	86	85
1	D	152/160 (95%)	151 (99%)	1 (1%)	84	82
2	B	466/468 (100%)	458 (98%)	8 (2%)	60	55
2	E	472/468 (101%)	469 (99%)	3 (1%)	86	85
3	C	259/261 (99%)	254 (98%)	5 (2%)	57	50
3	F	262/261 (100%)	260 (99%)	2 (1%)	81	80
All	All	1767/1778 (99%)	1747 (99%)	20 (1%)	73	71

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	9	ASP
2	B	122	LEU
2	B	269	GLN
2	B	433	SER
2	B	436	LEU
2	B	559[A]	GLN
2	B	559[B]	GLN
2	B	561	VAL
2	B	573	LYS
3	C	167	GLU
3	C	184	GLU
3	C	198	GLN
3	C	211	LYS
3	C	246	ARG
1	D	36	LYS
2	E	379	LYS
2	E	416	LYS
2	E	559	GLN
3	F	246	ARG
3	F	271	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such

sidechains are listed below:

Mol	Chain	Res	Type
3	F	198	GLN

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 28 ligands modelled in this entry, 6 are monoatomic - leaving 22 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	$\# Z > 2$
6	GOL	D	204	-	5,5,5	0.99	0	5,5,5	1.02	0
6	GOL	B	602	-	5,5,5	1.08	0	5,5,5	1.01	0
6	GOL	E	601	-	5,5,5	1.28	1 (20%)	5,5,5	0.72	0
6	GOL	E	602	-	5,5,5	1.07	0	5,5,5	0.90	0
6	GOL	A	203	-	5,5,5	1.72	1 (20%)	5,5,5	0.75	0
8	PO4	F	503	7	4,4,4	1.01	0	6,6,6	0.66	0
6	GOL	E	604	-	5,5,5	1.12	0	5,5,5	0.89	0
6	GOL	C	504	-	5,5,5	0.87	0	5,5,5	1.11	1 (20%)
8	PO4	E	606	-	4,4,4	0.89	0	6,6,6	0.39	0
8	PO4	C	503	7	4,4,4	0.82	0	6,6,6	0.56	0
4	GNP	A	201	5	29,34,34	1.57	6 (20%)	33,54,54	2.19	8 (24%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	GOL	F	505	-	5,5,5	1.24	0	5,5,5	1.02	0
6	GOL	E	603	-	5,5,5	0.83	0	5,5,5	1.03	0
8	PO4	C	506	-	4,4,4	0.87	0	6,6,6	0.42	0
6	GOL	D	203	-	5,5,5	1.32	0	5,5,5	1.28	0
4	GNP	D	201	5	29,34,34	1.54	7 (24%)	33,54,54	2.16	6 (18%)
6	GOL	F	506	-	5,5,5	0.83	0	5,5,5	0.92	0
6	GOL	F	504	-	5,5,5	0.85	0	5,5,5	1.00	0
6	GOL	B	603	-	5,5,5	0.90	0	5,5,5	1.06	0
6	GOL	B	601	-	5,5,5	1.33	1 (20%)	5,5,5	0.83	0
6	GOL	E	605	-	5,5,5	0.93	0	5,5,5	0.94	0
6	GOL	C	505	-	5,5,5	0.71	0	5,5,5	1.07	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	GOL	F	506	-	-	0/4/4/4	-
6	GOL	F	504	-	-	2/4/4/4	-
6	GOL	E	602	-	-	0/4/4/4	-
6	GOL	D	204	-	-	2/4/4/4	-
6	GOL	D	203	-	-	0/4/4/4	-
6	GOL	F	505	-	-	2/4/4/4	-
6	GOL	A	203	-	-	3/4/4/4	-
6	GOL	B	603	-	-	0/4/4/4	-
6	GOL	B	602	-	-	2/4/4/4	-
6	GOL	E	604	-	-	0/4/4/4	-
6	GOL	B	601	-	-	0/4/4/4	-
6	GOL	E	605	-	-	0/4/4/4	-
6	GOL	C	504	-	-	3/4/4/4	-
4	GNP	D	201	5	-	3/14/38/38	0/3/3/3
6	GOL	E	601	-	-	0/4/4/4	-
6	GOL	C	505	-	-	0/4/4/4	-
4	GNP	A	201	5	-	3/14/38/38	0/3/3/3
6	GOL	E	603	-	-	1/4/4/4	-

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	201	GNP	PB-O3A	4.17	1.64	1.59
4	D	201	GNP	C6-N1	3.47	1.39	1.33
4	D	201	GNP	PB-O3A	3.35	1.63	1.59
4	A	201	GNP	C6-N1	3.22	1.38	1.33
4	A	201	GNP	PG-N3B	3.04	1.71	1.63
4	A	201	GNP	PB-O1B	2.82	1.50	1.46
4	D	201	GNP	PG-O1G	2.77	1.50	1.46
4	D	201	GNP	PG-N3B	2.73	1.70	1.63
4	D	201	GNP	PB-O1B	2.72	1.50	1.46
6	A	203	GOL	O2-C2	-2.34	1.36	1.43
4	D	201	GNP	PA-O2A	-2.25	1.44	1.55
4	A	201	GNP	PG-O1G	2.25	1.49	1.46
6	E	601	GOL	C3-C2	2.24	1.60	1.51
6	B	601	GOL	O2-C2	-2.16	1.36	1.43
4	D	201	GNP	C5-C6	2.07	1.44	1.41
4	A	201	GNP	C5-C6	2.03	1.44	1.41

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	201	GNP	C5-C6-N1	-8.31	112.06	123.43
4	A	201	GNP	C5-C6-N1	-8.29	112.09	123.43
4	D	201	GNP	C2-N1-C6	5.69	124.97	115.93
4	A	201	GNP	C2-N1-C6	5.63	124.87	115.93
4	A	201	GNP	O1G-PG-N3B	-3.45	106.69	111.77
4	D	201	GNP	O1G-PG-N3B	-3.16	107.12	111.77
4	D	201	GNP	N3-C2-N1	-2.83	123.45	127.22
4	A	201	GNP	N3-C2-N1	-2.71	123.61	127.22
4	D	201	GNP	C4-C5-C6	-2.68	118.24	120.80
4	A	201	GNP	O2G-PG-O3G	2.38	113.97	107.64
4	A	201	GNP	C4-C5-C6	-2.33	118.57	120.80
4	A	201	GNP	C2-N3-C4	-2.28	112.75	115.36
6	C	504	GOL	C3-C2-C1	-2.06	103.68	111.70
4	D	201	GNP	PB-O3A-PA	-2.03	125.47	132.62
4	A	201	GNP	PB-O3A-PA	-2.01	125.53	132.62

There are no chirality outliers.

All (21) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	201	GNP	PG-N3B-PB-O1B
4	A	201	GNP	PA-O3A-PB-O1B

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Mol	Chain	Res	Type	Atoms
4	A	201	GNP	PA-O3A-PB-O2B
4	D	201	GNP	PG-N3B-PB-O1B
4	D	201	GNP	PA-O3A-PB-O1B
4	D	201	GNP	PA-O3A-PB-O2B
6	A	203	GOL	C1-C2-C3-O3
6	A	203	GOL	O2-C2-C3-O3
6	B	602	GOL	O1-C1-C2-C3
6	C	504	GOL	O1-C1-C2-O2
6	C	504	GOL	O1-C1-C2-C3
6	D	204	GOL	C1-C2-C3-O3
6	F	504	GOL	C1-C2-C3-O3
6	F	505	GOL	O1-C1-C2-C3
6	F	505	GOL	O1-C1-C2-O2
6	B	602	GOL	O1-C1-C2-O2
6	D	204	GOL	O2-C2-C3-O3
6	A	203	GOL	O1-C1-C2-O2
6	C	504	GOL	O2-C2-C3-O3
6	F	504	GOL	O2-C2-C3-O3
6	E	603	GOL	C1-C2-C3-O3

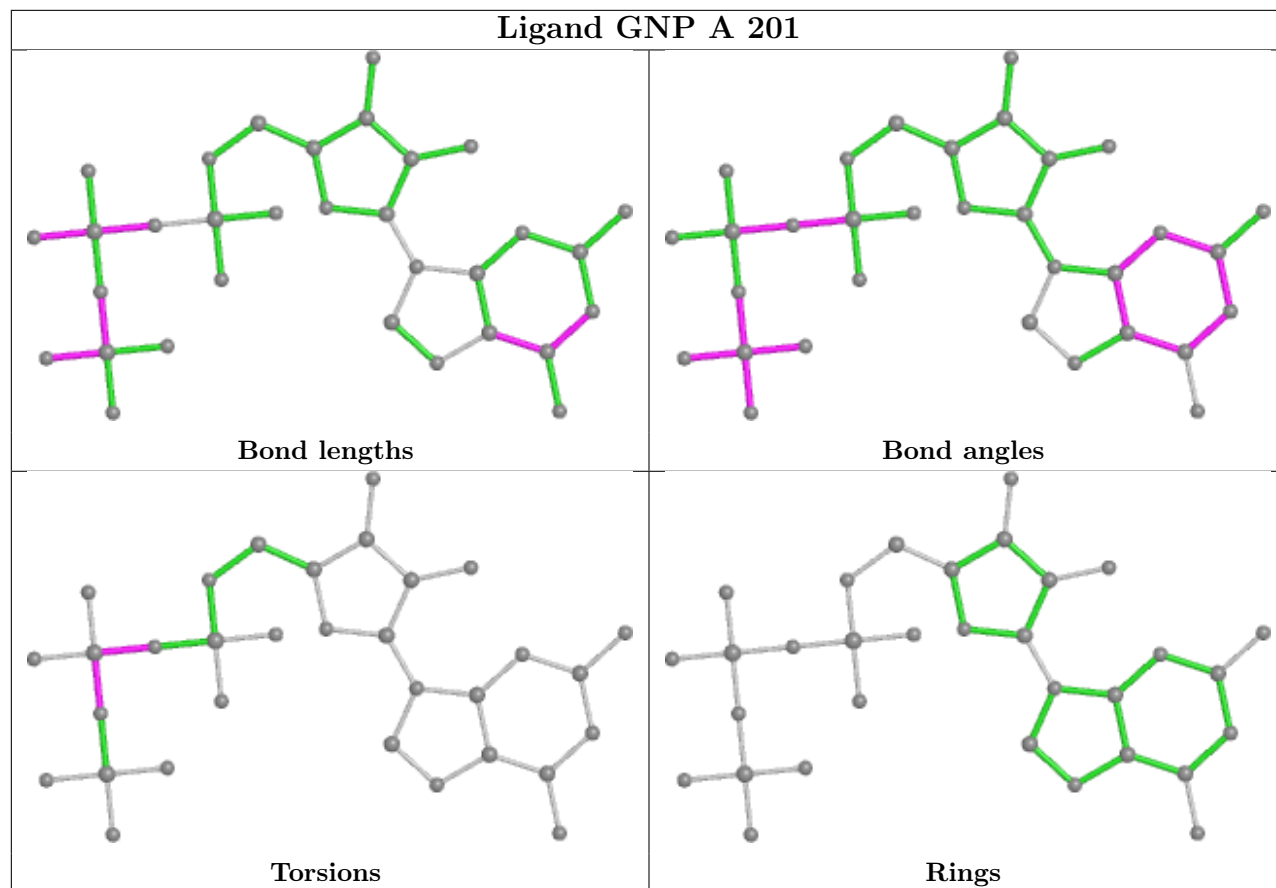
There are no ring outliers.

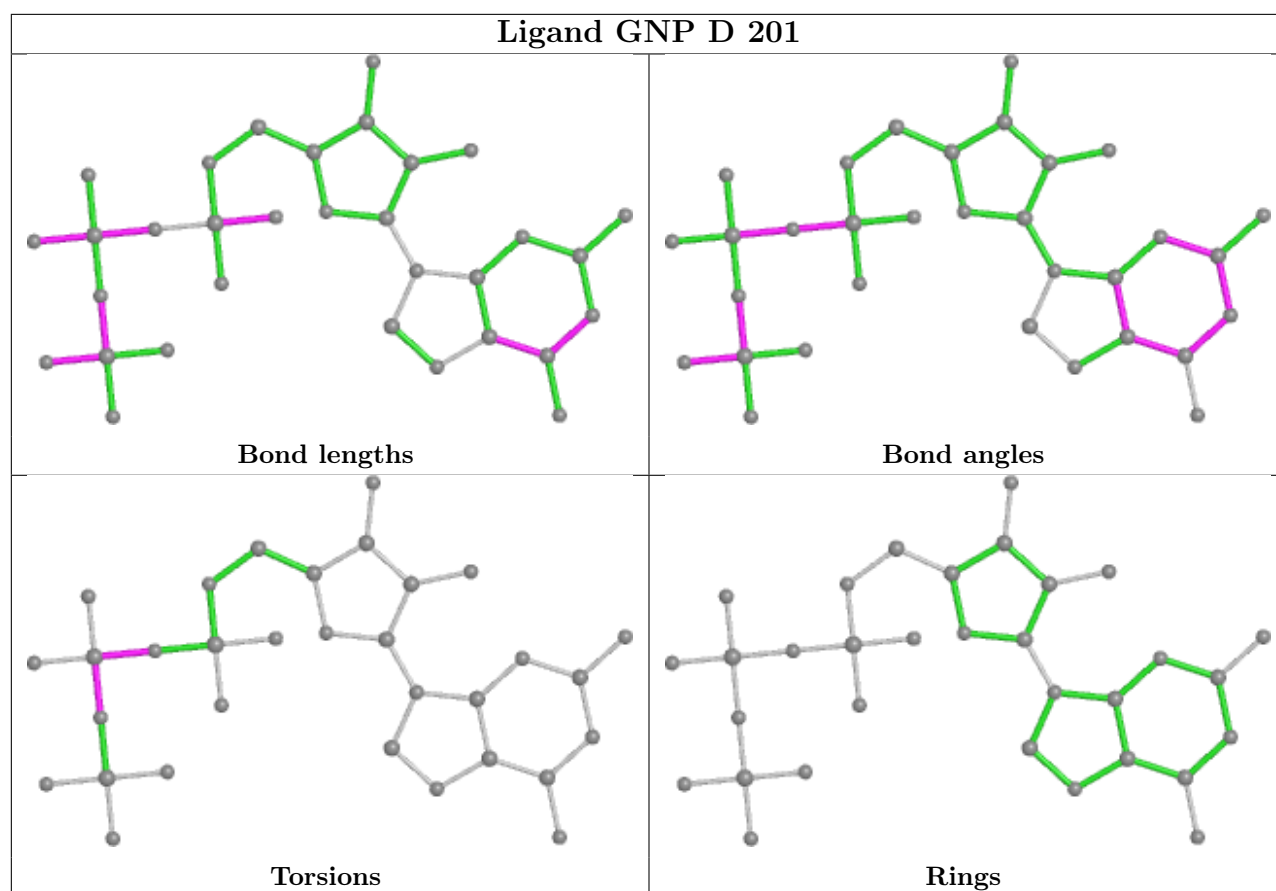
6 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	D	204	GOL	1	0
6	E	604	GOL	3	0
6	C	504	GOL	4	0
6	F	505	GOL	1	0
6	E	603	GOL	2	0
6	F	506	GOL	1	0

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

equivalents in the CSD to analyse the geometry.





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	173/180 (96%)	0.20	8 (4%) 32 42	25, 36, 59, 120	0
1	D	169/180 (93%)	-0.32	1 (0%) 89 93	18, 25, 39, 71	0
2	B	496/505 (98%)	-0.02	11 (2%) 62 70	24, 37, 58, 90	0
2	E	496/505 (98%)	-0.31	1 (0%) 95 97	20, 31, 43, 68	0
3	C	292/297 (98%)	0.61	42 (14%) 2 4	24, 40, 67, 119	0
3	F	294/297 (98%)	-0.01	7 (2%) 59 68	19, 28, 50, 103	0
All	All	1920/1964 (97%)	-0.01	70 (3%) 42 52	18, 33, 56, 120	0

All (70) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	C	24	PRO	6.2
3	C	23	ARG	5.8
1	A	9	ASP	5.7
3	C	25	GLY	5.3
3	F	24	PRO	4.6
3	F	25	GLY	4.4
3	C	22	SER	4.3
3	C	78	TYR	4.1
3	F	23	ARG	4.1
3	C	274	GLY	3.9
1	A	6	VAL	3.9
1	D	10	ASN	3.8
3	C	21	GLY	3.8
2	B	144	CYS	3.8
3	C	214	GLN	3.7
2	B	91	ILE	3.7
3	C	19	VAL	3.5
3	C	47	LEU	3.4
2	E	88	ALA	3.4

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Mol	Chain	Res	Type	RSRZ
3	C	159	LEU	3.3
2	B	324	GLU	3.2
3	C	189	ILE	3.1
2	B	99	GLU	3.1
3	C	212	ASP	3.0
2	B	95	ASN	3.0
3	C	20	GLN	3.0
3	C	158	CYS	3.0
1	A	8	SER	3.0
3	C	51	ILE	2.9
3	C	26	LYS	2.9
3	C	201	LEU	2.8
3	F	274	GLY	2.8
3	C	80	GLY	2.7
3	C	192	PRO	2.7
3	C	84	GLU	2.7
3	C	70	TYR	2.7
1	A	10	ASN	2.7
3	C	160	PRO	2.6
3	C	275	GLU	2.6
3	C	8	ASN	2.6
3	C	121	LEU	2.5
2	B	86	SER	2.5
3	C	18	GLU	2.5
3	C	52	LEU	2.5
3	C	46	PHE	2.4
3	C	255	TYR	2.4
1	A	11	LEU	2.4
3	F	298	PRO	2.4
3	C	290	MET	2.4
2	B	580	ALA	2.4
1	A	7	PRO	2.4
3	C	273	CYS	2.4
2	B	352	SER	2.3
3	C	29	GLN	2.3
3	C	162	ALA	2.3
3	C	27	ASN	2.3
3	F	22	SER	2.3
1	A	178	GLN	2.2
2	B	350	GLY	2.2
3	C	28	VAL	2.2
1	A	59	GLN	2.2

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Mol	Chain	Res	Type	RSRZ
3	C	287	GLU	2.2
3	C	186	ILE	2.2
2	B	581	MET	2.1
3	F	21	GLY	2.1
3	C	17	LEU	2.1
3	C	53	LEU	2.1
3	C	190	MET	2.1
3	C	77	GLU	2.0
2	B	141	GLU	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, 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.

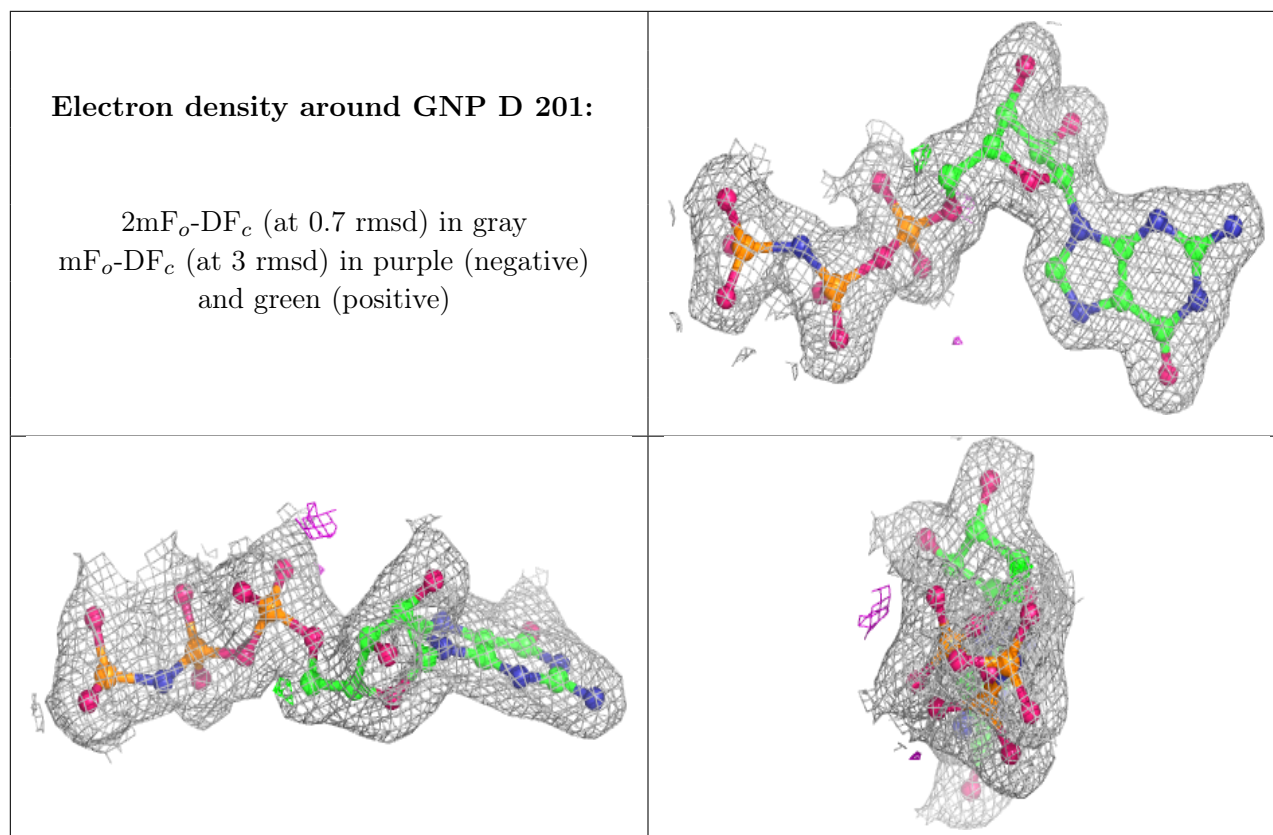
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
7	MN	C	501	1/1	0.72	0.15	81,81,81,81	0
8	PO4	C	506	5/5	0.76	0.27	94,99,105,115	0
6	GOL	E	604	6/6	0.77	0.17	59,59,61,62	0
7	MN	F	501	1/1	0.78	0.15	74,74,74,74	0
6	GOL	F	504	6/6	0.81	0.20	45,49,51,54	0
6	GOL	F	506	6/6	0.86	0.18	54,57,58,61	0
6	GOL	C	505	6/6	0.86	0.27	44,47,51,52	0
6	GOL	B	601	6/6	0.86	0.15	34,44,44,49	0
6	GOL	B	603	6/6	0.86	0.25	42,48,51,59	0
6	GOL	D	203	6/6	0.88	0.20	23,28,30,37	0
6	GOL	B	602	6/6	0.89	0.13	30,37,40,41	0
6	GOL	A	203	6/6	0.90	0.17	29,33,34,38	0
6	GOL	E	605	6/6	0.91	0.22	62,68,70,72	0
6	GOL	C	504	6/6	0.91	0.18	43,46,51,57	0

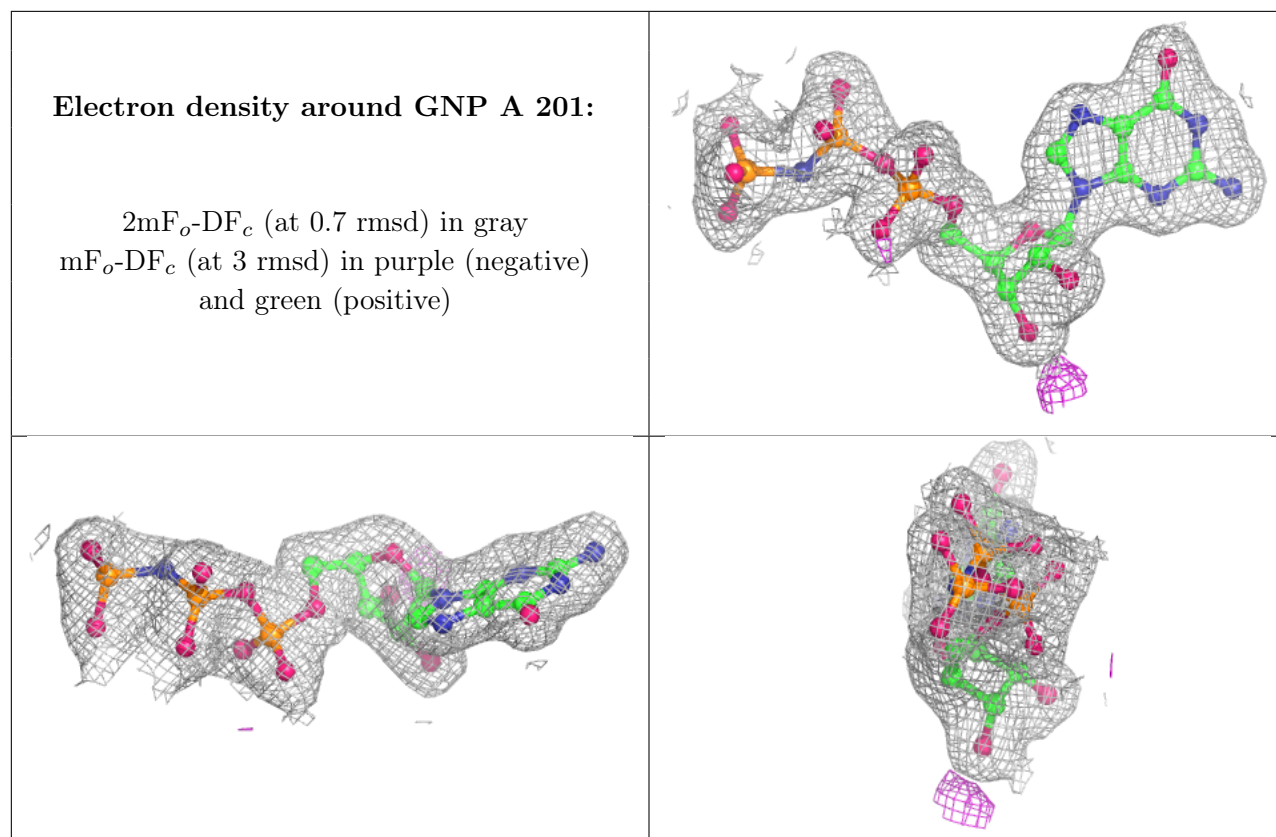
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
6	GOL	D	204	6/6	0.92	0.12	40,45,46,46	0
6	GOL	E	602	6/6	0.92	0.14	36,39,42,45	0
6	GOL	E	603	6/6	0.92	0.15	49,50,54,59	0
6	GOL	F	505	6/6	0.92	0.17	29,38,47,47	0
6	GOL	E	601	6/6	0.93	0.11	26,29,34,35	0
8	PO4	E	606	5/5	0.94	0.29	85,90,99,106	0
8	PO4	C	503	5/5	0.96	0.10	44,46,49,52	0
8	PO4	F	503	5/5	0.98	0.07	27,34,36,36	0
4	GNP	D	201	32/32	0.99	0.08	17,20,22,23	0
5	MG	A	202	1/1	0.99	0.08	24,24,24,24	0
5	MG	D	202	1/1	0.99	0.09	19,19,19,19	0
4	GNP	A	201	32/32	0.99	0.11	22,26,28,29	0
7	MN	C	502	1/1	0.99	0.02	36,36,36,36	0
7	MN	F	502	1/1	1.00	0.09	25,25,25,25	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.





6.5 Other polymers [i](#)

There are no such residues in this entry.