



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 01:42 PM UTC

PDB ID : 7KFV / pdb_00007kfv
Title : Structural basis for a germline-biased antibody response to SARS-CoV-2 (RBD:C1A-B12 Fab)
Authors : Pan, J.; Abraham, J.; Clark, L.; Clark, S.
Deposited on : 2020-10-15
Resolution : 2.10 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

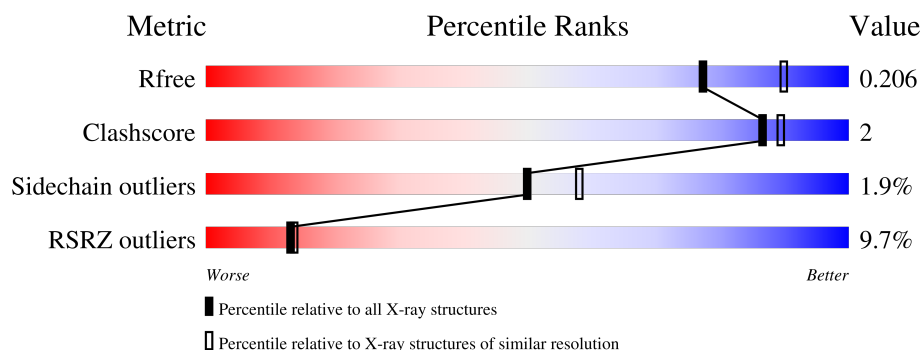
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 Å.

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



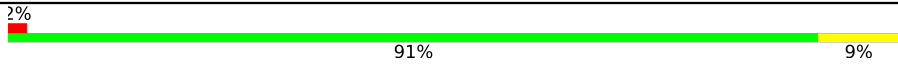
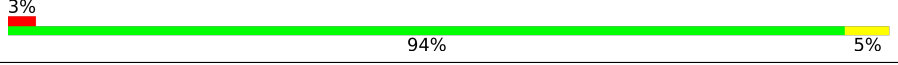
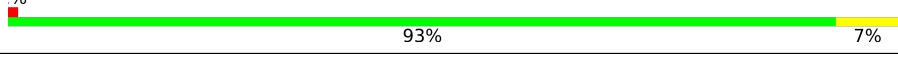
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (2.10-2.10)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 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	228	12% 81% 14%
1	B	228	18% 79% 6% 14%
1	E	228	26% 82% 14%
2	C	225	8% 91% 8%
2	F	225	7% 89% 8%
2	H	225	5% 95% 1%

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Mol	Chain	Length	Quality of chain
3	D	214	 2% 91% 9%
3	G	214	 3% 94% 5%
3	L	214	 % 93% 7%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 16494 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 Spike glycoprotein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	195	Total	C	N	O	S	0	5	0
			1600	1025	270	297	8			
1	B	195	Total	C	N	O	S	0	6	0
			1590	1019	268	295	8			
1	E	195	Total	C	N	O	S	0	3	0
			1570	1004	265	293	8			

There are 15 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	314	GLY	-	expression tag	UNP P0DTC2
A	315	SER	-	expression tag	UNP P0DTC2
A	316	GLY	-	expression tag	UNP P0DTC2
A	317	SER	-	expression tag	UNP P0DTC2
A	318	GLY	-	expression tag	UNP P0DTC2
B	314	GLY	-	expression tag	UNP P0DTC2
B	315	SER	-	expression tag	UNP P0DTC2
B	316	GLY	-	expression tag	UNP P0DTC2
B	317	SER	-	expression tag	UNP P0DTC2
B	318	GLY	-	expression tag	UNP P0DTC2
E	314	GLY	-	expression tag	UNP P0DTC2
E	315	SER	-	expression tag	UNP P0DTC2
E	316	GLY	-	expression tag	UNP P0DTC2
E	317	SER	-	expression tag	UNP P0DTC2
E	318	GLY	-	expression tag	UNP P0DTC2

- Molecule 2 is a protein called Heavy chain of antibody C1A-B12 Fab.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	225	Total	C	N	O	S	0	7	0
			1718	1075	294	340	9			

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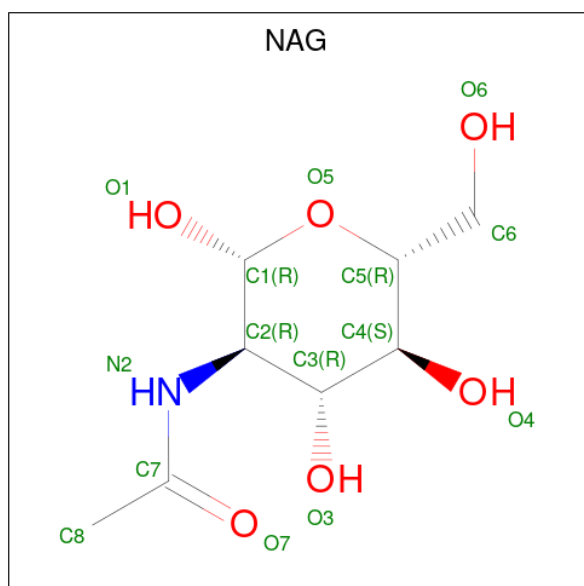
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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	F	219	Total	C	N	O	S	0	3	0
			1652	1039	281	325	7			
2	H	225	Total	C	N	O	S	0	5	0
			1709	1070	293	337	9			

- Molecule 3 is a protein called light chain of antibody C1A-B3 Fab.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	214	Total	C	N	O	S	0	3	0
			1653	1035	276	337	5			
3	G	214	Total	C	N	O	S	0	4	0
			1663	1041	279	338	5			
3	L	214	Total	C	N	O	S	0	3	0
			1655	1038	276	336	5			

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			14	8	1	5		
4	B	1	Total	C	N	O	0	0
			14	8	1	5		
4	E	1	Total	C	N	O	0	0
			14	8	1	5		

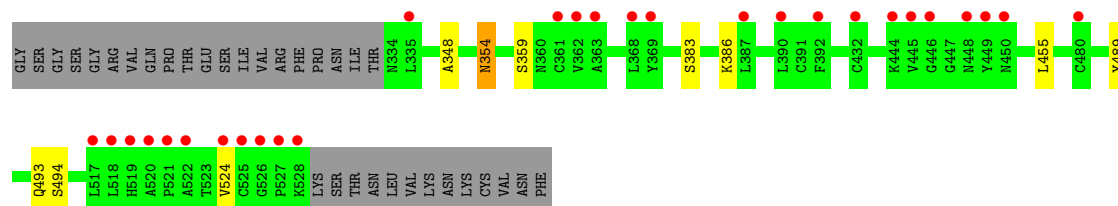
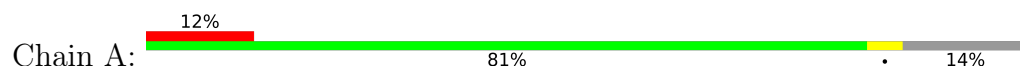
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	165	Total 165	O 165	0	0
5	B	154	Total 154	O 154	0	0
5	C	202	Total 202	O 202	0	0
5	D	237	Total 237	O 237	0	0
5	E	88	Total 88	O 88	0	0
5	F	128	Total 128	O 128	0	0
5	G	187	Total 187	O 187	0	0
5	H	250	Total 250	O 250	0	0
5	L	231	Total 231	O 231	0	0

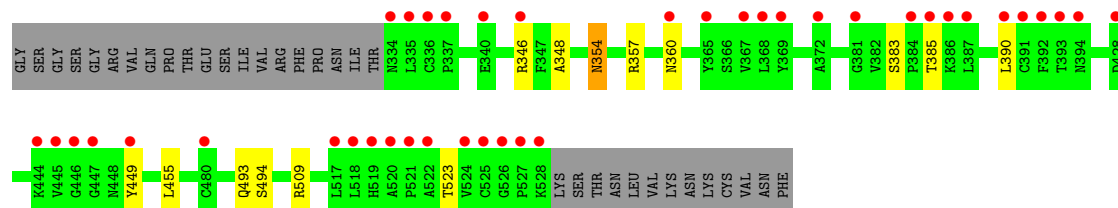
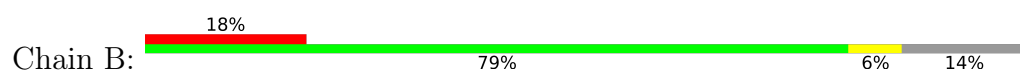
3 Residue-property plots [i](#)

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.

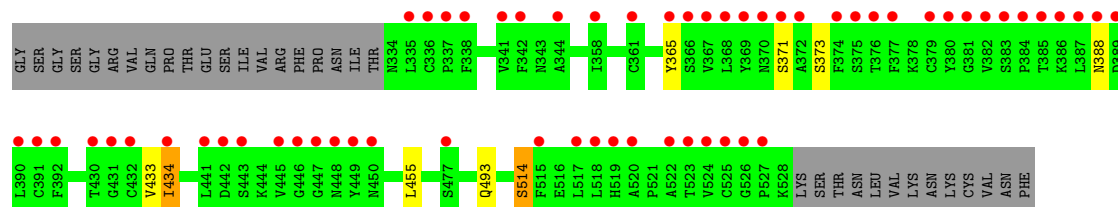
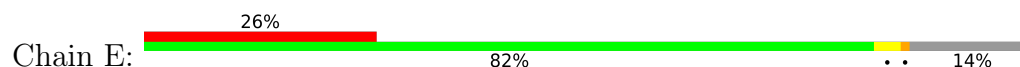
- Molecule 1: Spike glycoprotein



- Molecule 1: Spike glycoprotein

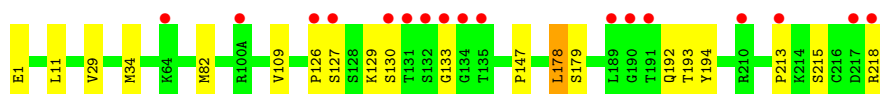


- Molecule 1: Spike glycoprotein

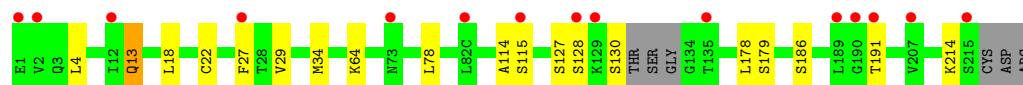
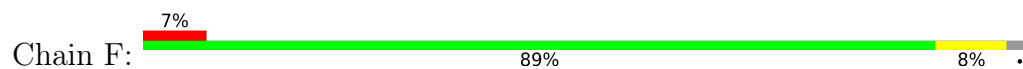


- Molecule 2: Heavy chain of antibody C1A-B12 Fab

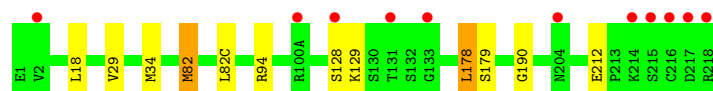




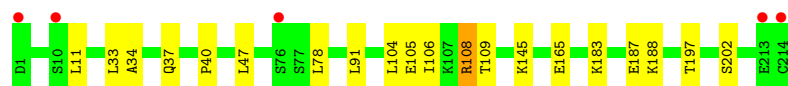
- Molecule 2: Heavy chain of antibody C1A-B12 Fab



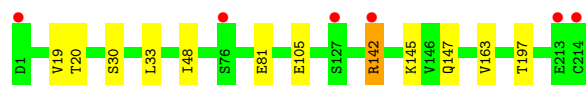
- Molecule 2: Heavy chain of antibody C1A-B12 Fab



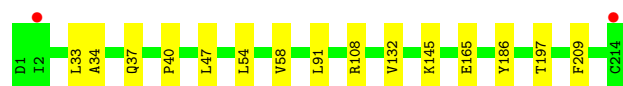
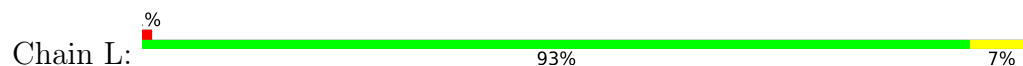
- Molecule 3: light chain of antibody C1A-B3 Fab



- Molecule 3: light chain of antibody C1A-B3 Fab



- Molecule 3: light chain of antibody C1A-B3 Fab



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	84.83Å 113.25Å 268.88Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	134.44 – 2.10 134.44 – 2.10	Depositor EDS
% Data completeness (in resolution range)	98.7 (134.44-2.10) 98.7 (134.44-2.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.53 (at 2.10Å)	Xtriage
Refinement program	BUSTER 2.10.3	Depositor
R, R_{free}	0.183 , 0.215 (Not available) , 0.206	Depositor DCC
R_{free} test set	7437 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å ²)	36.4	Xtriage
Anisotropy	0.308	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 69.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	16494	wwPDB-VP
Average B, all atoms (Å ²)	47.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.37% 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 [i](#)

5.1 Standard geometry [i](#)

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

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	0.65	0/1645	0.85	0/2235
1	B	0.65	0/1637	0.86	0/2224
1	E	0.61	0/1614	0.89	0/2195
2	C	0.70	0/1762	0.90	1/2395 (0.0%)
2	F	0.63	0/1692	0.95	5/2301 (0.2%)
2	H	0.71	1/1750 (0.1%)	0.92	1/2379 (0.0%)
3	D	0.72	0/1687	0.95	0/2289
3	G	0.71	1/1697 (0.1%)	0.93	0/2303
3	L	0.73	0/1689	0.95	1/2292 (0.0%)
All	All	0.68	2/15173 (0.0%)	0.91	8/20613 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	G	30	SER	CA-C	7.18	1.59	1.53
2	H	82	MET	SD-CE	-6.09	1.64	1.79

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	114	ALA	CA-C-N	7.11	132.50	121.19
2	F	114	ALA	C-N-CA	7.11	132.50	121.19
3	L	108	ARG	N-CA-CB	-5.85	102.45	111.46
2	C	178	LEU	N-CA-CB	-5.25	101.77	111.53
2	H	178	LEU	N-CA-CB	-5.13	103.09	111.66
2	F	115	SER	CA-C-N	5.09	131.27	121.54
2	F	115	SER	C-N-CA	5.09	131.27	121.54
2	F	115	SER	N-CA-C	5.07	119.69	111.37

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	1600	0	1519	5	0
1	B	1590	0	1520	8	0
1	E	1570	0	1486	5	0
2	C	1718	0	1680	10	0
2	F	1652	0	1618	6	0
2	H	1709	0	1671	6	0
3	D	1653	0	1617	11	0
3	G	1663	0	1627	5	0
3	L	1655	0	1623	9	0
4	A	14	0	13	0	0
4	B	14	0	13	0	0
4	E	14	0	13	0	0
5	A	165	0	0	0	0
5	B	154	0	0	1	0
5	C	202	0	0	0	0
5	D	237	0	0	1	0
5	E	88	0	0	1	0
5	F	128	0	0	0	0
5	G	187	0	0	0	0
5	H	250	0	0	0	0
5	L	231	0	0	4	0
All	All	16494	0	14400	61	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 2.

All (61) 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:C:133:GLY:HA2	3:G:81:GLU:HB3	1.72	0.72
2:H:82:MET:HE2	2:H:82(C):LEU:HD21	1.70	0.71
3:L:209:PHE:HZ	5:L:482:HOH:O	1.75	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:L:186:TYR:HE1	5:L:482:HOH:O	1.78	0.67
3:D:108:ARG:HG2	3:D:109:THR:N	2.12	0.63
3:G:20:THR:HB	2:H:190:GLY:HA3	1.80	0.63
3:D:145[A]:LYS:HB3	3:D:197:THR:HB	1.86	0.57
2:C:215:SER:HB2	2:C:218:ARG:HD2	1.87	0.57
1:E:433:VAL:C	1:E:434:ILE:HD13	2.31	0.55
1:B:346[B]:ARG:NH1	1:B:509:ARG:NH2	2.57	0.53
3:D:108:ARG:HG2	3:D:109:THR:H	1.74	0.52
1:A:489[B]:TYR:OH	2:H:94:ARG:NH1	2.43	0.52
3:D:40:PRO:HB3	3:D:165:GLU:HG3	1.92	0.51
3:L:40:PRO:HB3	3:L:165:GLU:HG3	1.93	0.51
3:L:37:GLN:HB2	3:L:47:LEU:HD11	1.92	0.51
1:E:365:TYR:H	1:E:388:ASN:HD21	1.58	0.50
1:A:383:SER:HB2	1:A:386:LYS:HB2	1.94	0.50
1:B:383:SER:O	1:B:385:THR:O	2.29	0.50
3:G:145:LYS:HE3	3:G:147:GLN:HB2	1.93	0.49
2:F:127:SER:OG	2:F:130:SER:OG	2.30	0.49
1:E:514:SER:HB2	5:E:738:HOH:O	2.12	0.49
2:C:126:PRO:HG2	2:C:213:PRO:HB3	1.96	0.47
2:F:128:SER:HB3	2:F:214:LYS:O	2.14	0.46
2:H:82:MET:CE	2:H:82(C):LEU:HD21	2.42	0.46
1:A:359:SER:HA	1:A:524:VAL:HG22	1.98	0.45
3:D:78:LEU:HD11	3:D:104:LEU:HD21	1.99	0.45
1:B:348:ALA:HB2	1:B:354:ASN:HD22	1.82	0.45
2:F:29:VAL:HG13	2:F:34:MET:HG3	1.98	0.45
3:L:132:VAL:HG22	5:L:482:HOH:O	2.17	0.45
3:L:145[B]:LYS:HB3	3:L:197:THR:HB	1.99	0.44
3:D:37:GLN:HB2	3:D:47:LEU:HD11	2.00	0.44
2:C:29:VAL:HG13	2:C:34:MET:HG3	2.00	0.43
2:F:13:GLN:HE21	2:F:13:GLN:HB3	1.64	0.43
3:L:132:VAL:CG2	5:L:482:HOH:O	2.67	0.43
1:B:360:ASN:H	1:B:523:THR:HB	1.83	0.43
1:E:371:SER:OG	1:E:373:SER:OG	2.32	0.43
1:B:357:ARG:HD3	5:B:844:HOH:O	2.19	0.43
1:B:455:LEU:HD22	1:B:493:GLN:HG3	2.00	0.43
1:A:455:LEU:HD22	1:A:493:GLN:HG3	2.01	0.43
1:B:449:TYR:HA	1:B:494:SER:OG	2.19	0.43
2:C:192:GLN:HG2	2:C:194:TYR:CZ	2.53	0.42
2:C:127:SER:HB3	2:C:130:SER:HB3	2.00	0.42
3:D:202:SER:HB2	2:H:212:GLU:OE2	2.18	0.42
2:C:215:SER:HB2	2:C:218:ARG:HH11	1.84	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:29:VAL:HG13	2:H:34:MET:HG3	2.01	0.42
3:D:34:ALA:HB2	3:D:91:LEU:HD11	2.01	0.42
1:A:348:ALA:HB2	1:A:354:ASN:HD22	1.84	0.42
2:C:11:LEU:HB2	2:C:147:PRO:HG3	2.02	0.42
3:L:34:ALA:HB2	3:L:91:LEU:HD11	2.02	0.42
2:C:192:GLN:HG3	2:C:193:THR:N	2.35	0.42
3:D:105:GLU:HG2	3:D:106:ILE:N	2.33	0.42
1:E:455:LEU:HD22	1:E:493:GLN:HG3	2.02	0.41
3:D:183:LYS:O	3:D:187:GLU:HG3	2.21	0.41
3:G:145:LYS:HB3	3:G:197:THR:HB	2.02	0.41
1:B:346[B]:ARG:HH12	1:B:509:ARG:NH2	2.17	0.41
3:D:188:LYS:NZ	5:D:305:HOH:O	2.54	0.41
3:G:142[B]:ARG:CZ	3:G:163:VAL:HG21	2.51	0.41
2:F:4:LEU:HD21	2:F:27:PHE:HZ	1.85	0.40
2:F:22:CYS:HB3	2:F:78:LEU:HB3	2.03	0.40
3:L:54[A]:LEU:HG	3:L:58:VAL:HB	2.03	0.40
2:C:82:MET:HE1	2:C:109:VAL:HG21	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

There are no protein backbone outliers to report in this entry.

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	174/198 (88%)	172 (99%)	2 (1%)	65	74
1	B	174/198 (88%)	172 (99%)	2 (1%)	65	74
1	E	171/198 (86%)	169 (99%)	2 (1%)	63	72

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	C	193/186 (104%)	188 (97%)	5 (3%)	40	46
2	F	184/186 (99%)	176 (96%)	8 (4%)	26	27
2	H	191/186 (103%)	185 (97%)	6 (3%)	35	39
3	D	189/186 (102%)	186 (98%)	3 (2%)	55	64
3	G	190/186 (102%)	183 (96%)	7 (4%)	30	33
3	L	189/186 (102%)	188 (100%)	1 (0%)	81	88
All	All	1655/1710 (97%)	1619 (98%)	36 (2%)	50	53

All (36) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	354	ASN
1	A	494	SER
1	B	354	ASN
1	B	390	LEU
2	C	1	GLU
2	C	129	LYS
2	C	178	LEU
2	C	179[A]	SER
2	C	179[B]	SER
3	D	11	LEU
3	D	33	LEU
3	D	108	ARG
1	E	434	ILE
1	E	514	SER
2	F	13	GLN
2	F	18	LEU
2	F	64	LYS
2	F	178	LEU
2	F	179[A]	SER
2	F	179[B]	SER
2	F	186	SER
2	F	191	THR
3	G	19	VAL
3	G	33	LEU
3	G	48[A]	ILE
3	G	48[B]	ILE
3	G	105	GLU
3	G	142[A]	ARG
3	G	142[B]	ARG

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Mol	Chain	Res	Type
2	H	18	LEU
2	H	128	SER
2	H	129	LYS
2	H	178	LEU
2	H	179[A]	SER
2	H	179[B]	SER
3	L	33	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (28) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	354	ASN
1	A	498	GLN
1	A	501	ASN
1	B	354	ASN
1	B	450	ASN
1	B	501	ASN
2	C	81	GLN
2	C	82(A)	ASN
3	D	55	GLN
3	D	79	GLN
3	D	160	GLN
3	D	199	GLN
1	E	334	ASN
1	E	360	ASN
1	E	388	ASN
2	F	13	GLN
2	F	81	GLN
2	F	82(A)	ASN
3	G	55	GLN
3	G	160	GLN
3	G	189	HIS
3	G	210	ASN
2	H	39	GLN
2	H	81	GLN
2	H	82(A)	ASN
2	H	199	ASN
3	L	38	GLN
3	L	189	HIS

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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

3 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
4	NAG	A	601	1	14,14,15	0.32	0	17,19,21	0.87	1 (5%)
4	NAG	B	601	1	14,14,15	0.34	0	17,19,21	0.79	1 (5%)
4	NAG	E	601	1	14,14,15	0.32	0	17,19,21	0.77	1 (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
4	NAG	A	601	1	-	0/6/23/26	0/1/1/1
4	NAG	B	601	1	-	0/6/23/26	0/1/1/1
4	NAG	E	601	1	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
4	A	601	NAG	C1-O5-C5	3.19	116.47	112.19
4	B	601	NAG	C1-O5-C5	2.90	116.07	112.19
4	E	601	NAG	C1-O5-C5	2.87	116.03	112.19

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	195/228 (85%)	0.67	28 (14%)	6 6	16, 43, 100, 130	5 (2%)
1	B	195/228 (85%)	0.82	40 (20%)	2 3	14, 44, 96, 111	6 (3%)
1	E	195/228 (85%)	1.53	60 (30%)	1 1	24, 68, 116, 128	3 (1%)
2	C	225/225 (100%)	0.19	17 (7%)	20 21	14, 34, 81, 137	7 (3%)
2	F	219/225 (97%)	0.58	15 (6%)	23 25	17, 51, 79, 120	3 (1%)
2	H	225/225 (100%)	0.05	11 (4%)	35 37	14, 35, 64, 119	5 (2%)
3	D	214/214 (100%)	0.07	5 (2%)	61 64	20, 37, 57, 82	3 (1%)
3	G	214/214 (100%)	0.18	6 (2%)	55 57	15, 39, 65, 96	4 (1%)
3	L	214/214 (100%)	0.10	2 (0%)	81 83	15, 37, 56, 81	3 (1%)
All	All	1896/2001 (94%)	0.45	184 (9%)	13 14	14, 40, 94, 137	39 (2%)

All (184) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	L	214	CYS	6.1
1	E	368	LEU	6.0
1	E	382	VAL	5.9
1	A	444[A]	LYS	5.6
1	E	369	TYR	5.4
1	E	449	TYR	5.2
1	E	367	VAL	5.1
1	E	522	ALA	5.1
1	B	390	LEU	4.8
3	D	214	CYS	4.8
2	C	133	GLY	4.7
1	B	445[A]	VAL	4.6
1	E	518	LEU	4.5
1	A	524	VAL	4.5
1	B	367	VAL	4.4

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Mol	Chain	Res	Type	RSRZ
1	A	448	ASN	4.4
1	E	385	THR	4.4
1	E	446	GLY	4.3
1	A	517	LEU	4.3
1	E	445	VAL	4.2
1	B	449	TYR	4.1
1	E	335	LEU	4.1
1	B	519	HIS	4.1
1	A	446	GLY	4.0
1	A	390	LEU	4.0
2	C	100(A)[A]	ARG	4.0
2	H	216	CYS	4.0
3	G	214	CYS	4.0
1	E	391	CYS	3.9
1	E	517	LEU	3.8
1	E	392	PHE	3.8
1	B	368	LEU	3.8
1	E	524	VAL	3.8
1	B	527	PRO	3.7
1	E	381	GLY	3.7
1	E	383	SER	3.7
2	C	131	THR	3.7
2	H	217	ASP	3.7
1	E	430	THR	3.6
1	A	363	ALA	3.6
1	E	372	ALA	3.6
1	E	371	SER	3.6
1	E	387	LEU	3.6
1	E	379	CYS	3.6
1	E	384	PRO	3.6
1	E	390	LEU	3.6
1	E	386	LYS	3.6
1	B	387	LEU	3.5
1	B	384	PRO	3.4
1	A	518	LEU	3.4
1	E	365	TYR	3.4
1	E	525	CYS	3.3
1	A	449	TYR	3.3
1	E	366	SER	3.3
1	B	521	PRO	3.3
1	E	441	LEU	3.3
2	F	190	GLY	3.2

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Mol	Chain	Res	Type	RSRZ
1	E	527	PRO	3.2
1	B	524	VAL	3.1
1	B	346[A]	ARG	3.1
1	B	518	LEU	3.1
1	E	443	SER	3.1
1	E	338	PHE	3.1
1	B	392	PHE	3.0
1	E	520	ALA	3.0
1	E	341	VAL	3.0
2	C	130	SER	3.0
1	A	450[A]	ASN	3.0
1	B	394	ASN	3.0
2	C	134	GLY	3.0
1	E	448	ASN	3.0
1	B	528	LYS	3.0
1	A	522	ALA	3.0
2	F	1	GLU	3.0
1	B	385	THR	3.0
1	E	374	PHE	3.0
2	F	215	SER	2.9
1	B	391	CYS	2.9
1	E	370	ASN	2.8
1	E	388	ASN	2.8
1	E	377	PHE	2.8
1	B	526	GLY	2.8
1	A	387	LEU	2.8
1	B	336	CYS	2.8
1	E	337	PRO	2.8
1	B	444[A]	LYS	2.8
2	C	191	THR	2.8
1	B	520	ALA	2.8
2	F	129	LYS	2.8
1	A	432	CYS	2.8
1	E	447	GLY	2.7
2	C	135	THR	2.7
1	A	527	PRO	2.7
1	E	380	TYR	2.7
1	E	477	SER	2.6
1	E	361	CYS	2.6
1	A	335	LEU	2.6
2	F	189	LEU	2.6
1	A	528	LYS	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	445	VAL	2.6
1	B	525	CYS	2.6
1	B	447	GLY	2.6
1	E	519	HIS	2.6
1	A	369	TYR	2.5
2	C	190	GLY	2.5
2	F	128	SER	2.5
1	E	336	CYS	2.5
2	C	210	ARG	2.5
2	H	218	ARG	2.5
1	B	381	GLY	2.5
1	E	375	SER	2.4
2	C	132	SER	2.4
1	E	344	ALA	2.4
3	D	1	ASP	2.4
1	B	365	TYR	2.4
1	B	393	THR	2.4
1	B	517	LEU	2.4
1	E	431	GLY	2.4
2	H	100(A)[A]	ARG	2.4
1	B	340	GLU	2.3
1	A	526	GLY	2.3
1	E	526	GLY	2.3
3	G	142[A]	ARG	2.3
2	H	2	VAL	2.3
1	A	525	CYS	2.3
1	B	334	ASN	2.3
2	F	73	ASN	2.3
1	B	446	GLY	2.3
2	F	2	VAL	2.3
1	A	480	CYS	2.3
1	B	480	CYS	2.3
1	B	372	ALA	2.3
1	E	442	ASP	2.3
1	E	515	PHE	2.3
2	C	213	PRO	2.3
2	H	204	ASN	2.3
1	A	361	CYS	2.3
1	E	432	CYS	2.3
2	H	128	SER	2.2
2	H	215	SER	2.2
2	F	12	ILE	2.2

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Mol	Chain	Res	Type	RSRZ
1	B	386	LYS	2.2
2	H	133	GLY	2.2
1	B	522	ALA	2.2
2	C	189	LEU	2.2
3	D	76	SER	2.2
1	A	392	PHE	2.2
1	A	521	PRO	2.2
1	B	337	PRO	2.2
1	E	342	PHE	2.2
1	E	523	THR	2.2
2	F	191	THR	2.2
3	G	213	GLU	2.2
1	E	376	THR	2.2
2	C	217	ASP	2.2
2	F	135	THR	2.2
1	A	519	HIS	2.1
1	A	520	ALA	2.1
1	B	335	LEU	2.1
3	G	76	SER	2.1
1	B	360	ASN	2.1
1	B	428	ASP	2.1
1	E	389	ASP	2.1
2	C	126	PRO	2.1
1	E	358	ILE	2.1
2	H	131	THR	2.1
1	A	362	VAL	2.1
2	F	207	VAL	2.1
2	F	115	SER	2.1
3	D	10	SER	2.1
3	G	127	SER	2.1
3	G	1	ASP	2.1
1	E	434	ILE	2.1
2	C	64[A]	LYS	2.1
2	C	127	SER	2.1
3	D	213	GLU	2.0
1	A	368	LEU	2.0
3	L	2	ILE	2.0
2	F	27	PHE	2.0
1	E	450[A]	ASN	2.0
2	F	82(C)	LEU	2.0
2	C	218	ARG	2.0
2	H	214	LYS	2.0

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Mol	Chain	Res	Type	RSRZ
1	B	369	TYR	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	NAG	E	601	14/15	0.62	0.20	141,141,141,141	0
4	NAG	B	601	14/15	0.79	0.13	72,74,74,74	0
4	NAG	A	601	14/15	0.83	0.13	81,83,83,83	0

6.5 Other polymers [i](#)

There are no such residues in this entry.