W O R L D W I D E

wwPDB

P R O T E I N   D A T A   B A N K

wwPDB X-ray Structure Validation Summary Report (i)

Nov 26, 2024 – 04:06 PM EST

|		
PDB ID	:	9B82
Title	:	Crystal structure of SARS-CoV-2 receptor binding domain in complex with neutralizing antibody COVA2-15
Authors	:	Yuan, M.; Zhu, X.; Wilson, I.A.
Deposited on	:	2024-03-28
Resolution	:	3.38 Å(reported)

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 3.38 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.
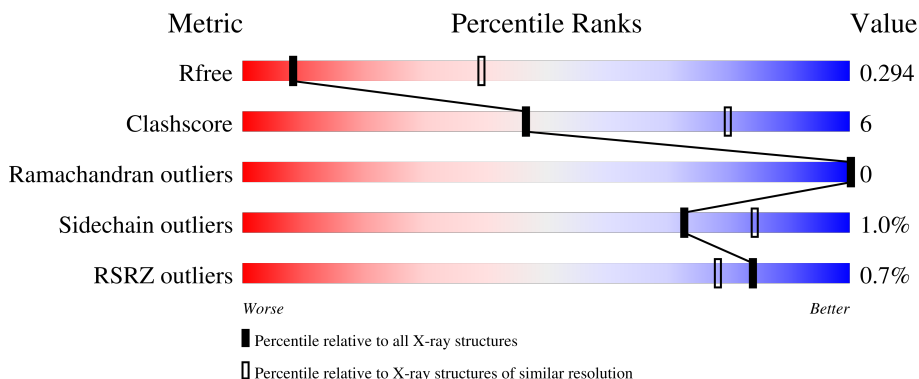
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	1137 (3.44-3.32)
Clashscore	180529	1165 (3.44-3.32)
Ramachandran outliers	177936	1164 (3.44-3.32)
Sidechain outliers	177891	1164 (3.44-3.32)
RSRZ outliers	164620	1137 (3.44-3.32)

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	205	81% 13% 6%
1	B	205	% 83% 8% 9%
1	C	205	85% 9% 6%
1	D	205	% 83% 11% 6%
1	E	205	83% 11% 6%

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Mol	Chain	Length	Quality of chain
1	F	205	% — 85% — 9% — 6%
2	H	232	78% — 20% — •
2	I	232	75% — 20% — • •
2	K	232	2% — 79% — 17% — • •
2	N	232	76% — 19% — • •
2	P	232	2% — 78% — 18% — • •
2	R	232	% — 75% — 21% — •
3	G	219	87% — 12% — •
3	J	219	2% — 87% — 12%
3	L	219	88% — 11% — •
3	M	219	91% — 8%
3	O	219	90% — 9%
3	Q	219	89% — 11%

2   Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 29362 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 protein S1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	193	Total	C	N	O	S	0	0	0
			1529	980	255	286	8			
1	C	193	Total	C	N	O	S	0	0	0
			1529	980	255	286	8			
1	B	187	Total	C	N	O	S	0	0	0
			1487	952	247	280	8			
1	D	193	Total	C	N	O	S	0	0	0
			1526	977	255	286	8			
1	E	193	Total	C	N	O	S	0	0	0
			1529	980	255	286	8			
1	F	193	Total	C	N	O	S	0	0	0
			1529	980	255	286	8			

There are 42 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	531	GLY	-	expression tag	UNP P0DTC2
A	532	HIS	-	expression tag	UNP P0DTC2
A	533	HIS	-	expression tag	UNP P0DTC2
A	534	HIS	-	expression tag	UNP P0DTC2
A	535	HIS	-	expression tag	UNP P0DTC2
A	536	HIS	-	expression tag	UNP P0DTC2
A	537	HIS	-	expression tag	UNP P0DTC2
C	531	GLY	-	expression tag	UNP P0DTC2
C	532	HIS	-	expression tag	UNP P0DTC2
C	533	HIS	-	expression tag	UNP P0DTC2
C	534	HIS	-	expression tag	UNP P0DTC2
C	535	HIS	-	expression tag	UNP P0DTC2
C	536	HIS	-	expression tag	UNP P0DTC2
C	537	HIS	-	expression tag	UNP P0DTC2
B	531	GLY	-	expression tag	UNP P0DTC2
B	532	HIS	-	expression tag	UNP P0DTC2
B	533	HIS	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	534	HIS	-	expression tag	UNP P0DTC2
B	535	HIS	-	expression tag	UNP P0DTC2
B	536	HIS	-	expression tag	UNP P0DTC2
B	537	HIS	-	expression tag	UNP P0DTC2
D	531	GLY	-	expression tag	UNP P0DTC2
D	532	HIS	-	expression tag	UNP P0DTC2
D	533	HIS	-	expression tag	UNP P0DTC2
D	534	HIS	-	expression tag	UNP P0DTC2
D	535	HIS	-	expression tag	UNP P0DTC2
D	536	HIS	-	expression tag	UNP P0DTC2
D	537	HIS	-	expression tag	UNP P0DTC2
E	531	GLY	-	expression tag	UNP P0DTC2
E	532	HIS	-	expression tag	UNP P0DTC2
E	533	HIS	-	expression tag	UNP P0DTC2
E	534	HIS	-	expression tag	UNP P0DTC2
E	535	HIS	-	expression tag	UNP P0DTC2
E	536	HIS	-	expression tag	UNP P0DTC2
E	537	HIS	-	expression tag	UNP P0DTC2
F	531	GLY	-	expression tag	UNP P0DTC2
F	532	HIS	-	expression tag	UNP P0DTC2
F	533	HIS	-	expression tag	UNP P0DTC2
F	534	HIS	-	expression tag	UNP P0DTC2
F	535	HIS	-	expression tag	UNP P0DTC2
F	536	HIS	-	expression tag	UNP P0DTC2
F	537	HIS	-	expression tag	UNP P0DTC2

- Molecule 2 is a protein called COVA2-15 antibody heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	227	Total	C	N	O	S	0	0	0
			1680	1055	282	335	8			
2	I	224	Total	C	N	O	S	0	0	0
			1659	1043	278	330	8			
2	K	225	Total	C	N	O	S	0	0	0
			1663	1045	279	331	8			
2	N	223	Total	C	N	O	S	0	0	0
			1653	1040	277	328	8			
2	P	224	Total	C	N	O	S	0	0	0
			1659	1043	278	330	8			
2	R	225	Total	C	N	O	S	0	0	0
			1657	1040	278	331	8			

- Molecule 3 is a protein called COVA2-15 antibody light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	L	219	Total	C	N	O	S	0	0	0
			1699	1058	295	339	7			
3	G	219	Total	C	N	O	S	0	0	0
			1699	1058	295	339	7			
3	J	218	Total	C	N	O	S	0	0	0
			1689	1052	293	338	6			
3	M	219	Total	C	N	O	S	0	0	0
			1699	1058	295	339	7			
3	O	219	Total	C	N	O	S	0	0	0
			1699	1058	295	339	7			
3	Q	218	Total	C	N	O	S	0	0	0
			1693	1055	294	338	6			

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: 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	C	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	D	1	Total	C	N	O	0	0
			14	8	1	5		
4	E	1	Total	C	N	O	0	0
			14	8	1	5		

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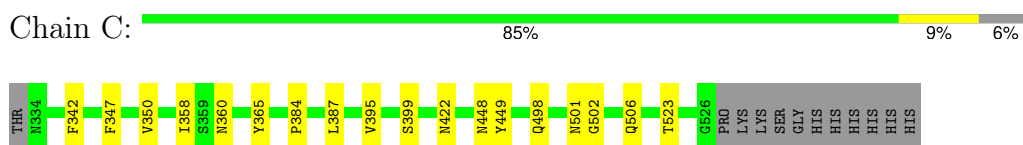| Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	F	1	Total	C	N	O	0	0
			14	8	1	5		

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.
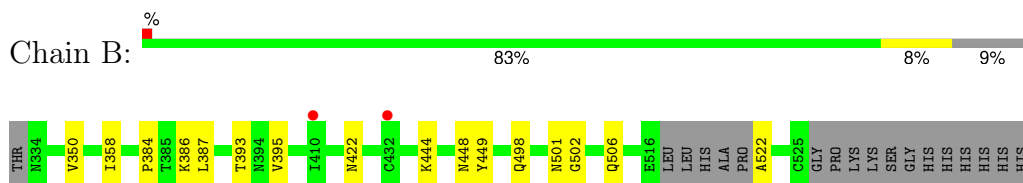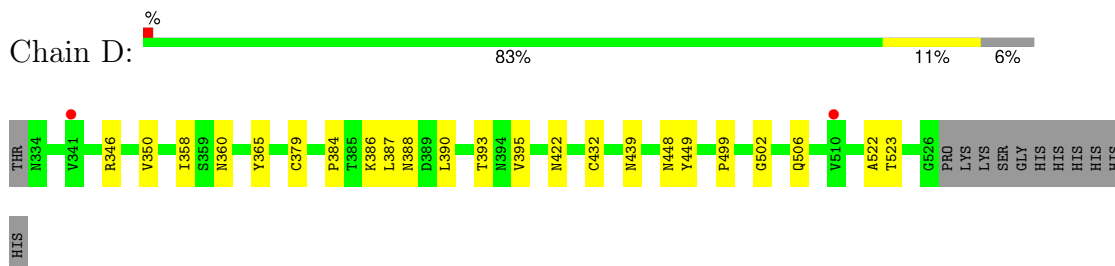
- Molecule 1: Spike protein S1
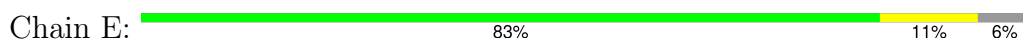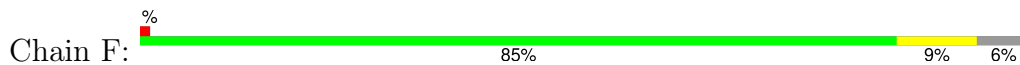
Chain A:

- Molecule 1: Spike protein S1

Chain C:

- Molecule 1: Spike protein S1

Chain B:

- Molecule 1: Spike protein S1

Chain D:

- Molecule 1: Spike protein S1

Chain E:

THR N334 V350 R355 I358 Y365 S366 N370 T376 F377 K378 C379 K386 L387 N388 D389 L390 V395 N422 C432 N440 K444 N448 Y449 K462 D467 I468 G526 PRO LYS SER GLY HIS HIS HIS HIS HIS

• Molecule 1: Spike protein S1

Chain F:

%

85%   9%   6%

THR N334 F338 V350 I358 S359 N360 Y365 K386 L387 N388 D389 L390 V395 V401 I418 N422 Y423 C432 N448 Y449 N450 K462 R509 T523 G526 PRO LYS LYS SER GLY HIS HIS HIS HIS HIS

• Molecule 2: COVA2-15 antibody heavy chain

Chain H: 78%   20%   •

Q1 L11 R19 C22 M34 S35 W36 A40 K43 W47 I51 S53 S56 R66 F67 T68 I69 L78 Y79 L80 Q81 M82 L82C D86 T87 K94 Y98 C99 G100 D100A D100B C100C Y100D I100E K100F R100I P100L D101 L108 V109 T110

P119 P126 S130 THR SER GLY G136 L140 L147 F148 P149 W157 V193 P194 Y206 I207 C208 P227 K228 SER CYS

• Molecule 2: COVA2-15 antibody heavy chain

Chain I: 75%   20%   • •

Q1 L11 V12 Q13 C22 Y32 A33 M34 A40 K43 W47 I51 S52 G52A S53 S56 T57 Y58 V63 R66 F67 T68 I69 L78 Q81 M82 L82C D86 T87 K94 D95 Y98 C99 G100 D100A D100B C100C Y100D I100E K100F R100I P100L

D101 G104 L108 V109 T110 P119 P126 S127 SER LYS SER THR SER GLY G136 L140 K145 D146 Y147 F148 P149 W157 A176 L187 C208 K228 SER CYS

• Molecule 2: COVA2-15 antibody heavy chain

Chain K:

2%

79%   17%   • •

Q1 L11 Y32 A33 M34 A40 K43 W47 I51 S52 G52A V63 R66 F67 T68 I69 L78 Q81 M82 L82C D86 T87 A93 K94 D95 T96 G97 Y98 C99 G100 C100C I100H R100I G100J G100K P100L D101 L108 V109 T110 T116 P119

S128 LYS SER THR SER GLY G136 Y147 F148 P149 E150 P151 A176 L187 S196 S197 L198 S215 K228 SER CYS

• Molecule 2: COVA2-15 antibody heavy chain

Chain N: 76%   19%   • •

Q1 L11 C22 M34 S35 W36 A40 K43 W47 I51 S52 G52A V63 R66 F67 T68 I69 L78 Y79 L80 Q81 M82 L82C D86 T87 A93 K94 D95 Y98 C99 G100 D100A D100B C100C Y100D I100E K100F L100G H100H R100I P100L D101 L108 V109
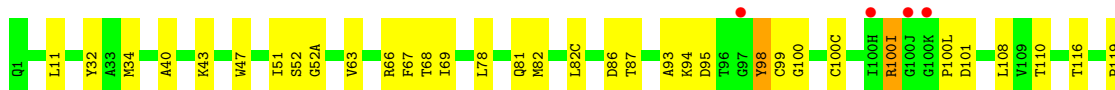
W O R L D W I D E
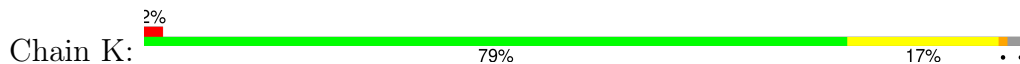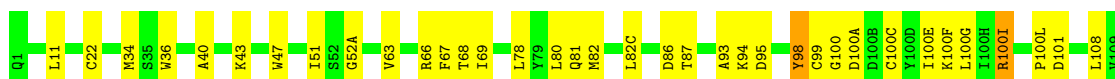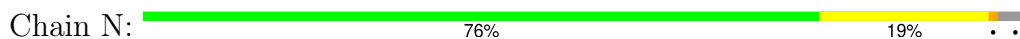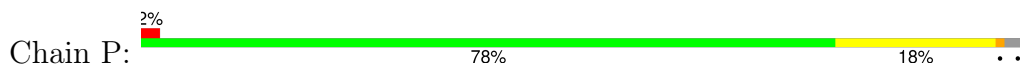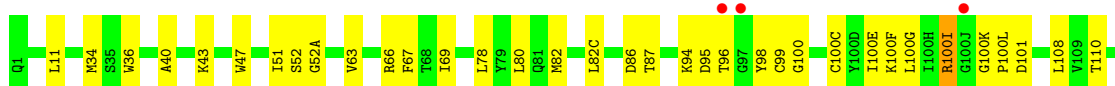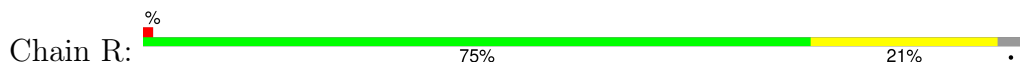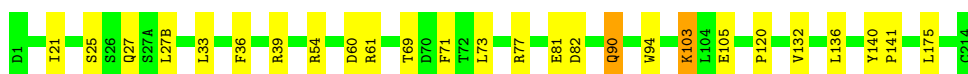wwPDB
PROTEIN DATA BANK

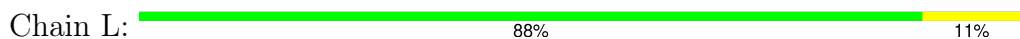- Molecule 2: COVA2-15 antibody heavy chain

Chain P:

- Molecule 2: COVA2-15 antibody heavy chain

Chain R:

- Molecule 3: COVA2-15 antibody light chain

Chain L:

- Molecule 3: COVA2-15 antibody light chain

Chain G:

- Molecule 3: COVA2-15 antibody light chain

Chain J:

- Molecule 3: COVA2-15 antibody light chain

Chain M:

D1 M4 T14 L27B L33 F36 Q37 Q38 R39 L47 F71 E81 D82 V83 Q90 K103 K107 Y140 P141 Q166 D185 K188 C214

• Molecule 3: COVA2-15 antibody light chain

Chain O:

90%   9%

D1 L27B F36 Q37 Q38 R39 S43 E81 D82 V83 Y86 Q90 W94 P95 K103 P113 P120 V132 F139 Y140 P141 Q147 L154 Q166 C214

• Molecule 3: COVA2-15 antibody light chain

Chain Q:

89%   11%

D1 S25 L27B N34 W35 F36 Q37 R46 L47 T69 Q90 W94 K103 I106 P113 P120 A130 S131 V132 F139 Y140 P141 Q147 W148 L154 T164 E165 Q166 E213 CYS

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	101.05Å 218.66Å 122.73Å 90.00° 112.34° 90.00°	Depositor
Resolution (Å)	33.14 – 3.38 33.14 – 3.38	Depositor EDS
% Data completeness (in resolution range)	98.7 (33.14-3.38) 98.6 (33.14-3.38)	Depositor EDS
R_{merge}	0.21	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.35 (at 3.39Å)	Xtriage
Refinement program	PHENIX (1.21rc1_5127: ???)	Depositor
R, R_{free}	0.242 , 0.295 0.243 , 0.294	Depositor DCC
R_{free} test set	3313 reflections (4.83%)	wwPDB-VP
Wilson B-factor (Å^2)	94.0	Xtriage
Anisotropy	0.156	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.29 , 68.8	EDS
L-test for twinning[2]	$< |L| > = 0.46, < L^2 > = 0.29$	Xtriage
Estimated twinning fraction	0.038 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.90	EDS
Total number of atoms	29362	wwPDB-VP
Average B, all atoms (Å^2)	113.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.84% of the height of the origin peak. No significant pseudotranslation is detected.*

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

5 Model quality (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	0.25	0/1572	0.48	0/2139
1	B	0.25	0/1527	0.46	0/2075
1	C	0.25	0/1572	0.48	0/2139
1	D	0.25	0/1569	0.47	0/2135
1	E	0.25	0/1572	0.47	0/2139
1	F	0.25	0/1572	0.47	0/2139
2	H	0.26	0/1718	0.52	0/2336
2	I	0.27	0/1697	0.51	0/2309
2	K	0.26	0/1701	0.49	0/2314
2	N	0.25	0/1691	0.49	0/2301
2	P	0.25	0/1697	0.50	0/2309
2	R	0.25	0/1695	0.50	0/2307
3	G	0.25	0/1736	0.50	0/2355
3	J	0.25	0/1726	0.49	0/2343
3	L	0.25	0/1736	0.50	0/2355
3	M	0.25	0/1736	0.49	0/2355
3	O	0.25	0/1736	0.48	0/2355
3	Q	0.25	0/1730	0.48	0/2347
All	All	0.25	0/29983	0.49	0/40752

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 (i)

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	1529	0	1445	21	0
1	B	1487	0	1400	10	0
1	C	1529	0	1445	11	0
1	D	1526	0	1436	14	0
1	E	1529	0	1445	16	0
1	F	1529	0	1445	13	0
2	H	1680	0	1634	33	0
2	I	1659	0	1611	32	0
2	K	1663	0	1612	29	0
2	N	1653	0	1606	31	0
2	P	1659	0	1611	31	0
2	R	1657	0	1594	37	0
3	G	1699	0	1648	17	0
3	J	1689	0	1632	18	0
3	L	1699	0	1648	15	0
3	M	1699	0	1648	10	0
3	O	1699	0	1648	12	0
3	Q	1693	0	1643	15	0
4	A	14	0	13	0	0
4	B	14	0	13	0	0
4	C	14	0	13	1	0
4	D	14	0	13	0	0
4	E	14	0	13	0	0
4	F	14	0	13	0	0
All	All	29362	0	28229	320	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

The worst 5 of 320 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:130:SER:HG	2:H:136:GLY:N	1.78	0.82
2:K:82:MET:HB3	2:K:82(C):LEU:HD21	1.63	0.80
2:P:82:MET:HB3	2:P:82(C):LEU:HD21	1.63	0.79
2:H:82:MET:HB3	2:H:82(C):LEU:HD21	1.63	0.79
2:I:82:MET:HB3	2:I:82(C):LEU:HD21	1.65	0.79

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	191/205 (93%)	186 (97%)	5 (3%)	0	100	100
1	B	183/205 (89%)	179 (98%)	4 (2%)	0	100	100
1	C	191/205 (93%)	187 (98%)	4 (2%)	0	100	100
1	D	191/205 (93%)	186 (97%)	5 (3%)	0	100	100
1	E	191/205 (93%)	187 (98%)	4 (2%)	0	100	100
1	F	191/205 (93%)	187 (98%)	4 (2%)	0	100	100
2	H	223/232 (96%)	217 (97%)	6 (3%)	0	100	100
2	I	220/232 (95%)	215 (98%)	5 (2%)	0	100	100
2	K	221/232 (95%)	215 (97%)	6 (3%)	0	100	100
2	N	219/232 (94%)	214 (98%)	5 (2%)	0	100	100
2	P	220/232 (95%)	215 (98%)	5 (2%)	0	100	100
2	R	221/232 (95%)	215 (97%)	6 (3%)	0	100	100
3	G	217/219 (99%)	213 (98%)	4 (2%)	0	100	100
3	J	216/219 (99%)	211 (98%)	5 (2%)	0	100	100
3	L	217/219 (99%)	212 (98%)	5 (2%)	0	100	100
3	M	217/219 (99%)	212 (98%)	5 (2%)	0	100	100
3	O	217/219 (99%)	213 (98%)	4 (2%)	0	100	100
3	Q	216/219 (99%)	212 (98%)	4 (2%)	0	100	100
All	All	3762/3936 (96%)	3676 (98%)	86 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	166/177 (94%)	166 (100%)	0	100	100
1	B	162/177 (92%)	161 (99%)	1 (1%)	84	91
1	C	166/177 (94%)	166 (100%)	0	100	100
1	D	165/177 (93%)	165 (100%)	0	100	100
1	E	166/177 (94%)	166 (100%)	0	100	100
1	F	166/177 (94%)	166 (100%)	0	100	100
2	H	186/190 (98%)	184 (99%)	2 (1%)	70	82
2	I	183/190 (96%)	179 (98%)	4 (2%)	47	69
2	K	183/190 (96%)	180 (98%)	3 (2%)	58	75
2	N	182/190 (96%)	179 (98%)	3 (2%)	58	75
2	P	183/190 (96%)	180 (98%)	3 (2%)	58	75
2	R	181/190 (95%)	179 (99%)	2 (1%)	70	82
3	G	195/195 (100%)	192 (98%)	3 (2%)	60	77
3	J	193/195 (99%)	191 (99%)	2 (1%)	73	84
3	L	195/195 (100%)	192 (98%)	3 (2%)	60	77
3	M	195/195 (100%)	193 (99%)	2 (1%)	73	84
3	O	195/195 (100%)	193 (99%)	2 (1%)	73	84
3	Q	194/195 (100%)	192 (99%)	2 (1%)	73	84
All	All	3256/3372 (97%)	3224 (99%)	32 (1%)	73	84

5 of 32 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	R	99	CYS
2	R	100(I)	ARG
1	B	386	LYS
3	G	103	LYS
3	Q	90	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
3	O	17	GLN

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Mol	Chain	Res	Type
2	R	172	HIS
3	Q	137	ASN
3	Q	50	GLN
3	J	17	GLN

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 ⓘ

6 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	E	1001	1	14,14,15	0.60	0	17,19,21	1.57	1 (5%)
4	NAG	B	1001	1	14,14,15	0.62	0	17,19,21	1.59	1 (5%)
4	NAG	A	1001	1	14,14,15	0.61	0	17,19,21	1.58	1 (5%)
4	NAG	F	1001	1	14,14,15	0.61	0	17,19,21	1.59	1 (5%)
4	NAG	D	1001	1	14,14,15	0.60	0	17,19,21	1.56	1 (5%)
4	NAG	C	601	1	14,14,15	0.69	0	17,19,21	2.18	4 (23%)

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	E	1001	1	-	4/6/23/26	0/1/1/1
4	NAG	B	1001	1	-	4/6/23/26	0/1/1/1
4	NAG	A	1001	1	-	4/6/23/26	0/1/1/1
4	NAG	F	1001	1	-	4/6/23/26	0/1/1/1
4	NAG	D	1001	1	-	4/6/23/26	0/1/1/1
4	NAG	C	601	1	-	3/6/23/26	0/1/1/1

There are no bond length outliers.

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	C	601	NAG	C1-O5-C5	5.54	119.61	112.19
4	F	1001	NAG	C1-O5-C5	5.53	119.59	112.19
4	B	1001	NAG	C1-O5-C5	5.46	119.51	112.19
4	D	1001	NAG	C1-O5-C5	5.43	119.46	112.19
4	A	1001	NAG	C1-O5-C5	5.43	119.46	112.19

There are no chirality outliers.

5 of 23 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	F	1001	NAG	O5-C5-C6-O6
4	A	1001	NAG	O5-C5-C6-O6
4	B	1001	NAG	O5-C5-C6-O6
4	D	1001	NAG	O5-C5-C6-O6
4	E	1001	NAG	O5-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	601	NAG	1	0

5.7 Other polymers ⓘ

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(Å²)	Q<0.9
1	A	193/205 (94%)	-0.48	0	100	100	37, 76, 152, 197	0
1	B	187/205 (91%)	0.21	2 (1%)	77	70	88, 133, 191, 209	0
1	C	193/205 (94%)	-0.38	0	100	100	46, 89, 148, 187	0
1	D	193/205 (94%)	-0.00	2 (1%)	79	71	73, 133, 200, 223	0
1	E	193/205 (94%)	-0.09	0	100	100	91, 140, 204, 216	0
1	F	193/205 (94%)	0.15	3 (1%)	70	62	107, 146, 189, 215	0
2	H	227/232 (97%)	-0.59	0	100	100	30, 58, 91, 142	0
2	I	224/232 (96%)	-0.54	0	100	100	35, 59, 89, 114	0
2	K	225/232 (96%)	-0.02	5 (2%)	62	53	83, 119, 145, 172	0
2	N	223/232 (96%)	-0.18	0	100	100	84, 130, 171, 187	0
2	P	224/232 (96%)	0.14	5 (2%)	62	53	81, 130, 176, 203	0
2	R	225/232 (96%)	0.05	3 (1%)	74	66	86, 141, 171, 193	0
3	G	219/219 (100%)	-0.44	0	100	100	45, 74, 103, 165	2 (0%)
3	J	218/219 (99%)	0.04	5 (2%)	61	51	73, 121, 150, 180	3 (1%)
3	L	219/219 (100%)	-0.46	0	100	100	38, 70, 110, 153	2 (0%)
3	M	219/219 (100%)	-0.12	0	100	100	84, 128, 158, 202	1 (0%)
3	O	219/219 (100%)	-0.19	1 (0%)	87	83	69, 115, 151, 184	2 (0%)
3	Q	218/219 (99%)	-0.01	0	100	100	79, 151, 185, 194	0
All	All	3812/3936 (96%)	-0.16	26 (0%)	84	78	30, 117, 176, 223	10 (0%)

The worst 5 of 26 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	432	CYS	4.6
2	K	128	SER	3.3
1	B	410	ILE	3.0

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Mol	Chain	Res	Type	RSRZ
2	R	97	GLY	3.0
2	K	100(J)	GLY	2.8

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	NAG	F	1001	14/15	0.49	0.14	126,167,186,200	0
4	NAG	E	1001	14/15	0.69	0.10	142,162,186,189	0
4	NAG	C	601	14/15	0.72	0.10	102,156,177,179	0
4	NAG	D	1001	14/15	0.80	0.10	121,161,174,183	0
4	NAG	B	1001	14/15	0.85	0.08	156,181,193,195	0
4	NAG	A	1001	14/15	0.86	0.07	75,116,133,140	0

6.5 Other polymers ⓘ

There are no such residues in this entry.