Full wwPDB X-ray Structure Validation Report ⓘ

Sep 2, 2025 – 01:33 AM JST

PDB ID	:	8ZRD / pdb_00008zrd
Title	:	The complex structure of SARS-CoV-2 RBD and llama single-domain antibody S4
Authors	:	Chen, L.
Deposited on	:	2024-06-04
Resolution	:	2.71 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:

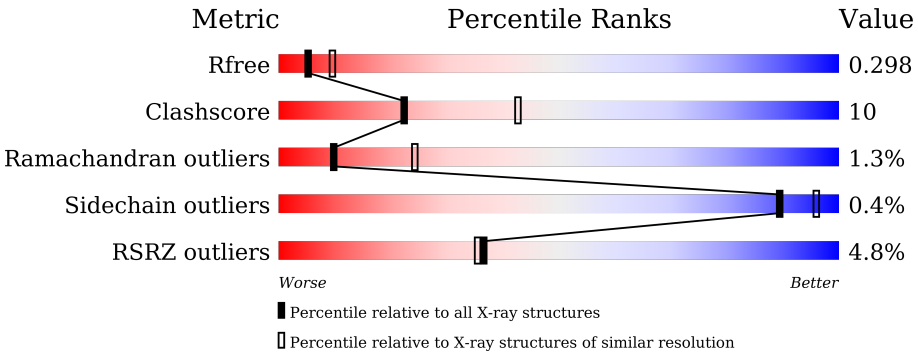
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.45.1

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 2.71 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	4050 (2.74-2.70)
Clashscore	180529	4439 (2.74-2.70)
Ramachandran outliers	177936	4374 (2.74-2.70)
Sidechain outliers	177891	4375 (2.74-2.70)
RSRZ outliers	164620	4050 (2.74-2.70)

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	220	7% 68% 17% • 14%
1	E	220	% 71% 16% 13%
2	C	144	% 74% 16% 10%
2	D	144	7% 53% 26% •• 19%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 4793 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	190	Total	C	N	O	S	0	0	0
			1456	934	244	271	7			
1	E	192	Total	C	N	O	S	0	0	0
			1448	928	245	267	8			

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	316	ALA	-	expression tag	UNP P0DTC2
A	317	ASP	-	expression tag	UNP P0DTC2
A	318	PRO	-	expression tag	UNP P0DTC2
A	530	HIS	-	expression tag	UNP P0DTC2
A	531	HIS	-	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
E	316	ALA	-	expression tag	UNP P0DTC2
E	317	ASP	-	expression tag	UNP P0DTC2
E	318	PRO	-	expression tag	UNP P0DTC2
E	530	HIS	-	expression tag	UNP P0DTC2
E	531	HIS	-	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

- Molecule 2 is a protein called llama single-domain antibody S4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	130	Total	C	N	O	S	0	0	0
			983	627	166	186	4			

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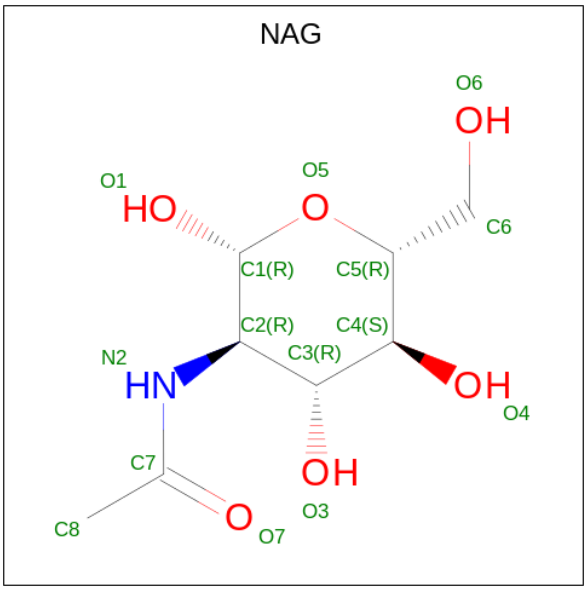
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	117	Total	C	N	O	S	0	0	0
			835	524	147	160	4			

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



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

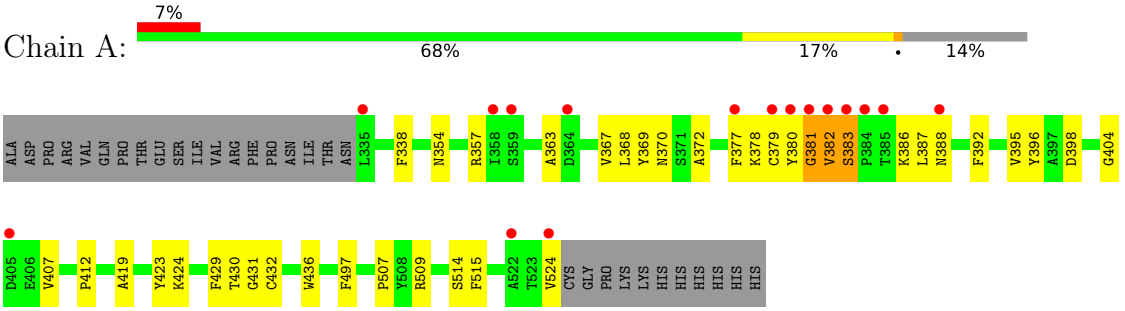
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	34	Total	O	0	0
			34	34		
4	D	2	Total	O	0	0
			2	2		
4	E	7	Total	O	0	0
			7	7		

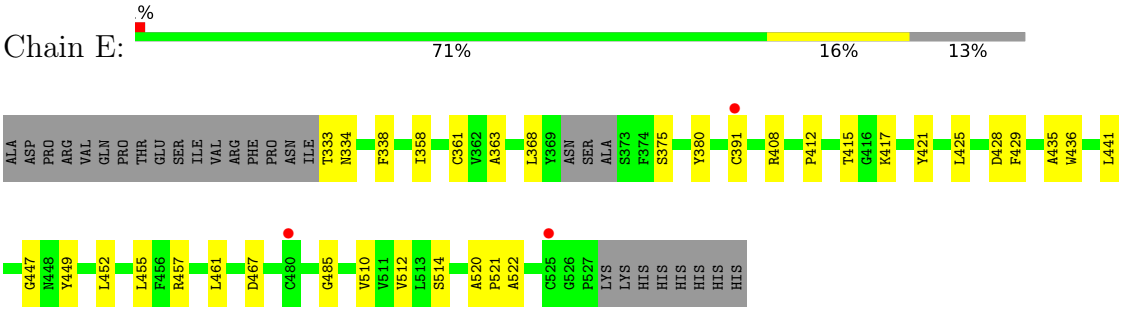
3 Residue-property plots

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.

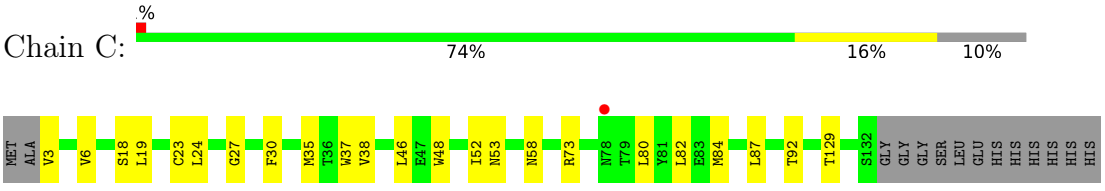
• Molecule 1: Spike protein S1



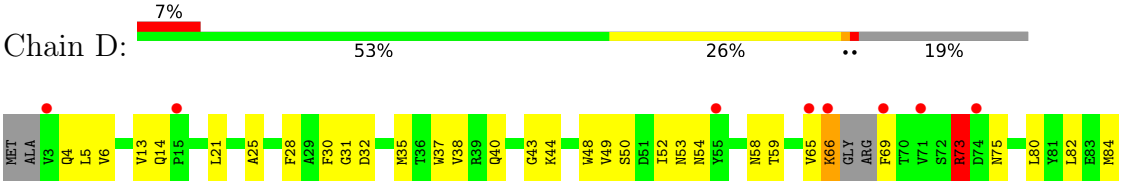
• Molecule 1: Spike protein S1

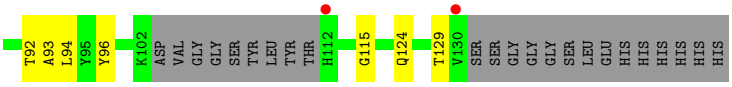


• Molecule 2: llama single-domain antibody S4



• Molecule 2: llama single-domain antibody S4




T92
A93
L94
Y95
Y96
K102
ASP
VAL
GLY
GLY
SER
TYR
LEU
TYR
THR
H112
G115
Q124
T129
V130
SER
SER
GLY
GLY
GLY
SER
LEU
GLU
HIS
HIS
HIS
HIS
HIS

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, α, β, γ	116.19Å 116.19Å 248.50Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	27.80 – 2.71 27.80 – 2.71	Depositor EDS
% Data completeness (in resolution range)	96.7 (27.80-2.71) 96.5 (27.80-2.71)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.70 (at 2.72Å)	Xtriage
Refinement program	PHENIX (1.14_3247: ???)	Depositor
R, R_{free}	0.235 , 0.295 0.241 , 0.298	Depositor DCC
R_{free} test set	1996 reflections (7.23%)	wwPDB-VP
Wilson B-factor (Å^2)	77.8	Xtriage
Anisotropy	0.129	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.28 , 40.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	4793	wwPDB-VP
Average B, all atoms (Å^2)	76.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.09% 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: 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	0.45	0/1497	0.67	0/2043
1	E	0.39	0/1489	0.57	0/2034
2	C	0.43	0/1010	0.63	0/1376
2	D	0.52	0/854	0.70	0/1162
All	All	0.44	0/4850	0.64	0/6615

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	D	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	D	73	ARG	Sidechain

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	1456	0	1304	31	0
1	E	1448	0	1284	23	0
2	C	983	0	891	13	0
2	D	835	0	703	28	0
3	A	14	0	13	3	0
3	E	14	0	13	0	0
4	A	34	0	0	3	0
4	D	2	0	0	0	0
4	E	7	0	0	1	0
All	All	4793	0	4208	93	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 10.

All (93) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:363:ALA:HB2	1:A:524:VAL:HG23	1.64	0.79
1:A:386:LYS:NZ	4:A:702:HOH:O	2.23	0.71
2:C:3:VAL:HG12	2:C:27:GLY:HA3	1.74	0.69
2:C:52:ILE:HD13	2:C:73:ARG:HB2	1.75	0.68
1:A:404:GLY:O	1:A:407:VAL:HG12	1.94	0.67
1:A:367:VAL:HG13	3:A:601:NAG:O3	1.95	0.66
2:C:84:MET:HE2	2:C:87:LEU:HD21	1.77	0.66
1:A:381:GLY:CA	1:A:430:THR:HA	2.25	0.66
1:E:457:ARG:HH21	1:E:461:LEU:HD23	1.60	0.65
1:A:381:GLY:HA2	1:A:430:THR:HA	1.78	0.64
1:A:372:ALA:HA	4:A:707:HOH:O	1.96	0.64
2:D:65:VAL:O	2:D:66:LYS:C	2.41	0.64
2:C:53:ASN:ND2	2:C:58:ASN:HB2	2.16	0.60
2:D:66:LYS:O	2:D:69:PHE:N	2.35	0.59
1:E:452:LEU:O	4:E:701:HOH:O	2.17	0.58
2:C:92:THR:HG23	2:C:129:THR:HA	1.87	0.57
2:D:31:GLY:HA2	2:D:75:ASN:OD1	2.05	0.57
2:C:6:VAL:HG23	2:C:24:LEU:HB3	1.87	0.56
1:A:379:CYS:HA	1:A:432:CYS:HA	1.88	0.55
1:E:408:ARG:NH2	1:E:415:THR:O	2.40	0.55
2:D:52:ILE:HG13	2:D:59:THR:HG22	1.89	0.54
2:C:23:CYS:HB3	2:C:80:LEU:HB3	1.89	0.54
2:C:35:MET:HB3	2:C:80:LEU:HD22	1.89	0.54
1:A:381:GLY:O	1:A:383:SER:N	2.41	0.54
2:D:25:ALA:HB1	2:D:28:PHE:CE1	2.41	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:520:ALA:HB1	1:E:521:PRO:HD2	1.90	0.54
2:D:53:ASN:ND2	2:D:58:ASN:OD1	2.41	0.53
1:A:377:PHE:O	1:A:377:PHE:HD1	1.92	0.53
2:D:32:ASP:N	2:D:32:ASP:OD1	2.40	0.53
1:E:333:THR:HG22	1:E:334:ASN:H	1.73	0.52
2:D:124:GLN:H	2:D:124:GLN:CD	2.16	0.52
1:A:338:PHE:HD2	3:A:601:NAG:H83	1.75	0.52
1:A:381:GLY:HA3	1:A:430:THR:HA	1.91	0.52
1:A:524:VAL:O	4:A:701:HOH:O	2.19	0.51
1:E:391:CYS:HB3	1:E:522:ALA:HB1	1.92	0.51
2:D:48:TRP:CD2	2:D:115:GLY:HA2	2.45	0.51
1:A:419:ALA:O	1:A:424:LYS:HB2	2.11	0.51
1:E:333:THR:HG22	1:E:334:ASN:OD1	2.11	0.50
2:C:46:LEU:HD13	1:E:485:GLY:HA2	1.93	0.50
1:A:363:ALA:CB	1:A:524:VAL:HG23	2.38	0.50
2:D:54:ASN:OD1	2:D:54:ASN:N	2.44	0.50
2:D:21:LEU:HD11	2:D:84:MET:HE2	1.95	0.49
1:A:431:GLY:HA2	1:A:515:PHE:CE2	2.46	0.49
1:A:392:PHE:HB2	1:A:524:VAL:HG13	1.94	0.49
2:D:21:LEU:HD12	2:D:82:LEU:HD23	1.94	0.48
2:D:92:THR:HG23	2:D:129:THR:HA	1.96	0.48
1:E:429:PHE:HE1	1:E:514:SER:HB3	1.78	0.48
1:E:375:SER:HB3	1:E:436:TRP:HA	1.95	0.48
2:D:6:VAL:HG23	2:D:124:GLN:NE2	2.28	0.48
2:C:30:PHE:O	2:C:73:ARG:NH2	2.47	0.48
1:E:338:PHE:HE2	1:E:363:ALA:HB1	1.78	0.48
1:A:378:LYS:HE3	1:A:380:TYR:HE2	1.78	0.47
1:E:457:ARG:NH1	1:E:467:ASP:OD2	2.48	0.47
1:A:392:PHE:O	1:A:524:VAL:HG12	2.15	0.47
2:D:38:VAL:HG23	2:D:96:TYR:HB2	1.97	0.47
2:C:37:TRP:CE2	2:C:82:LEU:HB2	2.51	0.46
2:D:94:LEU:HD23	2:D:96:TYR:CZ	2.50	0.46
1:A:377:PHE:O	1:A:377:PHE:CD1	2.69	0.46
1:A:368:LEU:C	1:A:370:ASN:H	2.25	0.45
2:D:43:GLY:O	2:D:44:LYS:HD3	2.17	0.45
2:C:38:VAL:HG12	2:C:48:TRP:HA	1.97	0.45
2:D:94:LEU:HD23	2:D:96:TYR:CE2	2.51	0.45
1:A:429:PHE:HE1	1:A:514:SER:HB3	1.82	0.44
1:E:435:ALA:HB2	1:E:510:VAL:HG22	1.99	0.44
1:A:357:ARG:HG3	1:A:396:TYR:CE1	2.52	0.44
2:D:13:VAL:HG12	2:D:14:GLN:H	1.82	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:421:TYR:CD1	1:E:457:ARG:HB3	2.52	0.44
1:A:419:ALA:HA	1:A:423:TYR:O	2.18	0.43
2:D:37:TRP:NE1	2:D:82:LEU:HB2	2.33	0.43
1:A:368:LEU:O	1:A:370:ASN:N	2.50	0.43
1:A:380:TYR:O	1:A:382:VAL:N	2.52	0.43
1:E:425:LEU:HD21	1:E:512:VAL:HG11	2.01	0.43
1:A:436:TRP:CZ2	1:A:509:ARG:HD3	2.54	0.43
1:E:447:GLY:HA3	1:E:449:TYR:HE2	1.83	0.43
1:E:380:TYR:CE2	1:E:412:PRO:HD2	2.54	0.43
1:E:417:LYS:HD3	1:E:455:LEU:HD23	2.00	0.42
2:D:35:MET:HB3	2:D:80:LEU:HD22	2.00	0.42
1:E:457:ARG:NH2	1:E:461:LEU:HD23	2.30	0.42
1:A:354:ASN:O	1:A:398:ASP:HA	2.19	0.42
2:D:49:VAL:HG12	2:D:50:SER:OG	2.19	0.42
1:E:428:ASP:OD1	1:E:428:ASP:N	2.52	0.42
2:D:124:GLN:OE1	2:D:124:GLN:N	2.53	0.42
1:E:447:GLY:HA3	1:E:449:TYR:CE2	2.55	0.42
2:D:4:GLN:O	2:D:5:LEU:HD12	2.20	0.42
2:D:6:VAL:HA	2:D:124:GLN:HE22	1.85	0.42
2:D:44:LYS:NZ	1:E:441:LEU:O	2.45	0.41
1:A:338:PHE:CD2	3:A:601:NAG:H83	2.55	0.41
1:A:395:VAL:HG23	1:A:524:VAL:HG11	2.01	0.41
2:C:18:SER:O	2:C:19:LEU:HG	2.20	0.41
1:E:358:ILE:HG22	1:E:361:CYS:SG	2.61	0.41
1:A:497:PHE:CE2	1:A:507:PRO:HB3	2.56	0.40
2:D:30:PHE:O	2:D:73:ARG:NH2	2.55	0.40
2:D:40:GLN:C	2:D:93:ALA:HB1	2.47	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	188/220 (86%)	163 (87%)	18 (10%)	7 (4%)	2 5
1	E	188/220 (86%)	173 (92%)	14 (7%)	1 (0%)	25 47
2	C	128/144 (89%)	123 (96%)	5 (4%)	0	100 100
2	D	111/144 (77%)	101 (91%)	10 (9%)	0	100 100
All	All	615/728 (84%)	560 (91%)	47 (8%)	8 (1%)	10 24

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	383	SER
1	A	388	ASN
1	A	381	GLY
1	A	382	VAL
1	A	387	LEU
1	A	412	PRO
1	A	369	TYR
1	E	368	LEU

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	144/192 (75%)	144 (100%)	0	100 100
1	E	141/192 (73%)	141 (100%)	0	100 100
2	C	96/118 (81%)	96 (100%)	0	100 100
2	D	73/118 (62%)	71 (97%)	2 (3%)	40 68
All	All	454/620 (73%)	452 (100%)	2 (0%)	89 96

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	66	LYS
2	D	73	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	450	ASN
2	C	4	GLN
2	C	33	HIS
2	C	75	ASN
2	D	33	HIS
1	E	394	ASN
1	E	474	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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

2 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	$\#\|Z\| > 2$
3	NAG	A	601	-	14,14,15	0.85	1 (7%)	17,19,21	1.43	3 (17%)
3	NAG	E	601	-	14,14,15	0.45	0	17,19,21	0.72	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
3	NAG	A	601	-	-	3/6/23/26	0/1/1/1
3	NAG	E	601	-	-	0/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	601	NAG	O5-C1	2.55	1.47	1.43

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	601	NAG	C1-O5-C5	3.93	117.52	112.19
3	A	601	NAG	C2-N2-C7	3.22	127.48	122.90
3	A	601	NAG	C1-C2-N2	2.36	114.51	110.49
3	E	601	NAG	C1-O5-C5	2.29	115.30	112.19

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	601	NAG	C1-C2-N2-C7
3	A	601	NAG	C4-C5-C6-O6
3	A	601	NAG	O5-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	601	NAG	3	0

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	190/220 (86%)	0.55	16 (8%)	18	18	54, 76, 98, 107	0
1	E	192/220 (87%)	0.27	3 (1%)	70	70	48, 75, 102, 105	0
2	C	130/144 (90%)	0.30	1 (0%)	82	82	55, 73, 91, 97	0
2	D	117/144 (81%)	0.72	10 (8%)	18	17	30, 83, 101, 110	0
All	All	629/728 (86%)	0.44	30 (4%)	36	35	30, 77, 100, 110	0

All (30) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	65	VAL	4.3
2	D	66	LYS	3.5
1	A	382	VAL	3.4
2	D	69	PHE	3.4
1	A	383	SER	3.2
1	A	384	PRO	3.1
1	A	359	SER	3.0
2	D	3	VAL	3.0
1	A	524	VAL	2.9
2	D	112	HIS	2.8
1	A	522	ALA	2.8
2	C	78	ASN	2.6
1	E	525	CYS	2.6
2	D	74	ASP	2.6
1	A	335	LEU	2.6
2	D	71	VAL	2.6
1	A	377	PHE	2.5
1	A	358	ILE	2.5
1	A	380	TYR	2.5
2	D	15	PRO	2.4
1	A	379	CYS	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	388	ASN	2.4
1	A	385	THR	2.3
1	A	364	ASP	2.3
2	D	130	VAL	2.3
2	D	55	TYR	2.2
1	A	381	GLY	2.2
1	E	480	CYS	2.1
1	A	405	ASP	2.1
1	E	391	CYS	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, 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
3	NAG	A	601	14/15	0.69	0.16	106,126,138,141	0
3	NAG	E	601	14/15	0.75	0.14	95,112,123,129	0

6.5 Other polymers (i)

There are no such residues in this entry.