



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 27, 2021 – 08:13 am GMT

PDB ID : 7NEH  
Title : Crystal structure of the receptor binding domain of SARS-CoV-2 Spike glycoprotein in complex with COVOX-269 Fab  
Authors : Zhou, D.; Ren, J.; Stuart, D.  
Deposited on : 2021-02-04  
Resolution : 1.77 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](mailto: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.

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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 : 2.18  
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) : 2.18

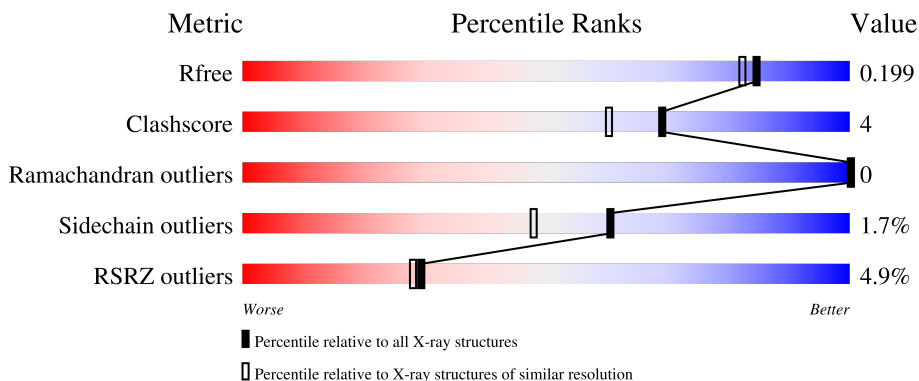
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

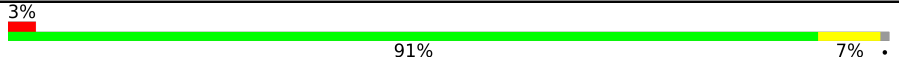
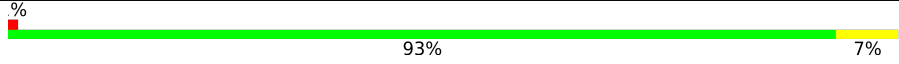
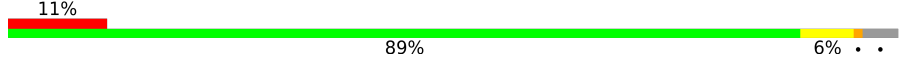
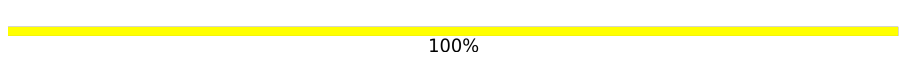
The reported resolution of this entry is 1.77 Å.

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	9185 (1.80-1.76)
Clashscore	141614	10184 (1.80-1.76)
Ramachandran outliers	138981	10051 (1.80-1.76)
Sidechain outliers	138945	10050 (1.80-1.76)
RSRZ outliers	127900	9032 (1.80-1.76)

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  $\geq 3$ , 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	H	222	 3% 91% 7%
2	L	215	 % 93% 7%
3	E	205	 11% 89% 6%
4	A	3	 100%

## 2 Entry composition i

There are 10 unique types of molecules in this entry. The entry contains 5460 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 COVOX-269 Fab heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	H	219	1630	1024	276	322	8	0	0	0

- Molecule 2 is a protein called COVOX-269 fab light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	L	215	1644	1035	273	331	5	0	1	0

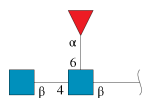
- Molecule 3 is a protein called Spike glycoprotein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	E	196	1551	993	260	290	8	0	0	0

There are 10 discrepancies between the modelled and reference sequences:

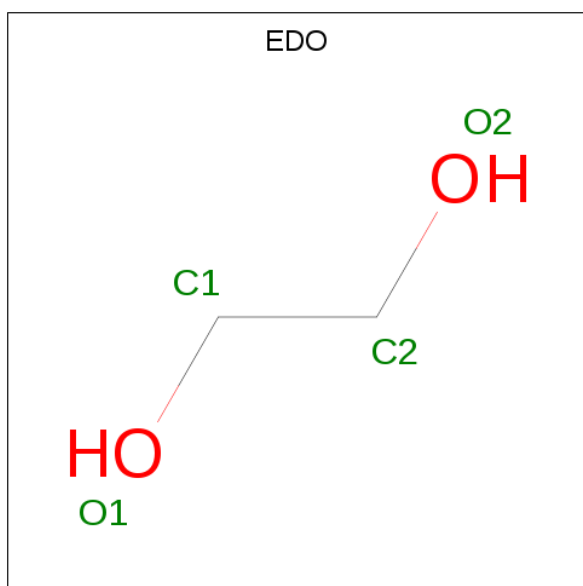
Chain	Residue	Modelled	Actual	Comment	Reference
E	324	GLU	-	expression tag	UNP P0DTC2
E	325	THR	-	expression tag	UNP P0DTC2
E	326	GLY	-	expression tag	UNP P0DTC2
E	327	HIS	-	expression tag	UNP P0DTC2
E	328	HIS	-	expression tag	UNP P0DTC2
E	329	HIS	-	expression tag	UNP P0DTC2
E	330	HIS	-	expression tag	UNP P0DTC2
E	331	HIS	-	expression tag	UNP P0DTC2
E	332	HIS	-	expression tag	UNP P0DTC2
E	527	LYS	PRO	engineered mutation	UNP P0DTC2

- Molecule 4 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace	
			Total	C	N				O
4	A	3	38	22	2	14	0	0	0

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



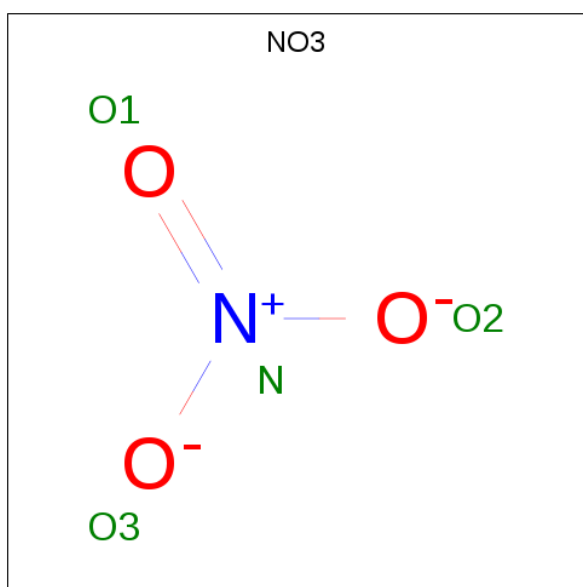
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
5	H	1	4	2	2	0	0
5	H	1	4	2	2	0	0
5	H	1	4	2	2	0	0
5	H	1	4	2	2	0	0
5	H	1	4	2	2	0	0
5	H	1	4	2	2	0	0
5	L	1	4	2	2	0	0
5	L	1	4	2	2	0	0

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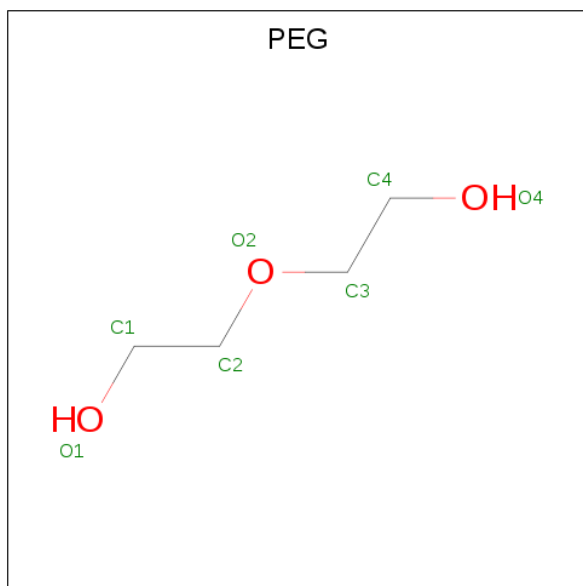
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	L	1	Total C O 4 2 2	0	0
5	L	1	Total C O 4 2 2	0	0
5	L	1	Total C O 4 2 2	0	0
5	L	1	Total C O 4 2 2	0	0
5	E	1	Total C O 4 2 2	0	0
5	E	1	Total C O 4 2 2	0	0
5	E	1	Total C O 4 2 2	0	0
5	E	1	Total C O 4 2 2	0	0
5	E	1	Total C O 4 2 2	0	0
5	E	1	Total C O 4 2 2	0	0
5	E	1	Total C O 4 2 2	0	0
5	E	1	Total C O 4 2 2	0	0

- Molecule 6 is NITRATE ION (three-letter code: NO3) (formula: NO<sub>3</sub>).



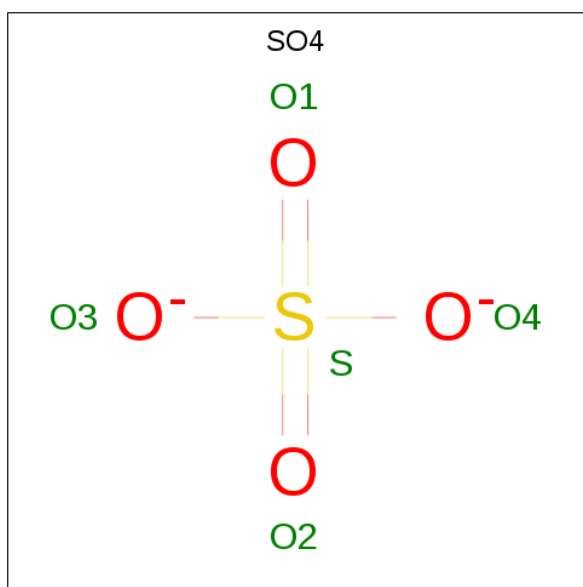
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	H	1	Total	N	O	0	0
			4	1	3		
6	L	1	Total	N	O	0	0
			4	1	3		
6	E	1	Total	N	O	0	0
			4	1	3		

- Molecule 7 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	L	1	Total	C	O	0	0
			7	4	3		

- Molecule 8 is SULFATE ION (three-letter code: SO<sub>4</sub>) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	L	1	Total	O S	0	0
			5	4 1		

- Molecule 9 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	E	1	Total	Cl	0	0
			1	1		

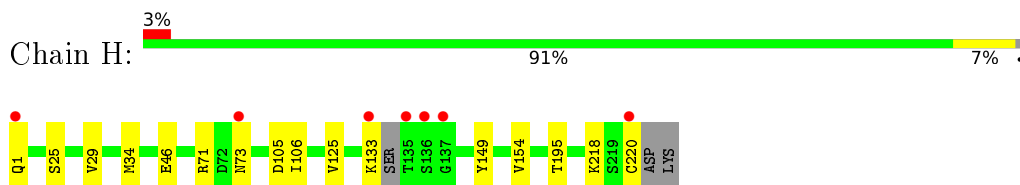
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	H	242	Total	O	0	0
			242	242		
10	L	163	Total	O	0	0
			163	163		
10	E	91	Total	O	0	0
			91	91		

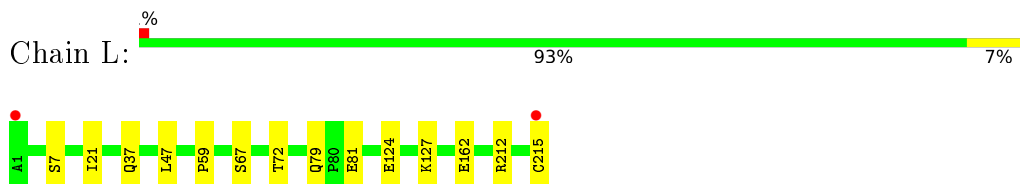
### 3 Residue-property plots [\(i\)](#)

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.

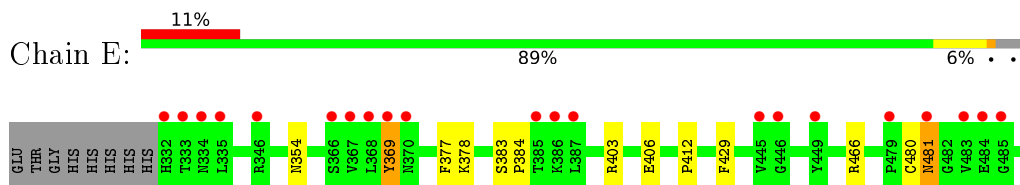
- Molecule 1: COVOX-269 Fab heavy chain



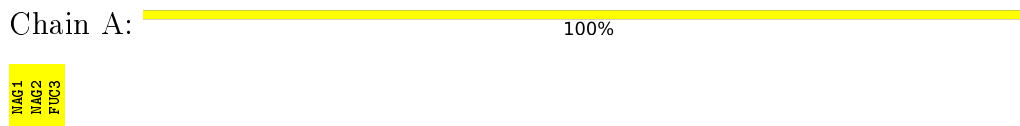
- Molecule 2: COVOX-269 fab light chain



- Molecule 3: Spike glycoprotein



- Molecule 4: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	82.81Å 149.71Å 145.91Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	42.74 – 1.77 74.86 – 1.77	Depositor EDS
% Data completeness (in resolution range)	99.7 (42.74-1.77) 99.7 (74.86-1.77)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	0.98 (at 1.77Å)	Xtriage
Refinement program	PHENIX 1.19_4092	Depositor
R, $R_{free}$	0.188 , 0.198 0.189 , 0.199	Depositor DCC
$R_{free}$ test set	4329 reflections (4.91%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	37.2	Xtriage
Anisotropy	0.172	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 44.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.011 for 1/2*h-1/2*k,-3/2*h-1/2*k,-l 0.024 for 1/2*h+1/2*k,3/2*h-1/2*k,-l	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	5460	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	49.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.02% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup> Intensities estimated from amplitudes.

<sup>2</sup> Theoretical 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: PEG, NO3, FUC, EDO, CL, NAG, SO4

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	H	0.28	0/1665	0.54	0/2262
2	L	0.29	0/1684	0.54	0/2289
3	E	0.28	0/1595	0.51	0/2171
All	All	0.28	0/4944	0.53	0/6722

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	H	1630	0	1604	13	0
2	L	1644	0	1608	10	0
3	E	1551	0	1461	8	0
4	A	38	0	34	2	0
5	E	28	0	42	5	0
5	H	24	0	36	5	0
5	L	24	0	35	3	0
6	E	4	0	0	1	0
6	H	4	0	0	0	0
6	L	4	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	L	7	0	10	1	0
8	L	5	0	0	0	0
9	E	1	0	0	1	0
10	E	91	0	0	2	1
10	H	242	0	0	5	3
10	L	163	0	0	2	0
All	All	5460	0	4830	36	3

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 4.

All (36) 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:H:218:LYS:O	10:H:501:HOH:O	2.01	0.78
1:H:73:ASN:ND2	10:H:502:HOH:O	2.15	0.77
4:A:1:NAG:H61	4:A:2:NAG:HN2	1.53	0.72
3:E:466:ARG:HD3	5:E:907:EDO:H21	1.75	0.67
9:E:909:CL:CL	10:E:1090:HOH:O	2.50	0.66
5:E:906:EDO:O2	10:E:1001:HOH:O	2.13	0.66
2:L:212:ARG:HH11	5:L:303:EDO:H21	1.61	0.65
2:L:59:PRO:HB3	7:L:305:PEG:H31	1.79	0.64
1:H:71:ARG:HH21	5:H:401:EDO:H21	1.66	0.61
2:L:162:GLU:OE2	10:L:401:HOH:O	2.16	0.59
1:H:125:VAL:H	5:H:407:EDO:H12	1.67	0.57
4:A:1:NAG:H61	4:A:2:NAG:N2	2.19	0.57
2:L:79:GLN:OE1	10:L:402:HOH:O	2.18	0.56
1:H:133:LYS:NZ	10:H:506:HOH:O	2.32	0.55
3:E:406:GLU:HG2	5:E:906:EDO:H21	1.90	0.54
3:E:480:CYS:O	3:E:481:ASN:ND2	2.41	0.54
2:L:124:GLU:O	2:L:127:LYS:HG2	2.09	0.53
1:H:46:GLU:OE2	10:H:504:HOH:O	2.20	0.47
1:H:195:THR:OG1	10:H:503:HOH:O	2.21	0.46
3:E:378:LYS:HG2	5:E:908:EDO:H21	1.99	0.44
2:L:37:GLN:HB2	2:L:47:LEU:HD11	1.99	0.44
1:H:125:VAL:N	5:H:407:EDO:H12	2.33	0.44
1:H:25:SER:HA	5:H:406:EDO:H22	2.00	0.44
1:H:149:TYR:CE1	1:H:154:VAL:HG13	2.53	0.43
1:H:220:CYS:HB2	2:L:215:CYS:SG	2.58	0.43
2:L:162:GLU:OE2	5:L:306:EDO:O1	2.30	0.43
5:E:903:EDO:O1	6:E:905:NO3:O3	2.34	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:E:412:PRO:HG3	3:E:429:PHE:HB3	2.01	0.43
3:E:481:ASN:ND2	3:E:481:ASN:O	2.41	0.42
3:E:369:TYR:CE2	3:E:384:PRO:HB2	2.55	0.42
3:E:403:ARG:HG3	3:E:495:TYR:CE1	2.55	0.42
5:H:402:EDO:H21	5:H:403:EDO:O1	2.20	0.42
1:H:105:ASP:CG	1:H:106:ILE:HD12	2.40	0.42
1:H:29:VAL:HG13	1:H:34:MET:HG3	2.02	0.41
2:L:212:ARG:HD2	5:L:303:EDO:H21	2.02	0.40
2:L:21:ILE:O	2:L:72:THR:HA	2.20	0.40

All (3) 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)
10:H:503:HOH:O	10:H:503:HOH:O[3_554]	2.08	0.12
10:H:696:HOH:O	10:H:730:HOH:O[3_554]	2.10	0.10
10:H:669:HOH:O	10:E:1083:HOH:O[8_455]	2.11	0.09

## 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	H	215/222 (97%)	213 (99%)	2 (1%)	0	100	100
2	L	214/215 (100%)	208 (97%)	6 (3%)	0	100	100
3	E	194/205 (95%)	183 (94%)	11 (6%)	0	100	100
All	All	623/642 (97%)	604 (97%)	19 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 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	H	184/187 (98%)	183 (100%)	1 (0%)	88	86
2	L	187/186 (100%)	184 (98%)	3 (2%)	62	51
3	E	168/177 (95%)	163 (97%)	5 (3%)	41	24
All	All	539/550 (98%)	530 (98%)	9 (2%)	60	48

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	H	1	GLN
2	L	7	SER
2	L	67	SER
2	L	81	GLU
3	E	354	ASN
3	E	369	TYR
3	E	377	PHE
3	E	383	SER
3	E	481	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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](#)

3 monosaccharides 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	1	4,3	14,14,15	0.61	0	17,19,21	0.58	0
4	NAG	A	2	4	14,14,15	0.46	0	17,19,21	0.43	0
4	FUC	A	3	4	10,10,11	1.10	1 (10%)	14,14,16	1.01	1 (7%)

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	1	4,3	-	2/6/23/26	0/1/1/1
4	NAG	A	2	4	-	0/6/23/26	0/1/1/1
4	FUC	A	3	4	-	-	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	3	FUC	O5-C1	-2.54	1.39	1.43

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	3	FUC	C1-C2-C3	-2.31	106.83	109.67

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	1	NAG	O5-C5-C6-O6
4	A	1	NAG	C4-C5-C6-O6

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	2	NAG	2	0
4	A	1	NAG	2	0

## 5.6 Ligand geometry [i](#)

Of 25 ligands modelled in this entry, 1 is monoatomic - leaving 24 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	$\# Z  > 2$
5	EDO	E	901	-	3,3,3	0.45	0	2,2,2	0.37	0
5	EDO	H	401	-	3,3,3	0.45	0	2,2,2	0.37	0
5	EDO	L	303	-	3,3,3	0.43	0	2,2,2	0.33	0
6	NO3	L	304	-	1,3,3	0.62	0	0,3,3	0.00	-
5	EDO	E	903	-	3,3,3	0.44	0	2,2,2	0.37	0
5	EDO	E	904	-	3,3,3	0.46	0	2,2,2	0.37	0
6	NO3	E	905	-	1,3,3	0.64	0	0,3,3	0.00	-
5	EDO	E	906	-	3,3,3	0.42	0	2,2,2	0.24	0
7	PEG	L	305	-	6,6,6	0.16	0	5,5,5	0.17	0
5	EDO	E	908	-	3,3,3	0.45	0	2,2,2	0.23	0
5	EDO	H	405	-	3,3,3	0.43	0	2,2,2	0.33	0
8	SO4	L	309	-	4,4,4	0.14	0	6,6,6	0.05	0
5	EDO	H	403	-	3,3,3	0.44	0	2,2,2	0.28	0
5	EDO	H	402	-	3,3,3	0.41	0	2,2,2	0.45	0
5	EDO	E	907	-	3,3,3	0.46	0	2,2,2	0.21	0
6	NO3	H	404	-	1,3,3	0.62	0	0,3,3	0.00	-
5	EDO	L	307	-	3,3,3	0.42	0	2,2,2	0.35	0
5	EDO	L	306	-	3,3,3	0.39	0	2,2,2	0.42	0
5	EDO	H	406	-	3,3,3	0.44	0	2,2,2	0.31	0
5	EDO	E	902	-	3,3,3	0.45	0	2,2,2	0.31	0
5	EDO	L	301	-	3,3,3	0.40	0	2,2,2	0.38	0
5	EDO	L	308	2	3,3,3	0.44	0	2,2,2	0.34	0
5	EDO	L	302	-	3,3,3	0.45	0	2,2,2	0.30	0
5	EDO	H	407	-	3,3,3	0.43	0	2,2,2	0.24	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
5	EDO	E	901	-	-	1/1/1/1	-
5	EDO	H	401	-	-	0/1/1/1	-
5	EDO	L	303	-	-	0/1/1/1	-
5	EDO	E	903	-	-	0/1/1/1	-
5	EDO	E	904	-	-	1/1/1/1	-
5	EDO	E	906	-	-	0/1/1/1	-
7	PEG	L	305	-	-	3/4/4/4	-
5	EDO	E	908	-	-	0/1/1/1	-
5	EDO	H	405	-	-	0/1/1/1	-
5	EDO	H	403	-	-	0/1/1/1	-
5	EDO	H	402	-	-	0/1/1/1	-
5	EDO	E	907	-	-	1/1/1/1	-
5	EDO	L	307	-	-	0/1/1/1	-
5	EDO	L	306	-	-	1/1/1/1	-
5	EDO	H	406	-	-	1/1/1/1	-
5	EDO	E	902	-	-	0/1/1/1	-
5	EDO	L	301	-	-	0/1/1/1	-
5	EDO	L	308	2	-	0/1/1/1	-
5	EDO	L	302	-	-	0/1/1/1	-
5	EDO	H	407	-	-	0/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	L	305	PEG	O1-C1-C2-O2
7	L	305	PEG	O2-C3-C4-O4
5	L	306	EDO	O1-C1-C2-O2
5	E	901	EDO	O1-C1-C2-O2
5	H	406	EDO	O1-C1-C2-O2
5	E	904	EDO	O1-C1-C2-O2
5	E	907	EDO	O1-C1-C2-O2
7	L	305	PEG	C1-C2-O2-C3

There are no ring outliers.

13 monomers are involved in 14 short contacts:



Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	H	401	EDO	1	0
5	L	303	EDO	2	0
5	E	903	EDO	1	0
6	E	905	NO3	1	0
5	E	906	EDO	2	0
7	L	305	PEG	1	0
5	E	908	EDO	1	0
5	H	403	EDO	1	0
5	H	402	EDO	1	0
5	E	907	EDO	1	0
5	L	306	EDO	1	0
5	H	406	EDO	1	0
5	H	407	EDO	2	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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	H	219/222 (98%)	0.35	7 (3%) 47 46	28, 40, 67, 106	0
2	L	215/215 (100%)	0.22	2 (0%) 84 84	32, 46, 64, 93	0
3	E	196/205 (95%)	0.62	22 (11%) 5 5	36, 55, 85, 109	0
All	All	630/642 (98%)	0.39	31 (4%) 29 28	28, 46, 79, 109	0

All (31) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	E	333	THR	6.9
1	H	136	SER	6.5
3	E	527	LYS	5.7
3	E	445	VAL	5.7
1	H	220	CYS	5.4
2	L	215	CYS	5.0
1	H	135	THR	4.7
1	H	1	GLN	4.5
3	E	449	TYR	4.5
3	E	385	THR	4.3
3	E	335	LEU	4.3
3	E	366	SER	3.7
3	E	369	TYR	3.6
3	E	481	ASN	3.4
3	E	387	LEU	3.1
1	H	133	LYS	3.0
3	E	370	ASN	3.0
1	H	137	GLY	2.9
3	E	479	PRO	2.8
3	E	484	GLU	2.7
3	E	332	HIS	2.6
3	E	483	VAL	2.5
2	L	1	ALA	2.4

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Mol	Chain	Res	Type	RSRZ
3	E	346	ARG	2.4
3	E	367	VAL	2.3
3	E	386	LYS	2.3
3	E	368	LEU	2.1
3	E	446	GLY	2.1
3	E	485	GLY	2.1
1	H	73	ASN	2.1
3	E	334	ASN	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](#)

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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
4	NAG	A	2	14/15	0.72	0.34	102,107,113,115	0
4	FUC	A	3	10/11	0.82	0.29	89,98,100,102	0
4	NAG	A	1	14/15	0.88	0.16	68,80,98,100	0

## 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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
5	EDO	L	306	4/4	0.51	0.21	55,57,66,68	0
7	PEG	L	305	7/7	0.52	0.23	64,74,77,81	0
5	EDO	H	401	4/4	0.68	0.19	63,65,71,73	0
5	EDO	E	907	4/4	0.70	0.32	51,56,58,61	0
5	EDO	H	406	4/4	0.71	0.12	64,68,70,78	0
6	NO3	H	404	4/4	0.75	0.32	64,64,67,74	0
5	EDO	H	405	4/4	0.76	0.16	44,51,57,60	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	EDO	L	308	4/4	0.78	0.18	55,60,68,74	0
5	EDO	E	908	4/4	0.79	0.19	64,66,70,72	0
6	NO3	L	304	4/4	0.80	0.31	51,66,67,72	0
8	SO4	L	309	5/5	0.82	0.32	100,110,137,150	0
6	NO3	E	905	4/4	0.83	0.23	56,68,71,76	0
5	EDO	L	307	4/4	0.86	0.19	52,53,54,62	0
5	EDO	E	906	4/4	0.87	0.53	55,60,62,67	0
5	EDO	L	303	4/4	0.87	0.21	51,59,60,72	0
5	EDO	L	301	4/4	0.88	0.14	36,42,43,44	0
9	CL	E	909	1/1	0.89	0.09	72,72,72,72	0
5	EDO	E	903	4/4	0.90	0.16	65,68,69,69	0
5	EDO	E	902	4/4	0.91	0.15	48,57,57,69	0
5	EDO	H	407	4/4	0.92	0.21	41,49,52,60	0
5	EDO	E	901	4/4	0.93	0.12	51,53,60,64	0
5	EDO	E	904	4/4	0.94	0.08	56,59,63,65	0
5	EDO	H	402	4/4	0.95	0.12	44,47,48,51	0
5	EDO	L	302	4/4	0.96	0.09	46,52,55,62	0
5	EDO	H	403	4/4	0.97	0.13	44,45,48,53	0

## 6.5 Other polymers

There are no such residues in this entry.