Full wwPDB X-ray Structure Validation Report ⓘ

Jul 29, 2024 – 02:47 PM EDT

PDB ID	:	8VD0
Title	:	Human TCR ET650-4 in complex with DQ8-InsC8-15-IAPP2
Authors	:	Tran, T.M.; Lim, J.J.; Loh, T.Y.; Mannering, I.S.; Rossjohn, J.; Reid, H.H.
Deposited on	:	2023-12-14
Resolution	:	2.40 Å(reported)

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

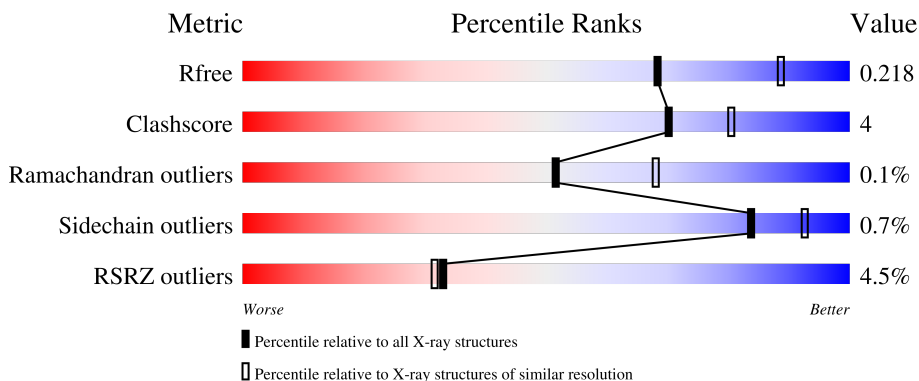|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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.
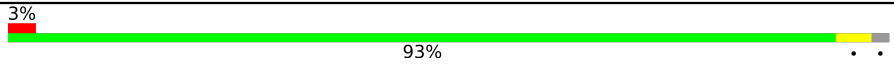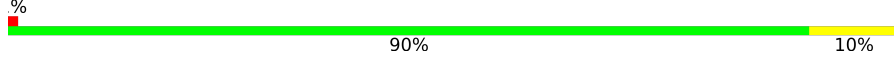
Metric	Percentile Ranks	Value
Rfree		0.218
Clashscore		4
Ramachandran outliers		0.1%
Sidechain outliers		0.7%
RSRZ outliers		4.5%

Worse *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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	185	% 91% 7% ··
1	F	185	6% 90% 7% ·
2	C	213	7% 79% 12% 9%
2	H	213	13% 79% 12% 8%
3	D	206	4% 90% 7% ·

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
3	I	206	3% ▮▮ 93%
4	E	240	90% 10%
4	J	240	.% 90% 10%

2 Entry composition ⓘ

There are 8 unique types of molecules in this entry. The entry contains 13282 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 MHC class II HLA-DQ-alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	183	Total	C	N	O	S	0	0	0
			1464	944	242	275	3			
1	F	180	Total	C	N	O	S	0	0	0
			1436	926	238	269	3			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	72	CYS	ILE	engineered mutation	UNP Q30069
F	72	CYS	ILE	engineered mutation	UNP Q30069

- Molecule 2 is a protein called Hybrid insulin peptide (HIP; InsC8-15-IAPP74-80),MHC class II HLA-DQ-beta-1 chimera.

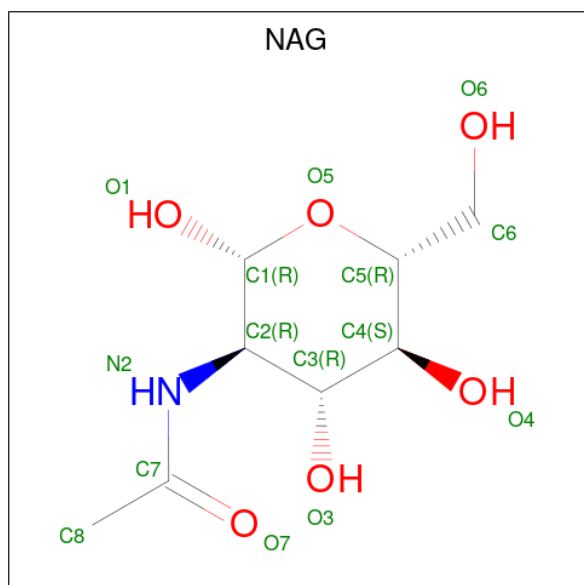| Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	194	Total	C	N	O	S	0	0	0
			1521	965	262	286	8			
2	H	195	Total	C	N	O	S	0	0	0
			1509	958	262	283	6			

- Molecule 3 is a protein called T-CELL-RECEPTOR, TCR ET650-4 alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	202	Total	C	N	O	S	0	0	0
			1524	953	257	304	10			
3	I	201	Total	C	N	O	S	0	0	0
			1490	937	248	294	11			

- Molecule 4 is a protein called T-CELL-RECEPTOR, TCR ET650-4 beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	E	240	Total 1897	C 1196	N 337	O 358	S 6	0	0	0
4	J	240	Total 1895	C 1195	N 335	O 359	S 6	0	0	0

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).

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

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

GOL

C3

OH O3

C1　C2

HO　OH

O1　O2

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total 6	C 3	O 3	0	0
6	A	1	Total 6	C 3	O 3	0	0
6	F	1	Total 6	C 3	O 3	0	0
6	F	1	Total 6	C 3	O 3	0	0
6	F	1	Total 6	C 3	O 3	0	0
6	H	1	Total 6	C 3	O 3	0	0
6	D	1	Total 6	C 3	O 3	0	0
6	E	1	Total 6	C 3	O 3	0	0
6	I	1	Total 6	C 3	O 3	0	0
6	I	1	Total 6	C 3	O 3	0	0
6	J	1	Total 6	C 3	O 3	0	0
6	J	1	Total 6	C 3	O 3	0	0

- Molecule 7 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).

W O R L D W I D E
PDB
PROTEIN DATA BANK

PO4

O3

O⁻

O2 O⁻ — P ═══ O O1

P

O⁻

O4

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total 5	O 4	P 1	0	0
7	C	1	Total 5	O 4	P 1	0	0
7	D	1	Total 5	O 4	P 1	0	0
7	E	1	Total 5	O 4	P 1	0	0
7	I	1	Total 5	O 4	P 1	0	0
7	J	1	Total 5	O 4	P 1	0	0

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	50	Total 50	O 50	0	0
8	C	39	Total 39	O 39	0	0
8	F	32	Total 32	O 32	0	0
8	H	28	Total 28	O 28	0	0
8	D	51	Total 51	O 51	0	0
8	E	80	Total 80	O 80	0	0

Continued on next page...

W O R L D W I D E

wwPDB

PROTEIN DATA BANK

Continued from previous page...

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	I	43	Total 43	O 43	0	0
8	J	51	Total 51	O 51	0	0

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.
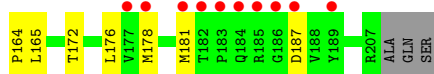
• Molecule 1: MHC class II HLA-DQ-alpha chain
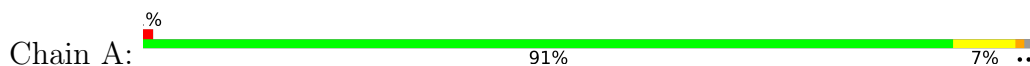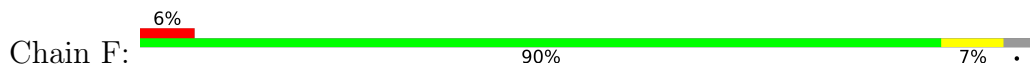
Chain A:

• Molecule 1: MHC class II HLA-DQ-alpha chain

Chain F:

• Molecule 2: Hybrid insulin peptide (HIP; InsC8-15-IAPP74-80),MHC class II HLA-DQ-beta-1 chimera

Chain C:

• Molecule 2: Hybrid insulin peptide (HIP; InsC8-15-IAPP74-80),MHC class II HLA-DQ-beta-1 chimera

Chain H:

• Molecule 3: T-CELL-RECEPTOR, TCR ET650-4 alpha

Chain D:

• Molecule 3: T-CELL-RECEPTOR, TCR ET650-4 alpha

Chain I:

• Molecule 4: T-CELL-RECEPTOR, TCR ET650-4 beta

Chain E:

• Molecule 4: T-CELL-RECEPTOR, TCR ET650-4 beta

Chain J:
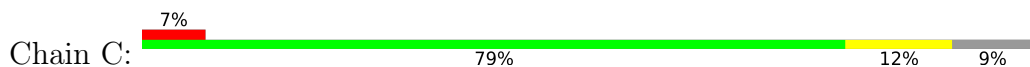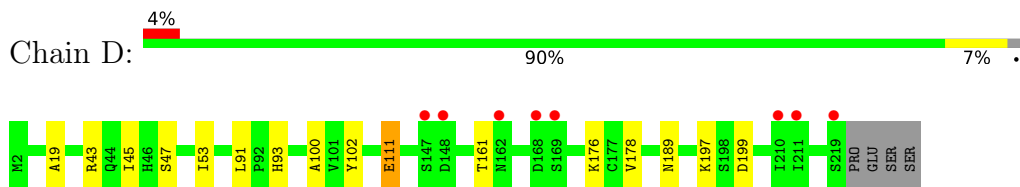
4 Data and refinement statistics (i)

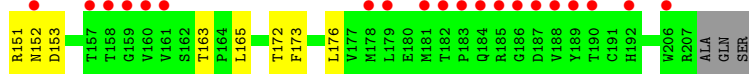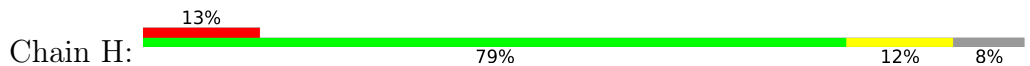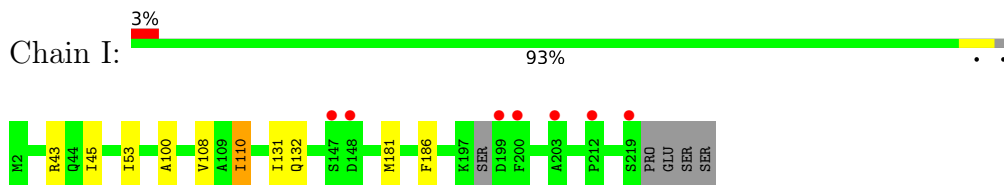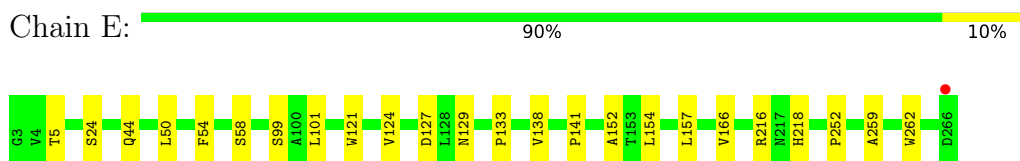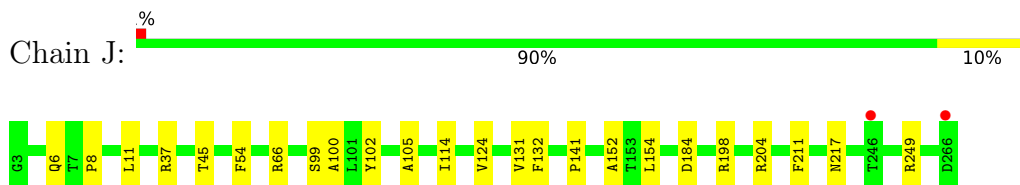| Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	72.19Å 139.30Å 120.50Å 90.00° 93.70° 90.00°	Depositor
Resolution (Å)	45.51 – 2.40 45.51 – 2.40	Depositor EDS
% Data completeness (in resolution range)	98.6 (45.51-2.40) 98.6 (45.51-2.40)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.08 (at 2.39Å)	Xtriage
Refinement program	PHENIX 1.19_4092	Depositor
R, R_{free}	0.188 , 0.220 0.186 , 0.218	Depositor DCC
R_{free} test set	4596 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å^2)	43.3	Xtriage
Anisotropy	0.403	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 38.6	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	13282	wwPDB-VP
Average B, all atoms (Å^2)	52.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.26% 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: PO4, GOL, 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	0.26	0/1508	0.47	0/2060
1	F	0.26	0/1479	0.46	0/2019
2	C	0.25	0/1556	0.51	0/2124
2	H	0.25	0/1544	0.52	0/2109
3	D	0.26	0/1557	0.47	0/2124
3	I	0.26	0/1522	0.48	0/2077
4	E	0.26	0/1949	0.51	0/2652
4	J	0.26	0/1947	0.51	0/2650
All	All	0.26	0/13062	0.49	0/17815

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1464	0	1394	8	0
1	F	1436	0	1362	11	0
2	C	1521	0	1421	16	0
2	H	1509	0	1400	18	0
3	D	1524	0	1414	10	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	I	1490	0	1364	7	0
4	E	1897	0	1792	12	0
4	J	1895	0	1787	13	0
5	A	28	0	26	0	0
5	F	28	0	26	0	0
5	H	14	0	13	0	0
6	A	12	0	16	0	0
6	D	6	0	8	0	0
6	E	6	0	8	0	0
6	F	18	0	24	4	0
6	H	6	0	8	2	0
6	I	12	0	16	3	0
6	J	12	0	16	1	0
7	A	5	0	0	0	0
7	C	5	0	0	0	0
7	D	5	0	0	0	0
7	E	5	0	0	0	0
7	I	5	0	0	0	0
7	J	5	0	0	0	0
8	A	50	0	0	0	0
8	C	39	0	0	2	0
8	D	51	0	0	0	0
8	E	80	0	0	0	0
8	F	32	0	0	0	0
8	H	28	0	0	1	0
8	I	43	0	0	2	0
8	J	51	0	0	0	0
All	All	13282	0	12095	89	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 4.

All (89) 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:F:119:ILE:H	6:F:204:GOL:H31	1.46	0.80
2:H:13:GLY:O	4:J:37:ARG:NH1	2.28	0.67
2:C:84:GLU:OE2	2:C:88:ARG:NH1	2.27	0.67
2:C:134:VAL:HG22	2:C:178:MET:HG3	1.77	0.67
2:H:143:ALA:HB1	2:H:165:LEU:HD21	1.80	0.63
1:A:11:ASN:HD21	1:A:62:ASN:HD22	1.48	0.61

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:163:THR:HG22	2:H:176:LEU:H	1.67	0.60
3:I:186:PHE:HA	6:I:302:GOL:H12	1.85	0.59
3:I:131:ILE:HA	6:I:302:GOL:H31	1.86	0.58
1:F:11:ASN:HD21	1:F:62:ASN:HD22	1.52	0.57
2:H:88:ARG:NH2	8:H:401:HOH:O	2.36	0.57
3:I:108:VAL:HB	3:I:110:ILE:HD12	1.85	0.57
4:J:105:ALA:HB1	4:J:114:ILE:HG23	1.86	0.56
4:J:184:ASP:OD1	4:J:204:ARG:NH2	2.34	0.56
2:C:143:ALA:HB1	2:C:165:LEU:HD21	1.88	0.56
4:E:99:SER:HB3	4:E:124:VAL:H	1.69	0.56
6:F:204:GOL:HO1	6:F:204:GOL:HO3	1.51	0.55
2:H:99:HIS:ND1	6:H:302:GOL:O2	2.32	0.55
4:E:133:PRO:HD3	4:E:252:PRO:HB3	1.88	0.54
2:C:163:THR:HG22	2:C:176:LEU:H	1.72	0.54
4:J:99:SER:HB3	4:J:124:VAL:H	1.72	0.53
4:J:8:PRO:HG2	4:J:11:LEU:HD21	1.91	0.53
4:J:211:PHE:O	4:J:217:ASN:ND2	2.35	0.52
1:F:70:LEU:HD13	2:H:27:TYR:HB2	1.92	0.52
2:C:115:PRO:HB3	2:C:140:PHE:HB3	1.92	0.51
2:H:72:GLY:N	2:H:73:PRO:HD2	2.25	0.51
4:J:141:PRO:HD3	4:J:154:LEU:HG	1.94	0.50
3:I:181:MET:HG2	6:J:302:GOL:H31	1.94	0.49
2:H:105:LEU:HD13	2:H:109:LEU:HD12	1.95	0.49
2:C:139:ASP:HA	2:C:172:THR:HB	1.95	0.49
2:H:139:ASP:HA	2:H:172:THR:HB	1.95	0.49
2:C:72:GLY:N	2:C:73:PRO:HD2	2.27	0.48
1:A:53:ARG:HD3	3:D:111:GLU:HG3	1.95	0.48
3:I:132:GLN:NE2	8:I:402:HOH:O	2.47	0.48
2:H:115:PRO:HB3	2:H:140:PHE:HB3	1.95	0.48
2:H:151:ARG:O	2:H:153:ASP:N	2.47	0.48
3:D:91:LEU:HD11	3:D:102:TYR:CE2	2.49	0.48
4:J:131:VAL:O	4:J:249:ARG:NH2	2.45	0.48
4:E:138:VAL:HG23	4:E:259:ALA:HB3	1.95	0.48
2:C:152:ASN:ND2	2:C:187:ASP:OD1	2.47	0.47
4:E:218:HIS:HB3	4:E:262:TRP:CD2	2.48	0.47
1:A:9(A):GLY:O	2:C:30:LYS:HA	2.15	0.47
4:J:141:PRO:HG3	4:J:152:ALA:HB1	1.96	0.47
2:C:28:GLN:HB2	2:C:49:ILE:HB	1.98	0.46
1:F:68:HIS:HA	6:F:205:GOL:H2	1.97	0.46
3:D:43:ARG:HB3	3:D:53:ILE:HD11	1.97	0.46
1:A:39:LYS:HG2	1:A:60:LEU:HD11	1.97	0.46

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:119:ILE:N	6:F:204:GOL:H31	2.22	0.46
4:J:132:PHE:CD1	4:J:198:ARG:HD3	2.51	0.46
1:A:30:GLU:OE2	1:A:33:TYR:HB3	2.16	0.45
3:D:197:LYS:O	3:D:199:ASP:N	2.42	0.45
2:H:99:HIS:HD1	6:H:302:GOL:HO2	1.57	0.45
3:I:43:ARG:HB3	3:I:53:ILE:HD11	1.99	0.45
3:I:45:ILE:HG13	3:I:100:ALA:HB2	1.98	0.45
3:D:47:SER:HB2	4:E:121:TRP:CZ2	2.51	0.45
1:A:178:TRP:CZ2	1:A:180:PRO:HA	2.52	0.44
1:A:43:TRP:CE3	1:A:48:PHE:HB3	2.52	0.44
4:J:6:GLN:NE2	4:J:102:TYR:O	2.49	0.44
6:I:301:GOL:H2	8:I:407:HOH:O	2.16	0.44
3:D:45:ILE:HG13	3:D:100:ALA:HB2	1.99	0.44
1:F:84:ASN:HA	1:F:114:PRO:HD3	2.00	0.43
2:C:152:ASN:HD21	2:C:187:ASP:HA	1.83	0.43
1:F:57:GLN:OE1	4:J:66:ARG:HD2	2.18	0.43
4:E:141:PRO:HD3	4:E:154:LEU:HG	2.01	0.43
2:H:9:GLU:HG3	2:H:10:VAL:H	1.83	0.43
4:E:101:LEU:HD13	4:E:121:TRP:CE2	2.53	0.43
3:D:47:SER:HB2	4:E:121:TRP:HZ2	1.83	0.43
2:H:102:GLN:O	2:H:106:ARG:HG2	2.19	0.42
4:E:44:GLN:HB2	4:E:50:LEU:HD13	2.00	0.42
1:F:39:LYS:HG2	1:F:60:LEU:HD11	2.00	0.42
2:C:163:THR:HG23	2:C:164:PRO:O	2.20	0.42
4:E:141:PRO:HG3	4:E:152:ALA:HB1	2.01	0.42
1:A:105:LEU:HD13	1:A:153:PHE:CE1	2.55	0.42
1:F:105:LEU:HD12	1:F:105:LEU:HA	1.89	0.42
4:E:5:THR:HB	4:E:24:SER:HB2	2.02	0.42
1:F:66:LEU:HG	2:H:27:TYR:CD1	2.54	0.41
4:J:45:THR:HG22	4:J:100:ALA:HB2	2.01	0.41
3:D:178:VAL:HG22	3:D:189:ASN:OD1	2.20	0.41
2:C:100:ASN:O	2:C:104:GLU:HG2	2.21	0.41
3:D:19:ALA:HB3	3:D:91:LEU:HB2	2.02	0.41
2:C:88:ARG:NH2	8:C:406:HOH:O	2.54	0.41
1:F:105:LEU:HD11	1:F:178:TRP:CE2	2.56	0.41
2:C:9:GLU:HG3	2:C:10:VAL:H	1.86	0.41
2:H:45:VAL:HA	2:H:58:PHE:O	2.21	0.41
2:C:87:GLU:OE1	8:C:401:HOH:O	2.22	0.41
4:E:127:ASP:OD2	4:E:129:ASN:HB3	2.21	0.41
2:H:72:GLY:N	2:H:73:PRO:CD	2.84	0.41
2:H:143:ALA:HB2	2:H:173:PHE:CE1	2.56	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:161:THR:O	3:D:176:LYS:HD3	2.21	0.40

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	181/185 (98%)	176 (97%)	5 (3%)	0	100	100
1	F	178/185 (96%)	175 (98%)	3 (2%)	0	100	100
2	C	188/213 (88%)	182 (97%)	6 (3%)	0	100	100
2	H	189/213 (89%)	181 (96%)	7 (4%)	1 (0%)	29	41
3	D	200/206 (97%)	189 (94%)	10 (5%)	1 (0%)	29	41
3	I	197/206 (96%)	189 (96%)	8 (4%)	0	100	100
4	E	238/240 (99%)	229 (96%)	9 (4%)	0	100	100
4	J	238/240 (99%)	231 (97%)	7 (3%)	0	100	100
All	All	1609/1688 (95%)	1552 (96%)	55 (3%)	2 (0%)	51	68

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	152	ASN
3	D	93	HIS

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	164/170 (96%)	163 (99%)	1 (1%)	86	94
1	F	159/170 (94%)	159 (100%)	0	100	100
2	C	159/189 (84%)	158 (99%)	1 (1%)	86	94
2	H	154/189 (82%)	154 (100%)	0	100	100
3	D	166/185 (90%)	165 (99%)	1 (1%)	86	94
3	I	157/185 (85%)	156 (99%)	1 (1%)	86	94
4	E	205/210 (98%)	200 (98%)	5 (2%)	49	68
4	J	205/210 (98%)	204 (100%)	1 (0%)	88	95
All	All	1369/1508 (91%)	1359 (99%)	10 (1%)	84	92

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	105	LEU
2	C	181	MET
3	D	111	GLU
4	E	54	PHE
4	E	58	SER
4	E	157	LEU
4	E	166	VAL
4	E	216	ARG
3	I	110	ILE
4	J	54	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	11	ASN
1	F	62	ASN

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 monosaccharides in this entry.

5.6　Ligand geometry ⓘ

23 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	$\#|Z| > 2$
5	NAG	F	202	-	14,14,15	0.25	0	17,19,21	0.40	0
7	PO4	D	302	-	4,4,4	0.89	0	6,6,6	0.42	0
6	GOL	F	204	-	5,5,5	0.95	0	5,5,5	0.91	0
7	PO4	E	302	-	4,4,4	0.87	0	6,6,6	0.47	0
6	GOL	I	301	-	5,5,5	0.93	0	5,5,5	0.98	0
6	GOL	J	301	-	5,5,5	0.87	0	5,5,5	1.02	0
5	NAG	F	201	1	14,14,15	0.26	0	17,19,21	0.45	0
6	GOL	F	205	-	5,5,5	0.93	0	5,5,5	0.98	0
6	GOL	I	302	-	5,5,5	0.84	0	5,5,5	0.96	0
6	GOL	J	302	-	5,5,5	0.85	0	5,5,5	0.99	0
6	GOL	A	203	-	5,5,5	0.90	0	5,5,5	0.99	0
6	GOL	F	203	-	5,5,5	0.90	0	5,5,5	0.99	0
6	GOL	D	301	-	5,5,5	0.87	0	5,5,5	1.04	0
5	NAG	H	301	2	14,14,15	0.28	0	17,19,21	0.37	0
6	GOL	E	301	-	5,5,5	0.95	0	5,5,5	0.96	0
7	PO4	J	303	-	4,4,4	0.88	0	6,6,6	0.43	0
7	PO4	A	205	-	4,4,4	0.89	0	6,6,6	0.42	0
7	PO4	I	303	-	4,4,4	0.90	0	6,6,6	0.45	0
6	GOL	H	302	-	5,5,5	0.86	0	5,5,5	1.00	0
5	NAG	A	201	1	14,14,15	0.35	0	17,19,21	0.49	0
5	NAG	A	202	1	14,14,15	0.25	0	17,19,21	0.35	0
6	GOL	A	204	-	5,5,5	0.93	0	5,5,5	0.99	0
7	PO4	C	301	-	4,4,4	0.88	0	6,6,6	0.41	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	GOL	I	301	-	-	2/4/4/4	-
6	GOL	J	301	-	-	4/4/4/4	-
5	NAG	H	301	2	-	2/6/23/26	0/1/1/1
5	NAG	F	201	1	-	2/6/23/26	0/1/1/1
6	GOL	F	205	-	-	2/4/4/4	-
6	GOL	I	302	-	-	1/4/4/4	-
6	GOL	E	301	-	-	1/4/4/4	-
5	NAG	F	202	-	-	4/6/23/26	0/1/1/1
6	GOL	J	302	-	-	0/4/4/4	-
6	GOL	F	204	-	-	0/4/4/4	-
5	NAG	A	201	1	-	2/6/23/26	0/1/1/1
6	GOL	D	301	-	-	1/4/4/4	-
5	NAG	A	202	1	-	3/6/23/26	0/1/1/1
6	GOL	A	203	-	-	0/4/4/4	-
6	GOL	A	204	-	-	0/4/4/4	-
6	GOL	F	203	-	-	0/4/4/4	-
6	GOL	H	302	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	J	301	GOL	O1-C1-C2-O2
6	J	301	GOL	O1-C1-C2-C3
6	J	301	GOL	C1-C2-C3-O3
5	F	202	NAG	O5-C5-C6-O6
5	A	201	NAG	O5-C5-C6-O6
5	A	201	NAG	C4-C5-C6-O6
5	F	202	NAG	C4-C5-C6-O6
5	F	202	NAG	C8-C7-N2-C2
5	F	202	NAG	O7-C7-N2-C2
5	H	301	NAG	C8-C7-N2-C2
5	H	301	NAG	O7-C7-N2-C2

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
5	F	201	NAG	O5-C5-C6-O6
5	A	202	NAG	O5-C5-C6-O6
5	F	201	NAG	C4-C5-C6-O6
6	F	205	GOL	C1-C2-C3-O3
6	D	301	GOL	O1-C1-C2-C3
6	E	301	GOL	O1-C1-C2-C3
6	I	302	GOL	O1-C1-C2-C3
6	J	301	GOL	O2-C2-C3-O3
6	F	205	GOL	O2-C2-C3-O3
6	H	302	GOL	O2-C2-C3-O3
5	A	202	NAG	C4-C5-C6-O6
6	I	301	GOL	C1-C2-C3-O3
5	A	202	NAG	C1-C2-N2-C7
6	I	301	GOL	O2-C2-C3-O3
6	H	302	GOL	C1-C2-C3-O3

There are no ring outliers.

6 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	F	204	GOL	3	0
6	I	301	GOL	1	0
6	F	205	GOL	1	0
6	I	302	GOL	2	0
6	J	302	GOL	1	0
6	H	302	GOL	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, 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	183/185 (98%)	-0.04	2 (1%)	80	79	29, 43, 65, 100	0
1	F	180/185 (97%)	0.17	11 (6%)	21	20	35, 53, 90, 112	0
2	C	194/213 (91%)	0.39	14 (7%)	15	14	29, 48, 101, 116	0
2	H	195/213 (91%)	0.56	28 (14%)	2	2	34, 53, 105, 133	0
3	D	202/206 (98%)	0.00	8 (3%)	38	37	33, 50, 92, 109	0
3	I	201/206 (97%)	0.13	7 (3%)	44	43	32, 49, 92, 114	0
4	E	240/240 (100%)	-0.12	1 (0%)	92	91	30, 43, 68, 117	0
4	J	240/240 (100%)	-0.08	2 (0%)	86	84	34, 49, 78, 103	0
All	All	1635/1688 (96%)	0.11	73 (4%)	33	31	29, 48, 94, 133	0

All (73) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	H	186	GLY	6.3
2	H	158	THR	5.7
2	H	187	ASP	5.0
2	H	206	TRP	4.9
1	F	157	ALA	4.5
2	H	189	TYR	4.5
4	J	246	THR	4.4
2	H	159	GLY	4.2
2	C	185	ARG	4.1
2	H	133	LEU	4.0
2	C	181	MET	3.7
4	E	266	ASP	3.6
3	D	147	SER	3.5
2	H	132	LEU	3.5
3	D	211	ILE	3.5
2	C	183	PRO	3.5

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
2	H	150	PHE	3.5
2	H	184	GLN	3.4
2	H	182	THR	3.4
2	H	179	LEU	3.2
2	C	159	GLY	3.2
1	F	154	LEU	3.2
2	C	160	VAL	3.2
2	H	13	GLY	3.1
2	H	157	THR	3.1
2	C	186	GLY	3.1
2	H	12	LYS	3.1
2	C	184	GLN	3.0
2	H	190	THR	3.0
1	A	180	PRO	3.0
3	I	200	PHE	2.9
1	F	126	HIS	2.9
2	H	160	VAL	2.9
2	H	152	ASN	2.8
3	D	148	ASP	2.8
1	F	129	THR	2.8
2	H	185	ARG	2.8
3	D	219	SER	2.7
3	I	147	SER	2.7
1	F	156	SER	2.7
1	F	128	VAL	2.7
2	H	183	PRO	2.7
3	I	203	ALA	2.6
3	I	212	PRO	2.6
2	H	161	VAL	2.6
2	H	148	ARG	2.5
1	A	181	GLU	2.5
2	H	131	ASN	2.5
3	D	169	SER	2.5
2	H	188	VAL	2.5
2	C	131	ASN	2.5
1	F	158	ASP	2.5
3	I	148	ASP	2.5
2	C	177	VAL	2.4
2	H	181	MET	2.4
4	J	266	ASP	2.4
2	H	178	MET	2.3
2	C	178	MET	2.3

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
3	D	210	ILE	2.3
1	F	98	THR	2.3
3	I	199	ASP	2.3
2	C	187	ASP	2.3
3	D	168	ASP	2.2
1	F	99	LEU	2.2
3	D	162	ASN	2.2
1	F	175	LEU	2.2
2	H	121	PRO	2.2
2	C	21	SER	2.1
2	C	189	TYR	2.1
2	C	182	THR	2.1
2	H	192	HIS	2.1
1	F	78	ASN	2.0
3	I	219	SER	2.0

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
5	NAG	A	202	14/15	0.65	0.26	80,89,94,96	0
5	NAG	H	301	14/15	0.70	0.27	78,87,97,97	0
6	GOL	F	203	6/6	0.74	0.27	62,70,79,80	0
6	GOL	F	205	6/6	0.75	0.26	68,75,80,87	0
6	GOL	E	301	6/6	0.79	0.31	74,81,88,89	0
5	NAG	A	201	14/15	0.82	0.39	59,75,86,96	0
6	GOL	F	204	6/6	0.83	0.31	71,79,86,93	0
6	GOL	I	301	6/6	0.83	0.30	49,60,66,67	0

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
6	GOL	D	301	6/6	0.84	0.23	57,58,63,65	0
6	GOL	J	302	6/6	0.85	0.26	49,58,66,72	0
6	GOL	J	301	6/6	0.86	0.21	65,72,78,78	0
5	NAG	F	201	14/15	0.86	0.28	70,79,93,98	0
6	GOL	H	302	6/6	0.87	0.22	50,57,57,62	0
5	NAG	F	202	14/15	0.87	0.48	104,109,113,113	0
7	PO4	I	303	5/5	0.87	0.19	60,64,82,86	0
7	PO4	D	302	5/5	0.89	0.15	52,60,76,78	0
6	GOL	I	302	6/6	0.89	0.26	51,57,63,65	0
7	PO4	E	302	5/5	0.91	0.25	62,73,81,86	0
7	PO4	C	301	5/5	0.91	0.27	53,63,77,77	0
6	GOL	A	203	6/6	0.92	0.18	63,70,73,73	0
6	GOL	A	204	6/6	0.93	0.20	58,62,62,69	0
7	PO4	J	303	5/5	0.96	0.16	56,69,75,75	0
7	PO4	A	205	5/5	0.98	0.11	46,52,55,60	0

6.5 Other polymers (i)

There are no such residues in this entry.