



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 07:48 AM UTC

PDB ID : 1FMD / pdb_00001fmd
Title : THE STRUCTURE AND ANTIGENICITY OF A TYPE C FOOT-AND-MOUTH DISEASE VIRUS
Authors : Lea, S.; Fry, E.; Stuart, D.
Deposited on : 1994-02-10
Resolution : 3.50 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4-5-2 with Phenix2.0
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

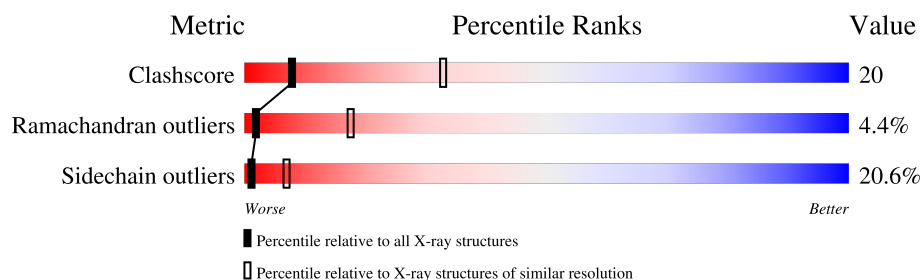
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.50 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))
Clashscore	190562	1140 (3.54-3.46)
Ramachandran outliers	187476	1113 (3.54-3.46)
Sidechain outliers	187428	1114 (3.54-3.46)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	1	208	50% 27% 11% • 10%
2	2	218	50% 39% 10% •
3	3	219	51% 32% 16% •
4	4	85	35% 14% • • 46%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 5168 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 FOOT-AND-MOUTH DISEASE VIRUS (SUBUNIT VP1).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	1	187	Total	C	N	O	S	0	0	0
			1445	913	259	270	3			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
1	46	ASP	GLY	conflict	UNP Q65095
1	99	ASN	ASP	conflict	UNP Q65095
1	112	VAL	LEU	conflict	UNP Q65095
1	129	ALA	GLY	conflict	UNP Q65095
1	144	ALA	THR	conflict	UNP Q65095
1	153	THR	ALA	conflict	UNP Q65095
1	155	HIS	ARG	conflict	UNP Q65095
1	157	ALA	GLY	conflict	UNP Q65095

- Molecule 2 is a protein called FOOT-AND-MOUTH DISEASE VIRUS (SUBUNIT VP2).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	2	218	Total	C	N	O	S	0	0	0
			1680	1061	296	316	7			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
2	21	HIS	GLN	conflict	UNP Q9YQQ5
2	50	ALA	GLY	conflict	UNP Q9YQQ5
2	122	LEU	GLN	conflict	UNP Q9YQQ5
2	123	VAL	ALA	conflict	UNP Q9YQQ5

- Molecule 3 is a protein called FOOT-AND-MOUTH DISEASE VIRUS (SUBUNIT VP3).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	3	219	Total	C	N	O	S	0	0	0
			1690	1075	277	327	11			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
3	168	THR	ALA	conflict	UNP Q9YQQ5

- Molecule 4 is a protein called FOOT-AND-MOUTH DISEASE VIRUS (SUBUNIT VP4).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	4	46	Total	C	N	O	S	0	0	0
			353	222	57	72	2			

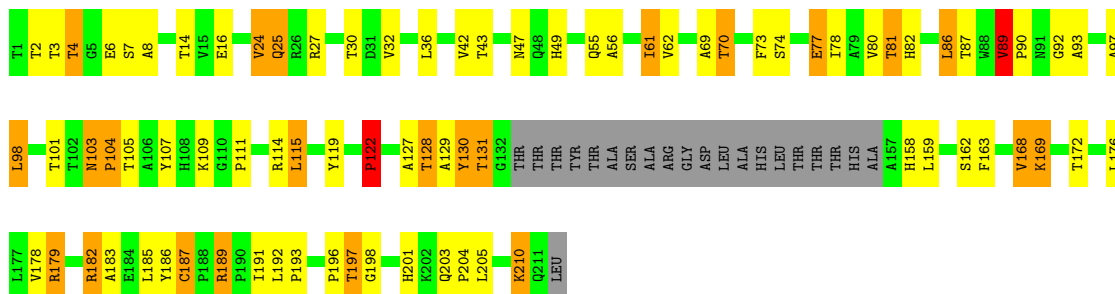
3 Residue-property plots

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. 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. 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.

Note EDS was not executed.

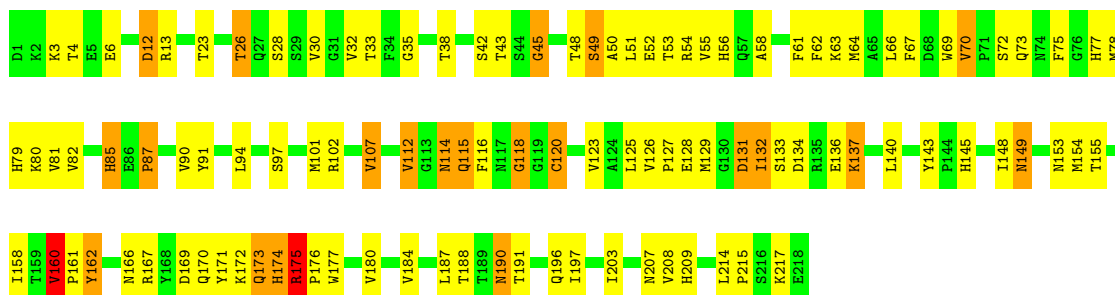
• Molecule 1: FOOT-AND-MOUTH DISEASE VIRUS (SUBUNIT VP1)

Chain 1: 



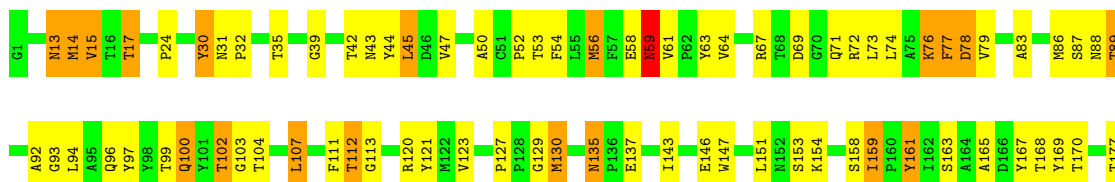
• Molecule 2: FOOT-AND-MOUTH DISEASE VIRUS (SUBUNIT VP2)

Chain 2: 



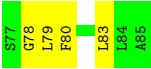
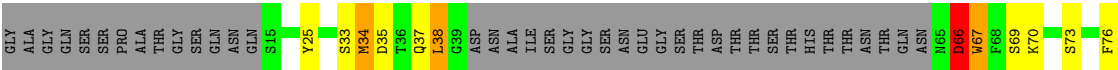
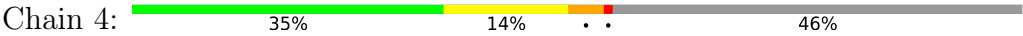
• Molecule 3: FOOT-AND-MOUTH DISEASE VIRUS (SUBUNIT VP3)

Chain 3: 





● Molecule 4: FOOT-AND-MOUTH DISEASE VIRUS (SUBUNIT VP4)



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	I 2 3	Depositor
Cell constants a, b, c, α , β , γ	347.60 Å 347.60 Å 347.60 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	27.00 – 3.50	Depositor
% Data completeness (in resolution range)	(Not available) (27.00-3.50)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, R_{free}	0.204 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	5168	wwPDB-VP
Average B, all atoms (Å ²)	52.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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	1	0.71	0/1480	1.21	19/2027 (0.9%)
2	2	0.67	0/1723	1.24	17/2352 (0.7%)
3	3	0.68	0/1739	1.30	25/2377 (1.1%)
4	4	0.78	0/359	1.35	6/481 (1.2%)
All	All	0.69	0/5301	1.26	67/7237 (0.9%)

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
3	3	0	1

There are no bond length outliers.

All (67) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
2	2	137	LYS	N-CA-C	-10.21	100.56	113.23
2	2	118	GLY	N-CA-C	-9.76	99.35	112.81
4	4	67	TRP	N-CA-C	9.26	130.53	110.80
2	2	4	THR	N-CA-C	8.98	117.37	108.75
4	4	66	ASP	N-CA-C	8.65	122.30	109.24
3	3	159	ILE	CA-C-N	8.20	128.21	119.76
3	3	159	ILE	C-N-CA	8.20	128.21	119.76
4	4	66	ASP	CA-C-N	7.96	136.75	121.54
4	4	66	ASP	C-N-CA	7.96	136.75	121.54
3	3	170	THR	N-CA-C	-7.76	102.14	111.69
3	3	188	GLN	N-CA-C	-7.38	96.52	109.06
2	2	149	ASN	CA-C-N	7.37	129.05	119.84
2	2	149	ASN	C-N-CA	7.37	129.05	119.84
1	1	109	LYS	N-CA-C	-7.04	95.80	110.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	1	159	LEU	CA-C-N	7.03	127.06	119.89
1	1	159	LEU	C-N-CA	7.03	127.06	119.89
3	3	31	ASN	N-CA-C	6.98	118.51	109.64
1	1	81	THR	N-CA-C	-6.74	96.68	108.20
3	3	54	PHE	N-CA-C	6.72	121.01	110.32
4	4	33	SER	N-CA-C	-6.70	99.67	110.32
2	2	160	VAL	CA-C-N	6.67	126.84	120.31
2	2	160	VAL	C-N-CA	6.67	126.84	120.31
3	3	197	ASP	N-CA-C	6.58	119.78	110.23
3	3	189	ILE	N-CA-C	-6.50	106.22	111.81
2	2	26	THR	CB-CA-C	-6.47	103.41	111.43
1	1	77	GLU	N-CA-C	-6.43	98.13	109.06
2	2	45	GLY	CA-C-N	6.29	125.85	119.19
2	2	45	GLY	C-N-CA	6.29	125.85	119.19
1	1	159	LEU	N-CA-C	6.24	117.57	109.64
1	1	183	ALA	N-CA-C	6.23	119.02	110.24
1	1	47	ASN	N-CA-C	-6.10	105.01	112.88
3	3	217	ALA	N-CA-C	-6.08	98.49	108.41
1	1	103	ASN	N-CA-C	-6.02	102.29	110.36
3	3	32	PRO	CA-C-N	6.02	126.96	119.98
3	3	32	PRO	C-N-CA	6.02	126.96	119.98
3	3	61	VAL	CA-C-N	6.00	127.34	119.84
3	3	61	VAL	C-N-CA	6.00	127.34	119.84
3	3	198	ALA	N-CA-C	5.94	119.33	109.46
3	3	201	VAL	N-CA-C	5.94	117.03	108.48
1	1	119	TYR	N-CA-C	-5.94	101.25	110.10
3	3	77	PHE	N-CA-C	5.92	117.25	108.60
2	2	51	LEU	N-CA-C	-5.92	105.37	113.30
1	1	4	THR	N-CA-C	-5.79	99.08	108.41
1	1	162	SER	N-CA-C	5.77	119.84	112.34
2	2	175	ARG	N-CA-C	-5.68	99.54	109.48
3	3	31	ASN	CA-C-N	-5.59	115.63	119.66
3	3	31	ASN	C-N-CA	-5.59	115.63	119.66
2	2	148	ILE	N-CA-C	-5.59	100.28	108.11
2	2	112	VAL	N-CA-C	5.59	116.42	107.98
3	3	39	GLY	N-CA-C	5.57	122.52	114.10
1	1	128	THR	N-CA-C	-5.50	106.25	113.12
3	3	30	TYR	N-CA-C	5.48	117.69	107.99
3	3	32	PRO	N-CA-C	-5.47	104.73	110.58
1	1	210	LYS	N-CA-C	5.44	117.66	111.02
4	4	83	LEU	N-CA-C	5.34	118.93	109.96
1	1	24	VAL	CB-CA-C	-5.32	103.94	111.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	3	154	LYS	N-CA-C	5.27	118.70	110.32
1	1	89	VAL	CA-C-N	5.24	125.14	119.85
1	1	89	VAL	C-N-CA	5.24	125.14	119.85
3	3	50	ALA	N-CA-C	5.23	117.06	111.36
3	3	102	THR	CA-C-N	-5.20	115.34	122.57
3	3	102	THR	C-N-CA	-5.20	115.34	122.57
2	2	177	TRP	N-CA-C	5.20	118.02	109.76
1	1	56	ALA	N-CA-C	-5.18	103.56	110.55
1	1	115	LEU	N-CA-C	5.07	116.89	109.24
2	2	145	HIS	N-CA-C	5.02	115.94	108.86
2	2	75	PHE	N-CA-C	5.00	117.36	110.35

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	3	30	TYR	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	1	1445	0	1445	61	0
2	2	1680	0	1608	72	0
3	3	1690	0	1603	84	0
4	4	353	0	324	7	0
All	All	5168	0	4980	201	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 20.

All (201) 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)
2:2:48:THR:HG21	2:2:52:GLU:HB3	1.49	0.94

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:3:78:ASP:HB3	3:3:179:CYS:SG	2.13	0.87
1:1:70:THR:HG23	1:1:187:CYS:HB2	1.56	0.86
1:1:92:GLY:HA3	3:3:169:TYR:CE1	2.13	0.84
2:2:70:VAL:HG22	2:2:73:GLN:HE21	1.41	0.83
2:2:70:VAL:H	2:2:73:GLN:NE2	1.77	0.82
3:3:86:MET:HE3	3:3:89:THR:HG21	1.62	0.81
3:3:190:THR:HG22	3:3:191:HIS:H	1.45	0.80
2:2:58:ALA:HB3	2:2:208:VAL:HG21	1.63	0.80
1:1:203:GLN:HB2	1:1:204:PRO:HD2	1.69	0.75
3:3:103:GLY:HA3	3:3:209:PHE:HA	1.67	0.75
1:1:6:GLU:HG2	2:2:153:ASN:ND2	2.01	0.75
3:3:219:GLN:NE2	3:3:219:GLN:HA	2.00	0.74
3:3:52:PRO:HB3	3:3:204:SER:HB3	1.70	0.73
2:2:70:VAL:HG22	2:2:73:GLN:NE2	2.05	0.72
2:2:126:VAL:HG13	2:2:143:TYR:CE1	2.25	0.72
1:1:6:GLU:HB2	2:2:30:VAL:HG21	1.73	0.71
1:1:80:VAL:HG22	1:1:176:LEU:CD1	2.20	0.70
3:3:143:ILE:H	3:3:143:ILE:HD12	1.57	0.69
3:3:89:THR:HG23	3:3:92:ALA:H	1.58	0.67
3:3:190:THR:HG22	3:3:191:HIS:N	2.10	0.66
3:3:64:VAL:HG11	3:3:74:LEU:HB3	1.78	0.66
2:2:67:PHE:HB3	2:2:79:HIS:HD2	1.60	0.66
1:1:97:ALA:HB2	3:3:217:ALA:HB2	1.78	0.66
3:3:13:ASN:ND2	3:3:13:ASN:H	1.93	0.65
2:2:107:VAL:HG21	2:2:125:LEU:HD21	1.78	0.65
3:3:44:TYR:O	3:3:47:VAL:HG22	1.96	0.65
1:1:114:ARG:O	1:1:115:LEU:HD23	1.97	0.65
1:1:182:ARG:HH11	1:1:182:ARG:HG2	1.62	0.64
2:2:3:LYS:CB	2:2:12:ASP:HB2	2.28	0.64
2:2:70:VAL:O	2:2:73:GLN:HG2	1.98	0.64
1:1:122:PRO:HB3	3:3:100:GLN:HE21	1.63	0.63
3:3:78:ASP:CB	3:3:179:CYS:SG	2.84	0.63
1:1:107:TYR:HB2	3:3:14:MET:HB3	1.82	0.62
1:1:70:THR:HB	1:1:189:ARG:NH1	2.14	0.62
3:3:67:ARG:HE	3:3:72:ARG:NE	1.97	0.62
3:3:86:MET:O	3:3:88:ASN:N	2.32	0.62
1:1:89:VAL:HG13	1:1:93:ALA:HB3	1.81	0.62
1:1:182:ARG:HH11	1:1:182:ARG:CG	2.13	0.61
1:1:89:VAL:CG1	1:1:93:ALA:HB3	2.29	0.61
2:2:85:HIS:O	2:2:87:PRO:HD3	2.00	0.61
2:2:160:VAL:HG22	2:2:161:PRO:HD2	1.83	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:1:86:LEU:HD12	1:1:87:THR:N	2.15	0.61
1:1:86:LEU:HD11	1:1:168:VAL:HG13	1.82	0.61
1:1:196:PRO:HB3	1:1:201:HIS:HB2	1.84	0.60
3:3:191:HIS:CG	3:3:194:ALA:HB3	2.37	0.59
2:2:70:VAL:H	2:2:73:GLN:HE21	1.46	0.59
1:1:122:PRO:HB3	3:3:100:GLN:NE2	2.17	0.59
3:3:185:CYS:HB2	3:3:187:TYR:CE1	2.38	0.59
1:1:70:THR:HG22	1:1:189:ARG:HG2	1.84	0.59
3:3:187:TYR:CD1	3:3:187:TYR:N	2.70	0.59
3:3:78:ASP:HB3	3:3:179:CYS:HG	1.67	0.58
3:3:78:ASP:OD2	3:3:179:CYS:SG	2.62	0.58
3:3:195:ASP:O	3:3:196:ALA:HB3	2.02	0.58
3:3:63:TYR:HA	3:3:200:VAL:HA	1.84	0.58
3:3:212:ARG:HD3	3:3:213:LEU:HD22	1.86	0.57
1:1:92:GLY:HA3	3:3:169:TYR:HE1	1.66	0.57
3:3:14:MET:HG3	3:3:15:VAL:N	2.18	0.57
2:2:101:MET:HE2	2:2:171:TYR:CE2	2.38	0.57
3:3:94:LEU:HD12	3:3:211:LEU:HD23	1.88	0.56
3:3:135:ASN:HD22	3:3:135:ASN:N	2.04	0.56
3:3:102:THR:HA	3:3:161:TYR:CE2	2.40	0.56
1:1:78:ILE:HG22	1:1:178:VAL:HG12	1.88	0.56
2:2:126:VAL:HG13	2:2:143:TYR:CD1	2.41	0.55
1:1:61:ILE:HG23	1:1:62:VAL:N	2.21	0.55
2:2:114:ASN:ND2	2:2:116:PHE:H	2.04	0.55
1:1:73:PHE:CD1	1:1:73:PHE:C	2.85	0.55
3:3:102:THR:HA	3:3:161:TYR:CD2	2.41	0.55
3:3:120:ARG:HH11	3:3:146:GLU:HG2	1.72	0.55
1:1:129:ALA:O	1:1:130:TYR:HB2	2.07	0.54
2:2:70:VAL:N	2:2:73:GLN:NE2	2.53	0.54
3:3:121:TYR:CE2	3:3:199:LEU:HD22	2.43	0.54
3:3:93:GLY:O	3:3:96:GLN:HG2	2.08	0.54
1:1:89:VAL:HG13	1:1:93:ALA:CB	2.38	0.53
3:3:161:TYR:CE1	3:3:163:SER:HB3	2.42	0.53
1:1:105:THR:O	3:3:15:VAL:HA	2.09	0.53
2:2:115:GLN:HE21	2:2:115:GLN:N	2.07	0.53
3:3:135:ASN:HD22	3:3:135:ASN:H	1.54	0.53
3:3:161:TYR:C	3:3:161:TYR:CD1	2.86	0.53
4:4:34:MET:HA	4:4:34:MET:HE3	1.91	0.53
1:1:92:GLY:CA	3:3:169:TYR:CE1	2.89	0.53
3:3:167:TYR:CE2	3:3:212:ARG:HG2	2.43	0.53
2:2:54:ARG:HE	2:2:56:HIS:CD2	2.27	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:2:58:ALA:CB	2:2:208:VAL:HG21	2.37	0.52
1:1:86:LEU:CD1	1:1:168:VAL:HG13	2.39	0.52
3:3:191:HIS:HB2	3:3:194:ALA:HB3	1.91	0.52
3:3:97:TYR:O	3:3:214:PRO:HA	2.10	0.52
3:3:107:LEU:HD23	3:3:159:ILE:HD11	1.91	0.51
2:2:26:THR:HG22	2:2:28:SER:H	1.76	0.51
1:1:6:GLU:HG2	2:2:153:ASN:HD21	1.75	0.51
3:3:79:VAL:HG23	3:3:183:TRP:HA	1.91	0.51
1:1:73:PHE:CD1	1:1:74:SER:N	2.79	0.51
2:2:162:TYR:C	2:2:162:TYR:CD1	2.89	0.51
2:2:118:GLY:H	2:2:188:THR:HB	1.76	0.51
2:2:64:MET:O	2:2:64:MET:HG3	2.10	0.51
3:3:73:LEU:HD21	3:3:76:LYS:HB3	1.92	0.51
3:3:89:THR:CG2	3:3:92:ALA:H	2.24	0.50
3:3:89:THR:HG22	3:3:92:ALA:CB	2.41	0.50
3:3:89:THR:HG22	3:3:92:ALA:HB3	1.92	0.50
3:3:212:ARG:O	3:3:213:LEU:HB2	2.11	0.50
1:1:82:HIS:CE1	1:1:86:LEU:HB2	2.46	0.50
2:2:48:THR:C	2:2:50:ALA:N	2.69	0.50
2:2:115:GLN:NE2	2:2:115:GLN:H	2.08	0.50
3:3:168:THR:HG22	3:3:169:TYR:N	2.27	0.50
2:2:166:ASN:HD22	3:3:165:ALA:HA	1.77	0.50
2:2:114:ASN:HD21	2:2:116:PHE:HB2	1.77	0.49
2:2:12:ASP:O	2:2:13:ARG:HB2	2.12	0.49
2:2:48:THR:HG22	2:2:48:THR:O	2.13	0.49
2:2:214:LEU:HB3	2:2:215:PRO:HD2	1.94	0.49
3:3:102:THR:HG22	3:3:103:GLY:N	2.28	0.49
1:1:86:LEU:HD12	1:1:86:LEU:C	2.37	0.48
3:3:43:ASN:HD21	3:3:45:LEU:HB2	1.78	0.48
1:1:80:VAL:HG21	1:1:86:LEU:HD21	1.96	0.48
3:3:219:GLN:HA	3:3:219:GLN:HE21	1.76	0.48
3:3:67:ARG:HH21	3:3:72:ARG:HD3	1.78	0.48
2:2:126:VAL:HG13	2:2:127:PRO:HD2	1.95	0.47
1:1:7:SER:O	1:1:8:ALA:HB3	2.13	0.47
1:1:130:TYR:CE2	2:2:174:HIS:HD2	2.32	0.47
2:2:70:VAL:HG23	2:2:72:SER:H	1.78	0.47
1:1:127:ALA:HB3	1:1:163:PHE:HE2	1.79	0.47
2:2:42:SER:HB3	4:4:38:LEU:HD21	1.96	0.47
1:1:130:TYR:CZ	2:2:174:HIS:CD2	3.03	0.47
2:2:78:MET:HE3	2:2:80:LYS:HE2	1.97	0.47
3:3:190:THR:CG2	3:3:191:HIS:H	2.22	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:3:195:ASP:O	3:3:196:ALA:CB	2.62	0.47
3:3:56:MET:HE3	3:3:88:ASN:HD21	1.80	0.47
1:1:182:ARG:HH11	1:1:182:ARG:HB3	1.80	0.47
1:1:69:ALA:C	1:1:189:ARG:HG3	2.40	0.47
3:3:104:THR:CG2	3:3:158:SER:HB3	2.45	0.46
3:3:104:THR:HG23	3:3:158:SER:HB3	1.97	0.46
2:2:120:CYS:O	2:2:184:VAL:HG22	2.16	0.46
1:1:90:PRO:HG2	3:3:99:THR:HG21	1.98	0.46
2:2:166:ASN:ND2	3:3:165:ALA:HA	2.30	0.46
3:3:190:THR:CG2	3:3:191:HIS:N	2.79	0.46
1:1:36:LEU:HD11	1:1:185:LEU:HD11	1.97	0.46
1:1:49:HIS:CE1	1:1:55:GLN:HE22	2.34	0.46
2:2:115:GLN:N	2:2:115:GLN:NE2	2.64	0.46
2:2:118:GLY:N	2:2:188:THR:HB	2.31	0.46
3:3:129:GLY:O	3:3:130:MET:HE3	2.15	0.46
2:2:62:PHE:CD1	2:2:62:PHE:C	2.94	0.46
3:3:123:VAL:HG12	3:3:147:TRP:HZ3	1.81	0.46
3:3:168:THR:HG22	3:3:169:TYR:H	1.81	0.46
2:2:33:THR:HB	2:2:158:ILE:HG12	1.96	0.46
3:3:211:LEU:HD12	3:3:211:LEU:HA	1.81	0.46
4:4:25:TYR:C	4:4:25:TYR:CD1	2.94	0.45
2:2:132:ILE:HD13	2:2:137:LYS:HG2	1.98	0.45
2:2:61:PHE:HA	2:2:203:ILE:O	2.16	0.45
1:1:130:TYR:CE2	2:2:174:HIS:CD2	3.05	0.44
2:2:54:ARG:NH1	2:2:207:ASN:HA	2.32	0.44
3:3:77:PHE:O	3:3:183:TRP:HB3	2.17	0.44
4:4:66:ASP:HA	4:4:70:LYS:HE3	2.00	0.44
2:2:171:TYR:C	2:2:173:GLN:H	2.26	0.44
1:1:77:GLU:HB3	1:1:179:ARG:HB3	1.99	0.44
1:1:25:GLN:NE2	1:1:25:GLN:H	2.16	0.44
2:2:91:TYR:CE1	2:2:101:MET:HE1	2.52	0.44
2:2:70:VAL:N	2:2:73:GLN:HE21	2.15	0.44
3:3:56:MET:HE2	3:3:59:ASN:HA	1.99	0.44
2:2:73:GLN:OE1	2:2:77:HIS:CE1	2.71	0.44
1:1:61:ILE:CG2	1:1:62:VAL:N	2.81	0.43
3:3:15:VAL:HG12	3:3:17:THR:H	1.82	0.43
1:1:98:LEU:HG	1:1:169:LYS:HB2	1.99	0.43
1:1:197:THR:HG23	1:1:198:GLY:H	1.83	0.43
2:2:188:THR:HG22	2:2:190:ASN:ND2	2.33	0.43
3:3:74:LEU:HD11	3:3:188:GLN:HB2	2.00	0.43
3:3:100:GLN:HA	3:3:168:THR:O	2.19	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:1:6:GLU:H	1:1:6:GLU:CD	2.26	0.43
1:1:80:VAL:HG22	1:1:176:LEU:HD11	1.98	0.43
1:1:129:ALA:HB3	1:1:189:ARG:NH1	2.34	0.43
2:2:214:LEU:HD23	3:3:127:PRO:HG2	1.99	0.43
4:4:76:PHE:HE2	4:4:80:PHE:HD2	1.67	0.43
1:1:61:ILE:HG23	1:1:62:VAL:HG23	2.01	0.43
3:3:191:HIS:C	3:3:191:HIS:CD2	2.97	0.42
1:1:103:ASN:O	1:1:105:THR:N	2.52	0.42
2:2:118:GLY:CA	2:2:188:THR:HB	2.49	0.42
4:4:66:ASP:O	4:4:69:SER:HB3	2.20	0.42
2:2:69:TRP:CE2	2:2:187:LEU:HB2	2.54	0.42
1:1:104:PRO:HG3	3:3:17:THR:HG21	2.02	0.42
2:2:217:LYS:HE2	2:2:217:LYS:HB3	1.81	0.42
1:1:14:THR:HB	1:1:16:GLU:OE1	2.19	0.42
2:2:173:GLN:O	2:2:174:HIS:HB2	2.20	0.42
4:4:78:GLY:C	4:4:79:LEU:HD12	2.45	0.42
3:3:161:TYR:C	3:3:161:TYR:HD1	2.28	0.41
2:2:137:LYS:O	2:2:140:LEU:HB2	2.20	0.41
2:2:48:THR:O	2:2:50:ALA:N	2.52	0.41
2:2:101:MET:HE2	2:2:171:TYR:HE2	1.83	0.41
1:1:131:THR:OG1	2:2:128:GLU:HA	2.21	0.41
1:1:192:LEU:HD21	2:2:136:GLU:HB3	2.03	0.41
3:3:111:PHE:CZ	3:3:113:GLY:HA3	2.55	0.41
3:3:112:THR:HB	3:3:198:ALA:O	2.20	0.41
1:1:186:TYR:CD1	1:1:186:TYR:N	2.88	0.41
2:2:67:PHE:HB3	2:2:79:HIS:CD2	2.49	0.41
1:1:182:ARG:HH11	1:1:182:ARG:CB	2.34	0.41
2:2:54:ARG:HB2	2:2:209:HIS:NE2	2.36	0.41
2:2:82:VAL:HB	2:2:175:ARG:NH1	2.36	0.41
3:3:17:THR:O	3:3:17:THR:HG23	2.21	0.41
2:2:45:GLY:HA3	2:2:167:ARG:HE	1.85	0.40
2:2:48:THR:HB	2:2:52:GLU:OE1	2.21	0.40
3:3:143:ILE:HD12	3:3:143:ILE:N	2.31	0.40
1:1:131:THR:HG21	2:2:129:MET:O	2.20	0.40
2:2:54:ARG:HB2	2:2:209:HIS:CD2	2.56	0.40
3:3:190:THR:O	3:3:191:HIS:HB3	2.22	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	1	183/208 (88%)	158 (86%)	17 (9%)	8 (4%)	2	17
2	2	216/218 (99%)	177 (82%)	29 (13%)	10 (5%)	2	17
3	3	217/219 (99%)	182 (84%)	25 (12%)	10 (5%)	2	17
4	4	42/85 (49%)	36 (86%)	5 (12%)	1 (2%)	4	29
All	All	658/730 (90%)	553 (84%)	76 (12%)	29 (4%)	2	17

All (29) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	2	6	GLU
2	2	35	GLY
2	2	174	HIS
3	3	87	SER
3	3	219	GLN
4	4	67	TRP
2	2	49	SER
2	2	173	GLN
3	3	14	MET
3	3	59	ASN
3	3	71	GLN
1	1	193	PRO
1	1	104	PRO
1	1	130	TYR
1	1	187	CYS
2	2	85	HIS
2	2	190	ASN
3	3	196	ALA
1	1	111	PRO
2	2	131	ASP
2	2	176	PRO
3	3	15	VAL

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Mol	Chain	Res	Type
3	3	83	ALA
1	1	61	ILE
3	3	24	PRO
3	3	180	VAL
1	1	32	VAL
1	1	122	PRO
2	2	87	PRO

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	1	157/173 (91%)	128 (82%)	29 (18%)	1	9
2	2	177/187 (95%)	138 (78%)	39 (22%)	1	5
3	3	177/177 (100%)	138 (78%)	39 (22%)	1	5
4	4	37/67 (55%)	31 (84%)	6 (16%)	2	14
All	All	548/604 (91%)	435 (79%)	113 (21%)	1	7

All (113) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	1	2	THR
1	1	3	THR
1	1	4	THR
1	1	24	VAL
1	1	25	GLN
1	1	27	ARG
1	1	30	THR
1	1	42	VAL
1	1	43	THR
1	1	70	THR
1	1	81	THR
1	1	86	LEU
1	1	89	VAL
1	1	98	LEU

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Mol	Chain	Res	Type
1	1	101	THR
1	1	122	PRO
1	1	128	THR
1	1	131	THR
1	1	158	HIS
1	1	168	VAL
1	1	169	LYS
1	1	172	THR
1	1	179	ARG
1	1	182	ARG
1	1	189	ARG
1	1	191	ILE
1	1	197	THR
1	1	205	LEU
1	1	210	LYS
2	2	12	ASP
2	2	23	THR
2	2	32	VAL
2	2	38	THR
2	2	43	THR
2	2	49	SER
2	2	53	THR
2	2	55	VAL
2	2	63	LYS
2	2	66	LEU
2	2	70	VAL
2	2	81	VAL
2	2	90	VAL
2	2	94	LEU
2	2	97	SER
2	2	102	ARG
2	2	107	VAL
2	2	112	VAL
2	2	114	ASN
2	2	115	GLN
2	2	120	CYS
2	2	123	VAL
2	2	131	ASP
2	2	132	ILE
2	2	133	SER
2	2	134	ASP
2	2	149	ASN

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Mol	Chain	Res	Type
2	2	154	MET
2	2	155	THR
2	2	160	VAL
2	2	162	TYR
2	2	169	ASP
2	2	170	GLN
2	2	172	LYS
2	2	175	ARG
2	2	180	VAL
2	2	191	THR
2	2	196	GLN
2	2	197	ILE
3	3	13	ASN
3	3	17	THR
3	3	35	THR
3	3	42	THR
3	3	45	LEU
3	3	53	THR
3	3	56	MET
3	3	58	GLU
3	3	59	ASN
3	3	69	ASP
3	3	76	LYS
3	3	78	ASP
3	3	89	THR
3	3	100	GLN
3	3	107	LEU
3	3	112	THR
3	3	130	MET
3	3	135	ASN
3	3	137	GLU
3	3	151	LEU
3	3	153	SER
3	3	161	TYR
3	3	177	THR
3	3	179	CYS
3	3	180	VAL
3	3	183	TRP
3	3	184	VAL
3	3	185	CYS
3	3	186	VAL
3	3	187	TYR

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Mol	Chain	Res	Type
3	3	191	HIS
3	3	200	VAL
3	3	201	VAL
3	3	207	LYS
3	3	211	LEU
3	3	212	ARG
3	3	213	LEU
3	3	218	ARG
3	3	219	GLN
4	4	34	MET
4	4	35	ASP
4	4	37	GLN
4	4	38	LEU
4	4	66	ASP
4	4	73	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (27) such sidechains are listed below:

Mol	Chain	Res	Type
1	1	17	ASN
1	1	25	GLN
1	1	55	GLN
1	1	82	HIS
1	1	99	ASN
1	1	108	HIS
2	2	19	ASN
2	2	56	HIS
2	2	73	GLN
2	2	114	ASN
2	2	115	GLN
2	2	117	ASN
2	2	149	ASN
2	2	153	ASN
2	2	166	ASN
2	2	190	ASN
3	3	13	ASN
3	3	43	ASN
3	3	88	ASN
3	3	100	GLN
3	3	135	ASN
3	3	152	ASN
3	3	191	HIS

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Mol	Chain	Res	Type
3	3	219	GLN
4	4	31	GLN
4	4	32	ASN
4	4	65	ASN

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](#)

There are no ligands in this entry.

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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.