



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 07:11 PM UTC

PDB ID : 1NNT / pdb_00001nnt
Title : STRUCTURAL EVIDENCE FOR A PH-SENSITIVE DI-LYSINE TRIGGER IN THE HEN OVOTRANSFERRIN N-LOBE: IMPLICATIONS FOR TRANSFERRIN IRON RELEASE
Authors : Dewan, J.C.; Mikami, B.; Sacchettini, J.C.
Deposited on : 1993-09-15
Resolution : 2.30 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
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

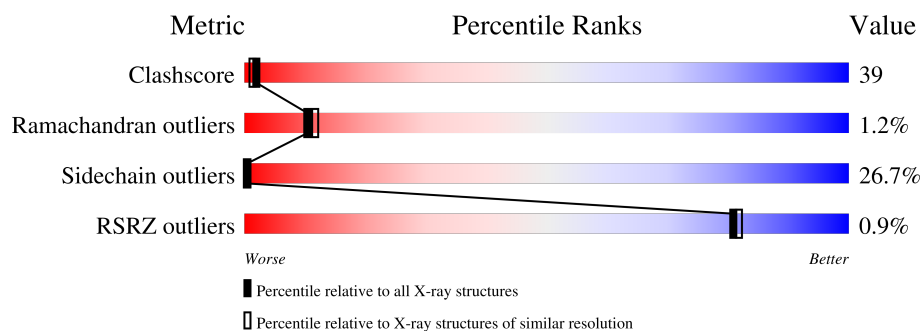
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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 $\leq 5\%$. 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	328	

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 2646 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.

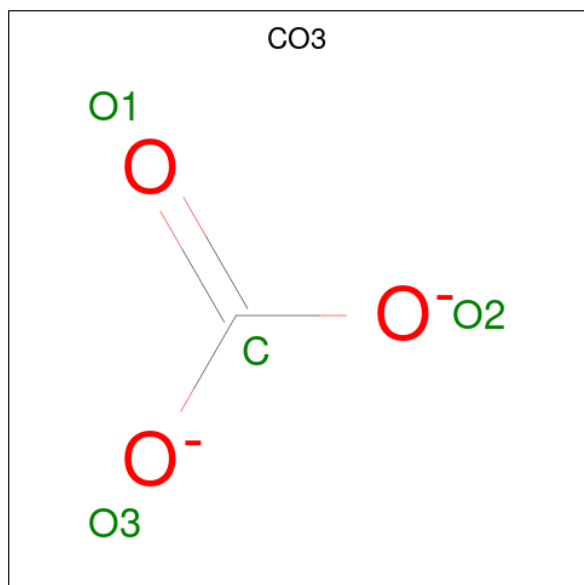
- Molecule 1 is a protein called OVOTRANSFERRIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	328	Total	C	N	O	S	0	0	0
			2533	1592	435	491	15			

- Molecule 2 is FE (III) ION (CCD ID: FE) (formula: Fe).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Fe	0	0
			1	1		

- Molecule 3 is CARBONATE ION (CCD ID: CO3) (formula: CO₃).



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

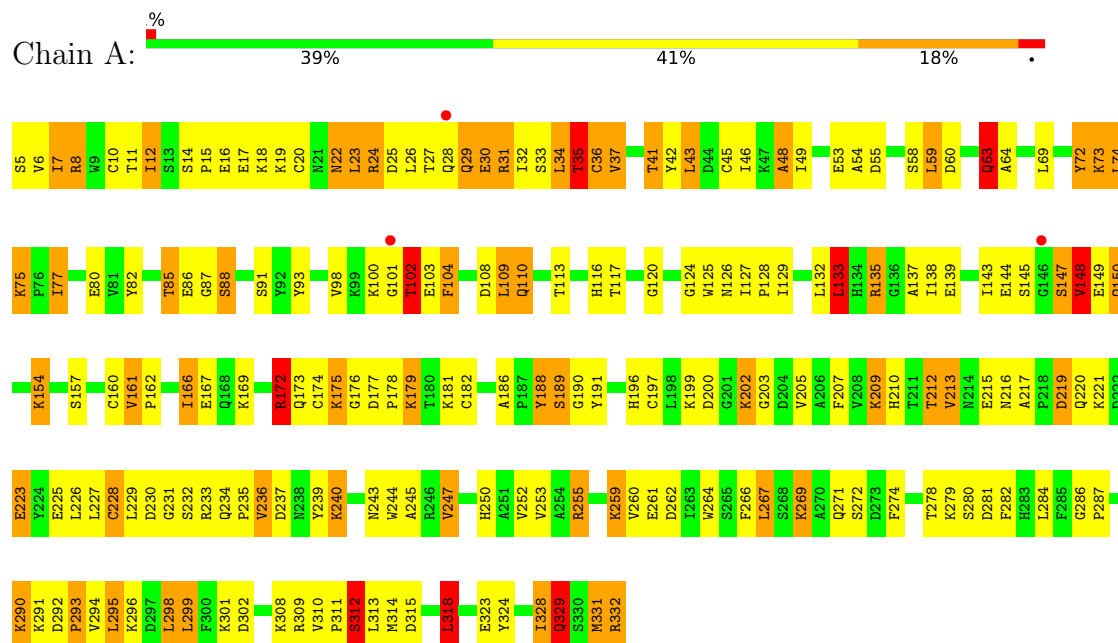
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	108	Total 108	O 108	0	0

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: OVOTRANSFERRIN



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	46.94Å 91.79Å 75.82Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	(Not available) – 2.30 58.46 – 2.30	Depositor EDS
% Data completeness (in resolution range)	(Not available) ((Not available)-2.30) 80.5 (58.46-2.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.26 (at 1.92Å)	Xtriage
Refinement program	TNT, X-PLOR	Depositor
R, R_{free}	0.160 , (Not available) 0.202 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	21.5	Xtriage
Anisotropy	0.168	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , 77.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	2646	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.33% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: FE, CO3

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	1.36	3/2586 (0.1%)	1.63	29/3497 (0.8%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	144	GLU	CD-OE2	5.76	1.36	1.25
1	A	48	ALA	CA-C	-5.64	1.45	1.52
1	A	161	VAL	CA-CB	-5.11	1.47	1.54

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	196	HIS	CA-CB-CG	-9.13	104.67	113.80
1	A	302	ASP	CA-CB-CG	8.33	120.93	112.60
1	A	207	PHE	CA-CB-CG	-7.48	106.32	113.80
1	A	135	ARG	N-CA-C	-6.84	99.44	110.32
1	A	85	THR	N-CA-C	-6.51	104.26	111.36
1	A	12	ILE	N-CA-C	6.27	118.13	112.17
1	A	314	MET	N-CA-C	6.22	119.78	109.46
1	A	35	THR	N-CA-CB	6.16	120.89	110.49
1	A	212	THR	N-CA-C	6.13	121.43	111.37
1	A	172	ARG	N-CA-C	5.78	117.25	111.07
1	A	209	LYS	CB-CA-C	-5.70	98.42	109.76
1	A	88	SER	N-CA-C	5.68	117.16	108.52
1	A	63	GLN	N-CA-CB	5.67	119.03	110.30
1	A	312	SER	CA-C-N	5.59	128.33	120.28
1	A	312	SER	C-N-CA	5.59	128.33	120.28
1	A	72	TYR	N-CA-C	5.56	117.20	111.03
1	A	133	LEU	N-CA-CB	-5.52	102.04	110.26
1	A	148	VAL	CB-CA-C	5.46	119.55	112.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	64	ALA	N-CA-C	-5.23	105.58	111.28
1	A	213	VAL	CB-CA-C	-5.17	105.35	111.97
1	A	329	GLN	CB-CA-C	-5.16	102.55	110.81
1	A	166	ILE	CA-C-N	-5.13	113.71	122.33
1	A	166	ILE	C-N-CA	-5.13	113.71	122.33
1	A	329	GLN	O-C-N	5.12	127.42	122.09
1	A	36	CYS	N-CA-C	5.08	116.81	108.52
1	A	212	THR	CB-CA-C	5.08	119.27	110.84
1	A	237	ASP	CA-CB-CG	5.07	117.67	112.60
1	A	160	CYS	N-CA-CB	5.02	118.58	110.65
1	A	318	LEU	N-CA-C	-5.01	105.82	111.28

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	2533	0	2470	193	0
2	A	1	0	0	0	0
3	A	4	0	0	0	0
4	A	108	0	0	6	0
All	All	2646	0	2470	193	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 39.

All (193) 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:220:GLN:HB2	1:A:223:GLU:HG3	1.38	1.04
1:A:143:ILE:H	1:A:143:ILE:HD12	1.25	1.00
1:A:59:LEU:HG	1:A:63:GLN:HB2	1.52	0.91
1:A:191:TYR:CE1	1:A:209:LYS:HG3	2.12	0.85
1:A:93:TYR:H	1:A:210:HIS:HD2	1.23	0.83

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:229:LEU:HD11	1:A:244:TRP:HA	1.60	0.81
1:A:209:LYS:NZ	1:A:301:LYS:NZ	2.29	0.81
1:A:332:ARG:HG3	1:A:332:ARG:HH11	1.45	0.81
1:A:173:GLN:HB3	1:A:202:LYS:HB3	1.64	0.80
1:A:41:THR:HG23	1:A:43:LEU:H	1.47	0.79
1:A:11:THR:HB	1:A:16:GLU:HG2	1.64	0.79
1:A:209:LYS:HZ3	1:A:301:LYS:NZ	1.81	0.77
1:A:169:LYS:HG3	1:A:172:ARG:NH1	1.99	0.77
1:A:73:LYS:HZ2	1:A:73:LYS:HB3	1.50	0.77
1:A:324:TYR:CZ	1:A:328:ILE:HD11	2.20	0.76
1:A:41:THR:HG23	1:A:43:LEU:N	2.01	0.76
1:A:74:LEU:HB3	1:A:253:VAL:CG1	2.16	0.75
1:A:267:LEU:O	1:A:271:GLN:HG2	1.87	0.75
1:A:77:ILE:HG13	1:A:260:VAL:HG13	1.68	0.74
1:A:209:LYS:NZ	1:A:301:LYS:HZ3	1.83	0.74
1:A:6:VAL:HG12	1:A:33:SER:OG	1.87	0.73
1:A:30:GLU:OE1	1:A:269:LYS:HE3	1.87	0.73
1:A:32:ILE:HD13	1:A:262:ASP:O	1.88	0.73
1:A:324:TYR:O	1:A:328:ILE:HD12	1.89	0.73
1:A:175:LYS:HG3	1:A:176:GLY:N	2.05	0.72
1:A:24:ARG:O	1:A:27:THR:HG22	1.89	0.71
1:A:143:ILE:H	1:A:143:ILE:CD1	1.98	0.71
1:A:229:LEU:HD21	1:A:244:TRP:CD2	2.25	0.71
1:A:24:ARG:HH11	1:A:24:ARG:HG2	1.55	0.71
1:A:24:ARG:HG2	1:A:24:ARG:NH1	2.07	0.69
1:A:191:TYR:CD1	1:A:209:LYS:HG3	2.27	0.69
1:A:75:LYS:HE3	1:A:312:SER:O	1.92	0.69
1:A:45:CYS:O	1:A:49:ILE:HG13	1.93	0.68
1:A:324:TYR:CE1	1:A:328:ILE:HD11	2.29	0.68
1:A:234:GLN:HB3	1:A:235:PRO:HD2	1.74	0.68
1:A:221:LYS:N	4:A:521:HOH:O	2.28	0.67
1:A:125:TRP:C	1:A:128:PRO:HD2	2.20	0.66
1:A:166:ILE:O	1:A:167:GLU:HG2	1.95	0.66
1:A:86:GLU:N	1:A:86:GLU:OE1	2.29	0.66
1:A:293:PRO:HA	1:A:296:LYS:HG3	1.78	0.66
1:A:116:HIS:CD2	1:A:161:VAL:HG22	2.31	0.66
1:A:74:LEU:HB3	1:A:253:VAL:HG13	1.77	0.65
1:A:14:SER:HB2	1:A:15:PRO:HD3	1.79	0.65
1:A:93:TYR:H	1:A:210:HIS:CD2	2.09	0.64
1:A:23:LEU:HB2	1:A:282:PHE:CZ	2.33	0.64
1:A:14:SER:O	1:A:17:GLU:HB3	1.99	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:213:VAL:HG21	1:A:236:VAL:CG2	2.29	0.62
1:A:73:LYS:HB3	1:A:73:LYS:NZ	2.14	0.62
1:A:24:ARG:HA	1:A:27:THR:HG22	1.82	0.61
1:A:169:LYS:HG3	1:A:172:ARG:HH12	1.64	0.61
1:A:274:PHE:HA	1:A:278:THR:HB	1.81	0.61
1:A:255:ARG:HB2	1:A:255:ARG:NH1	2.15	0.61
1:A:229:LEU:CD1	1:A:244:TRP:HA	2.30	0.61
1:A:55:ASP:OD2	1:A:259:LYS:NZ	2.35	0.60
1:A:98:VAL:HG13	1:A:205:VAL:HG12	1.83	0.60
1:A:209:LYS:HZ3	1:A:301:LYS:CE	2.12	0.60
1:A:49:ILE:O	1:A:255:ARG:HD3	2.01	0.60
1:A:12:ILE:HG13	1:A:16:GLU:OE2	2.02	0.60
1:A:295:LEU:HA	1:A:298:LEU:HD21	1.83	0.60
1:A:226:LEU:O	1:A:233:ARG:HA	2.02	0.60
1:A:17:GLU:OE2	1:A:36:CYS:HB2	2.02	0.59
1:A:24:ARG:HB2	1:A:34:LEU:HB3	1.85	0.59
1:A:296:LYS:O	1:A:298:LEU:HD13	2.03	0.59
1:A:150:GLN:O	1:A:154:LYS:HG3	2.02	0.58
1:A:295:LEU:O	1:A:298:LEU:HD22	2.04	0.58
1:A:17:GLU:O	1:A:20:CYS:HB3	2.03	0.58
1:A:216:ASN:O	1:A:290:LYS:HG2	2.04	0.57
1:A:117:THR:HG22	1:A:190:GLY:C	2.29	0.57
1:A:162:PRO:HG2	1:A:189:SER:HA	1.86	0.57
1:A:32:ILE:HG21	1:A:266:PHE:HB2	1.87	0.56
1:A:174:CYS:O	1:A:181:LYS:HD2	2.06	0.56
1:A:178:PRO:HA	1:A:181:LYS:HG2	1.88	0.56
1:A:48:ALA:HB1	1:A:53:GLU:HB2	1.87	0.56
1:A:209:LYS:HZ2	1:A:301:LYS:NZ	2.03	0.55
1:A:126:ASN:HA	1:A:331:MET:HE1	1.88	0.55
1:A:98:VAL:CG1	1:A:205:VAL:HG12	2.36	0.55
1:A:132:LEU:HB3	1:A:138:ILE:HD12	1.88	0.55
1:A:240:LYS:O	1:A:240:LYS:HD2	2.07	0.55
1:A:7:ILE:HD11	1:A:34:LEU:CD2	2.38	0.54
1:A:24:ARG:C	1:A:27:THR:HG22	2.32	0.54
1:A:217:ALA:HB1	1:A:220:GLN:HG2	1.90	0.54
1:A:239:TYR:O	1:A:243:ASN:HB3	2.08	0.53
1:A:24:ARG:HH11	1:A:24:ARG:CG	2.22	0.53
1:A:188:TYR:CZ	1:A:197:CYS:HA	2.44	0.53
1:A:10:CYS:HA	1:A:37:VAL:O	2.09	0.53
1:A:72:TYR:C	1:A:73:LYS:HG3	2.34	0.53
1:A:147:SER:OG	1:A:148:VAL:N	2.40	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:173:GLN:NE2	1:A:202:LYS:O	2.39	0.52
1:A:209:LYS:HZ2	1:A:301:LYS:HZ3	1.55	0.52
1:A:24:ARG:CA	1:A:27:THR:HG22	2.39	0.52
1:A:24:ARG:HA	1:A:27:THR:CG2	2.39	0.52
1:A:332:ARG:HH11	1:A:332:ARG:CG	2.19	0.52
1:A:120:GLY:H	1:A:125:TRP:CG	2.27	0.52
1:A:225:GLU:HB2	1:A:234:GLN:O	2.10	0.52
1:A:103:GLU:O	1:A:104:PHE:HB3	2.09	0.52
1:A:264:TRP:HA	1:A:264:TRP:CE3	2.44	0.52
1:A:291:LYS:HD3	1:A:295:LEU:HB2	1.91	0.52
1:A:213:VAL:HG21	1:A:236:VAL:HG21	1.90	0.52
1:A:213:VAL:HG21	1:A:236:VAL:HG22	1.92	0.52
1:A:229:LEU:HD21	1:A:244:TRP:CE2	2.45	0.51
1:A:210:HIS:HB2	1:A:239:TYR:CG	2.46	0.51
1:A:104:PHE:CD2	1:A:233:ARG:NH2	2.79	0.51
1:A:116:HIS:HD2	1:A:161:VAL:HG22	1.73	0.51
1:A:91:SER:HB2	1:A:247:VAL:O	2.10	0.51
1:A:324:TYR:CE2	1:A:328:ILE:HD11	2.46	0.51
1:A:177:ASP:O	1:A:181:LYS:N	2.43	0.51
1:A:104:PHE:CE2	1:A:233:ARG:NH2	2.79	0.50
1:A:209:LYS:HB2	1:A:212:THR:OG1	2.12	0.50
1:A:12:ILE:HD12	1:A:12:ILE:C	2.37	0.50
1:A:101:GLY:O	1:A:103:GLU:N	2.45	0.50
1:A:240:LYS:HD2	1:A:240:LYS:C	2.36	0.50
1:A:309:ARG:HG2	1:A:310:VAL:N	2.27	0.50
1:A:19:LYS:HG2	1:A:299:LEU:HG	1.93	0.49
1:A:117:THR:HG22	1:A:191:TYR:HA	1.94	0.49
1:A:127:ILE:HD12	1:A:245:ALA:CB	2.42	0.49
1:A:264:TRP:CD1	1:A:309:ARG:HE	2.30	0.49
1:A:41:THR:HA	4:A:522:HOH:O	2.13	0.48
1:A:125:TRP:HD1	1:A:126:ASN:OD1	1.95	0.48
1:A:292:ASP:O	1:A:295:LEU:N	2.38	0.48
1:A:113:THR:OG1	1:A:203:GLY:HA2	2.14	0.48
1:A:186:ALA:HB1	4:A:356:HOH:O	2.13	0.48
1:A:244:TRP:O	1:A:245:ALA:HB2	2.13	0.47
1:A:135:ARG:C	1:A:137:ALA:H	2.23	0.47
1:A:209:LYS:NZ	1:A:301:LYS:HZ1	2.11	0.47
1:A:286:GLY:HA3	1:A:287:PRO:HA	1.49	0.47
1:A:132:LEU:O	1:A:137:ALA:HB3	2.14	0.47
1:A:228:CYS:SG	1:A:234:GLN:HG3	2.55	0.47
1:A:177:ASP:OD1	1:A:178:PRO:HD2	2.15	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:230:ASP:OD1	1:A:231:GLY:N	2.48	0.47
1:A:234:GLN:HB3	1:A:235:PRO:CD	2.42	0.47
1:A:255:ARG:HB2	1:A:255:ARG:CZ	2.45	0.47
1:A:310:VAL:HG13	1:A:311:PRO:HD2	1.97	0.47
1:A:301:LYS:HB3	4:A:509:HOH:O	2.15	0.47
1:A:133:LEU:O	1:A:135:ARG:O	2.32	0.46
1:A:23:LEU:O	1:A:27:THR:HB	2.14	0.46
1:A:6:VAL:HG12	1:A:33:SER:HG	1.79	0.46
1:A:69:LEU:CD1	1:A:69:LEU:N	2.79	0.46
1:A:102:THR:O	1:A:102:THR:OG1	2.29	0.46
1:A:7:ILE:HD11	1:A:34:LEU:HD21	1.99	0.45
1:A:24:ARG:NH1	1:A:25:ASP:OD1	2.48	0.45
1:A:116:HIS:HB3	1:A:124:GLY:O	2.17	0.45
1:A:58:SER:HA	1:A:252:VAL:HA	1.98	0.44
1:A:117:THR:HG22	1:A:191:TYR:N	2.33	0.44
1:A:110:GLN:HE21	1:A:110:GLN:HB3	1.61	0.44
1:A:332:ARG:CG	1:A:332:ARG:NH1	2.79	0.44
1:A:98:VAL:HG21	1:A:227:LEU:HD13	2.00	0.44
1:A:127:ILE:HB	1:A:128:PRO:HD3	1.99	0.44
1:A:80:GLU:OE1	1:A:82:TYR:OH	2.22	0.44
1:A:120:GLY:HA2	1:A:125:TRP:CD1	2.53	0.44
1:A:191:TYR:CE2	1:A:301:LYS:HE3	2.53	0.43
1:A:229:LEU:HD11	1:A:244:TRP:CA	2.40	0.43
1:A:31:ARG:HG2	1:A:32:ILE:HG13	2.01	0.43
1:A:315:ASP:OD1	1:A:318:LEU:HD22	2.17	0.43
1:A:209:LYS:HZ3	1:A:301:LYS:HZ3	1.51	0.43
1:A:109:LEU:HD23	1:A:109:LEU:HA	1.81	0.43
1:A:177:ASP:OD1	1:A:179:LYS:HB2	2.18	0.43
1:A:295:LEU:C	1:A:298:LEU:HD22	2.44	0.43
1:A:77:ILE:HG13	1:A:260:VAL:CG1	2.44	0.43
1:A:27:THR:C	1:A:29:GLN:H	2.25	0.43
1:A:169:LYS:HG3	1:A:172:ARG:CZ	2.49	0.43
1:A:219:ASP:OD1	1:A:290:LYS:HD2	2.19	0.43
1:A:27:THR:HG23	1:A:28:GLN:OE1	2.19	0.42
1:A:42:TYR:CE2	1:A:43:LEU:HD12	2.54	0.42
1:A:329:GLN:C	1:A:331:MET:H	2.27	0.42
1:A:298:LEU:O	1:A:299:LEU:HB2	2.20	0.42
1:A:20:CYS:SG	1:A:34:LEU:HD11	2.60	0.42
1:A:74:LEU:HB3	1:A:253:VAL:HG12	1.98	0.42
1:A:75:LYS:HD3	4:A:343:HOH:O	2.18	0.42
1:A:87:GLY:O	1:A:88:SER:HB3	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:60:ASP:HA	1:A:250:HIS:CD2	2.55	0.42
1:A:34:LEU:HD22	1:A:35:THR:H	1.85	0.42
1:A:245:ALA:HA	4:A:365:HOH:O	2.20	0.41
1:A:188:TYR:OH	1:A:200:ASP:HB2	2.20	0.41
1:A:120:GLY:H	1:A:125:TRP:CD1	2.37	0.41
1:A:209:LYS:HZ3	1:A:301:LYS:HE2	1.82	0.41
1:A:8:ARG:HG3	1:A:54:ALA:HA	2.03	0.41
1:A:77:ILE:N	1:A:252:VAL:O	2.52	0.41
1:A:117:THR:CG2	1:A:191:TYR:HA	2.49	0.41
1:A:117:THR:OG1	1:A:124:GLY:HA3	2.20	0.41
1:A:34:LEU:O	1:A:35:THR:HG23	2.20	0.41
1:A:27:THR:C	1:A:29:GLN:N	2.79	0.41
1:A:177:ASP:HA	1:A:178:PRO:HD3	1.96	0.41
1:A:292:ASP:OD1	1:A:294:VAL:HB	2.20	0.41
1:A:24:ARG:CG	1:A:25:ASP:N	2.79	0.41
1:A:173:GLN:HG3	1:A:202:LYS:O	2.21	0.40
1:A:259:LYS:C	1:A:261:GLU:N	2.79	0.40
1:A:34:LEU:HD23	1:A:34:LEU:HA	1.75	0.40
1:A:54:ALA:O	1:A:55:ASP:OD1	2.39	0.40
1:A:284:LEU:HA	1:A:284:LEU:HD12	1.81	0.40
1:A:135:ARG:C	1:A:137:ALA:N	2.80	0.40
1:A:169:LYS:HZ2	1:A:172:ARG:HH22	1.70	0.40
1:A:22:ASN:HD22	1:A:22:ASN:HA	1.58	0.40
1:A:280:SER:OG	1:A:281:ASP:N	2.54	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	326/328 (99%)	286 (88%)	36 (11%)	4 (1%)	10 12

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	102	THR
1	A	104	PHE
1	A	35	THR
1	A	293	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	A	273/273 (100%)	200 (73%)	73 (27%)	0 0

All (73) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	SER
1	A	7	ILE
1	A	8	ARG
1	A	18	LYS
1	A	22	ASN
1	A	23	LEU
1	A	24	ARG
1	A	26	LEU
1	A	29	GLN
1	A	30	GLU
1	A	31	ARG
1	A	34	LEU
1	A	37	VAL
1	A	41	THR
1	A	43	LEU
1	A	46	ILE
1	A	59	LEU
1	A	63	GLN
1	A	73	LYS
1	A	74	LEU
1	A	75	LYS

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Mol	Chain	Res	Type
1	A	77	ILE
1	A	85	THR
1	A	100	LYS
1	A	102	THR
1	A	108	ASP
1	A	109	LEU
1	A	110	GLN
1	A	129	ILE
1	A	133	LEU
1	A	139	GLU
1	A	145	SER
1	A	147	SER
1	A	148	VAL
1	A	149	GLU
1	A	150	GLN
1	A	154	LYS
1	A	157	SER
1	A	172	ARG
1	A	175	LYS
1	A	179	LYS
1	A	182	CYS
1	A	188	TYR
1	A	189	SER
1	A	199	LYS
1	A	202	LYS
1	A	215	GLU
1	A	219	ASP
1	A	223	GLU
1	A	228	CYS
1	A	232	SER
1	A	236	VAL
1	A	240	LYS
1	A	247	VAL
1	A	255	ARG
1	A	259	LYS
1	A	267	LEU
1	A	269	LYS
1	A	272	SER
1	A	279	LYS
1	A	290	LYS
1	A	295	LEU
1	A	298	LEU

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Mol	Chain	Res	Type
1	A	299	LEU
1	A	308	LYS
1	A	312	SER
1	A	313	LEU
1	A	318	LEU
1	A	323	GLU
1	A	328	ILE
1	A	329	GLN
1	A	331	MET
1	A	332	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	22	ASN
1	A	110	GLN
1	A	196	HIS
1	A	210	HIS
1	A	283	HIS
1	A	329	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](#)

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 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	$\# Z > 2$
3	CO3	A	334	2	3,3,3	1.08	0	2,3,3	0.48	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	328/328 (100%)	0.14	3 (0%) 81 82	3, 25, 50, 70	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	101	GLY	2.2
1	A	28	GLN	2.1
1	A	146	GLY	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, 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
3	CO3	A	334	4/4	0.97	0.05	4,6,6,6	0
2	FE	A	333	1/1	0.98	0.03	12,12,12,12	0

6.5 Other polymers [i](#)

There are no such residues in this entry.