



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 07:37 AM UTC

PDB ID : 2R2F / pdb_00002r2f
Title : RIBONUCLEOTIDE REDUCTASE R2F PROTEIN FROM SALMONELLA
TYPHIMURIUM (OXIDIZED)
Authors : Eklund, H.; Eriksson, M.
Deposited on : 1998-08-24
Resolution : 2.25 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

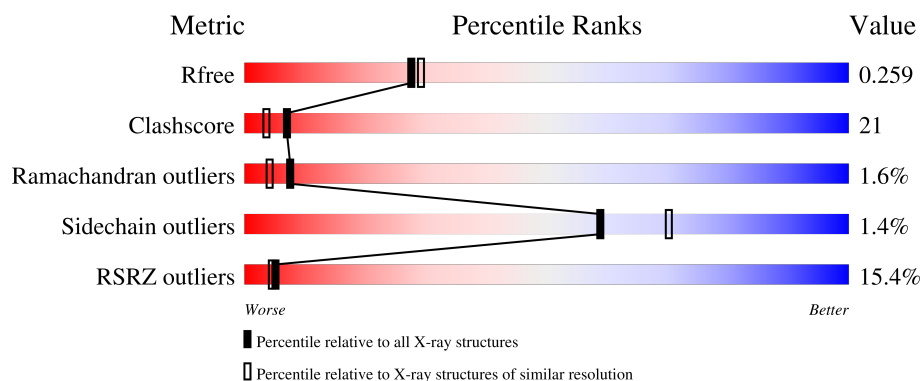
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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}	180053	1898 (2.26-2.26)
Clashscore	190562	2005 (2.26-2.26)
Ramachandran outliers	187476	1965 (2.26-2.26)
Sidechain outliers	187428	1966 (2.26-2.26)
RSRZ outliers	180081	1898 (2.26-2.26)

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	319	5% 66% 20% • 10%
1	B	319	23% 57% 30% • 11%

2 Entry composition [i](#)

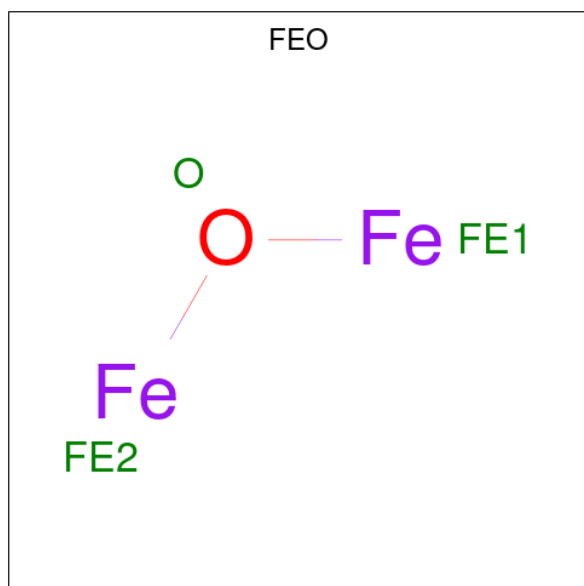
There are 3 unique types of molecules in this entry. The entry contains 5003 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 PROTEIN (RIBONUCLEOSIDE-DIPHOSPHATE REDUCTASE SMALL CHAIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	286	Total	C	N	O	S	0	0	0
			2293	1484	371	430	8			
1	B	285	Total	C	N	O	S	0	0	0
			2289	1484	370	427	8			

- Molecule 2 is MU-OXO-DIIRON (CCD ID: FEO) (formula: Fe₂O).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	Fe	O	0	0
			3	2	1		
2	B	1	Total	Fe	O	0	0
			3	2	1		

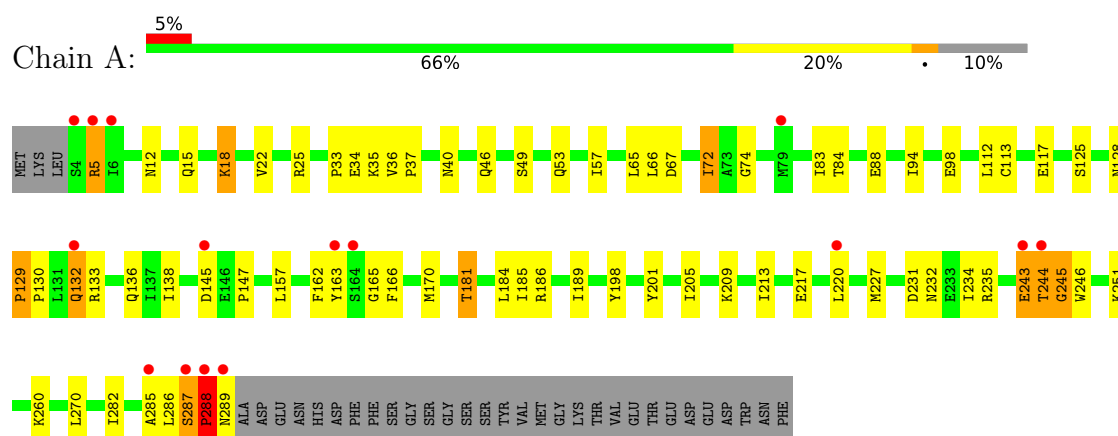
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	260	Total 260	O 260	0	0
3	B	155	Total 155	O 155	0	0

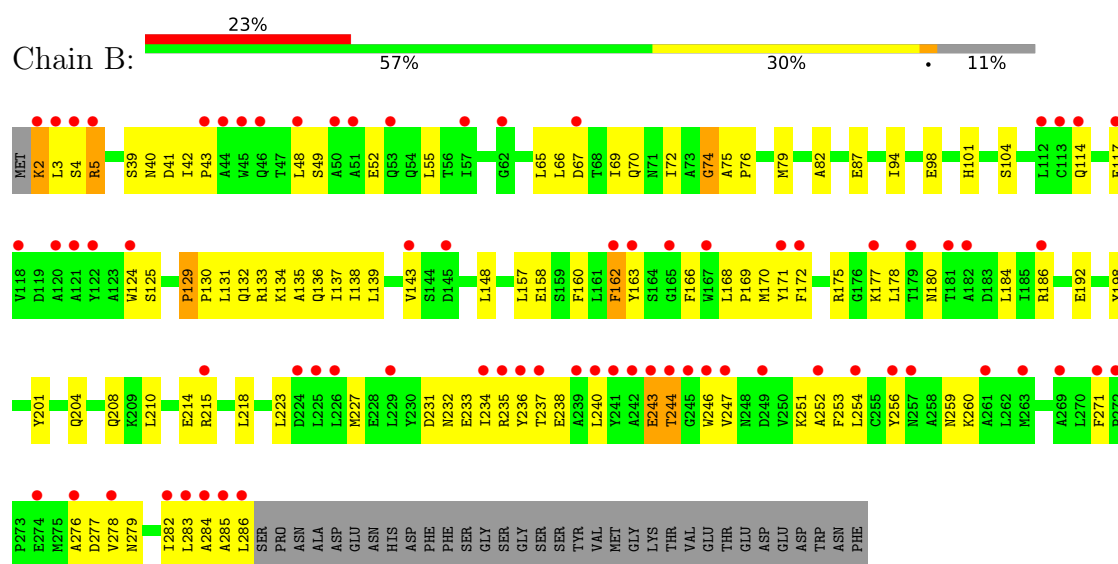
3 Residue-property plots

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: PROTEIN (RIBONUCLEOSIDE-DIPHOSPHATE REDUCTASE SMALL CHAIN)



- Molecule 1: PROTEIN (RIBONUCLEOSIDE-DIPHOSPHATE REDUCTASE SMALL CHAIN)



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	58.49Å 71.74Å 96.07Å 90.00° 95.01° 90.00°	Depositor
Resolution (Å)	20.00 – 2.25 20.00 – 2.25	Depositor EDS
% Data completeness (in resolution range)	99.3 (20.00-2.25) 99.2 (20.00-2.25)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.07	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.18 (at 2.01Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.228 , 0.268 0.224 , 0.259	Depositor DCC
R_{free} test set	2653 reflections (5.10%)	wwPDB-VP
Wilson B-factor (Å ²)	30.7	Xtriage
Anisotropy	0.427	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 53.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	5003	wwPDB-VP
Average B, all atoms (Å ²)	43.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.52% 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: FEO

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	0.49	0/2349	0.91	9/3199 (0.3%)
1	B	0.41	0/2344	0.85	1/3190 (0.0%)
All	All	0.45	0/4693	0.88	10/6389 (0.2%)

There are no bond length outliers.

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	245	GLY	N-CA-C	-7.39	105.02	115.43
1	A	72	ILE	N-CA-C	6.92	117.53	110.82
1	A	287	SER	CA-C-N	6.17	127.56	119.84
1	A	287	SER	C-N-CA	6.17	127.56	119.84
1	A	112	LEU	N-CA-C	5.79	120.36	113.12
1	A	181	THR	N-CA-C	-5.76	105.08	111.36
1	A	113	CYS	N-CA-C	5.68	118.86	110.46
1	A	129	PRO	N-CA-C	5.65	117.59	110.70
1	A	12	ASN	N-CA-C	-5.38	105.94	112.88
1	B	129	PRO	N-CA-C	5.36	117.24	110.70

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	2293	0	2271	107	0
1	B	2289	0	2277	118	0
2	A	3	0	0	0	0
2	B	3	0	0	0	0
3	A	260	0	0	11	1
3	B	155	0	0	5	0
All	All	5003	0	4548	192	1

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 21.

All (192) 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:132:GLN:HG3	1:B:3:LEU:HD13	1.21	1.15
1:B:129:PRO:HG2	1:B:130:PRO:HD3	1.39	1.05
3:A:419:HOH:O	1:B:2:LYS:HB3	1.63	0.99
1:A:132:GLN:HA	1:B:2:LYS:N	1.83	0.93
1:A:132:GLN:HG2	1:B:2:LYS:N	1.84	0.93
1:B:2:LYS:HB2	1:B:2:LYS:NZ	1.81	0.92
1:A:125:SER:O	1:B:2:LYS:HG2	1.72	0.90
1:A:132:GLN:CA	1:B:2:LYS:HD3	2.03	0.89
1:A:189:ILE:HG21	1:A:288:PRO:HA	1.56	0.86
1:A:132:GLN:HA	1:B:2:LYS:HD3	1.60	0.84
1:A:128:ASN:O	1:B:2:LYS:HE3	1.80	0.81
1:A:132:GLN:CG	1:B:3:LEU:HD13	2.10	0.80
1:B:170:MET:HE1	1:B:186:ARG:HH11	1.51	0.75
1:A:132:GLN:HG2	1:B:2:LYS:HZ2	1.52	0.74
1:A:5:ARG:HE	1:B:136:GLN:HA	1.53	0.73
1:A:5:ARG:NE	1:B:136:GLN:HA	2.02	0.73
1:B:168:LEU:HB3	1:B:169:PRO:HD3	1.69	0.73
1:A:129:PRO:HB2	1:A:130:PRO:HD3	1.71	0.71
1:A:5:ARG:NH1	1:B:139:LEU:HD23	2.06	0.70
1:A:5:ARG:HG3	3:A:540:HOH:O	1.91	0.70
1:A:5:ARG:HH11	1:B:139:LEU:HD23	1.57	0.69
1:B:49:SER:OG	1:B:52:GLU:HG3	1.93	0.69
1:A:244:THR:HB	1:A:246:TRP:CE3	2.28	0.69
1:B:2:LYS:HB2	1:B:2:LYS:HZ2	1.58	0.69
1:B:129:PRO:CG	1:B:130:PRO:HD3	2.20	0.68
1:A:132:GLN:CG	1:B:2:LYS:N	2.57	0.67
1:B:40:ASN:HB2	1:B:180:ASN:ND2	2.10	0.66
1:B:2:LYS:HB2	1:B:2:LYS:HZ3	1.61	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:165:GLY:HA2	3:A:543:HOH:O	1.96	0.65
1:B:70:GLN:OE1	1:B:157:LEU:HD23	1.98	0.64
1:A:231:ASP:OD2	1:A:235:ARG:NH2	2.31	0.64
1:B:175:ARG:HA	1:B:175:ARG:HE	1.61	0.64
1:A:132:GLN:CG	1:B:2:LYS:HZ2	2.09	0.64
1:B:172:PHE:CD2	1:B:178:LEU:HD12	2.33	0.64
1:A:125:SER:O	1:B:2:LYS:HE2	1.98	0.64
1:A:132:GLN:N	1:B:2:LYS:HD3	2.13	0.63
1:A:189:ILE:CG2	1:A:288:PRO:HA	2.29	0.62
1:A:243:GLU:O	1:A:245:GLY:N	2.32	0.62
1:B:214:GLU:O	1:B:218:LEU:HD23	2.00	0.62
1:A:260:LYS:HD3	1:A:289:ASN:HB2	1.82	0.62
1:B:166:PHE:O	1:B:170:MET:HG2	2.00	0.62
1:B:247:VAL:HG12	1:B:251:LYS:HE3	1.82	0.62
1:A:220:LEU:C	1:A:220:LEU:HD23	2.25	0.61
1:B:172:PHE:HD2	1:B:178:LEU:HD12	1.65	0.61
1:A:132:GLN:OE1	1:B:3:LEU:HD22	2.00	0.61
1:A:286:LEU:O	1:A:287:SER:HB3	2.01	0.60
1:B:256:TYR:HA	1:B:276:ALA:HB1	1.83	0.60
1:A:5:ARG:HH11	1:A:5:ARG:HG2	1.67	0.60
1:B:259:ASN:HD21	1:B:271:PHE:H	1.48	0.60
1:B:260:LYS:HE2	3:B:443:HOH:O	2.02	0.60
1:A:132:GLN:HB2	1:B:2:LYS:CE	2.32	0.59
1:A:260:LYS:HD3	1:A:289:ASN:CB	2.33	0.59
1:A:157:LEU:HD21	1:A:162:PHE:HE2	1.67	0.58
1:A:201:TYR:CZ	1:A:205:ILE:HD11	2.38	0.58
1:A:289:ASN:C	3:A:490:HOH:O	2.46	0.58
1:A:125:SER:O	1:B:2:LYS:CG	2.49	0.57
1:A:170:MET:HE1	1:A:186:ARG:HG3	1.85	0.57
1:A:132:GLN:HE21	1:B:2:LYS:N	2.02	0.57
1:B:133:ARG:HB3	1:B:232:ASN:HD21	1.69	0.57
1:B:170:MET:HE3	1:B:285:ALA:CB	2.35	0.57
1:A:163:TYR:HE2	1:A:288:PRO:HB2	1.67	0.57
1:B:41:ASP:OD2	1:B:178:LEU:HA	2.04	0.57
1:A:138:ILE:HG21	1:A:157:LEU:HD12	1.86	0.55
1:A:133:ARG:HH11	1:A:133:ARG:HG2	1.70	0.55
1:B:170:MET:HG3	1:B:286:LEU:CD2	2.37	0.55
1:A:49:SER:O	1:A:53:GLN:HG3	2.06	0.55
1:A:132:GLN:HB2	1:B:2:LYS:NZ	2.22	0.55
1:B:233:GLU:HG2	1:B:254:LEU:HD22	1.89	0.55
1:B:66:LEU:HB2	1:B:162:PHE:HE1	1.72	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:132:GLN:CG	1:B:2:LYS:NZ	2.70	0.54
1:A:244:THR:HB	1:A:246:TRP:CD2	2.42	0.54
1:B:170:MET:HE3	1:B:285:ALA:HB1	1.90	0.53
1:A:157:LEU:C	1:A:157:LEU:HD23	2.33	0.53
1:B:124:TRP:CZ2	1:B:240:LEU:HD21	2.44	0.53
1:A:133:ARG:HD2	1:A:136:GLN:NE2	2.23	0.53
1:B:210:LEU:O	1:B:215:ARG:NH1	2.42	0.52
1:B:160:PHE:HE1	1:B:254:LEU:O	1.93	0.52
1:B:148:LEU:HD12	1:B:210:LEU:HD11	1.92	0.52
1:B:184:LEU:C	1:B:184:LEU:HD23	2.35	0.52
1:B:130:PRO:HB2	1:B:236:TYR:HD1	1.74	0.52
1:B:138:ILE:HD12	1:B:138:ILE:N	2.25	0.52
1:B:170:MET:HG3	1:B:286:LEU:HD21	1.91	0.52
1:A:289:ASN:O	3:A:490:HOH:O	2.19	0.51
1:A:5:ARG:HH21	1:B:136:GLN:HG3	1.75	0.51
1:B:253:PHE:HD1	1:B:278:VAL:HG21	1.75	0.51
1:A:57:ILE:CD1	1:A:117:GLU:HG2	2.40	0.51
1:A:5:ARG:NH1	1:A:5:ARG:HG2	2.26	0.51
1:B:237:THR:HG22	1:B:247:VAL:HG13	1.93	0.51
1:B:283:LEU:C	3:B:462:HOH:O	2.53	0.51
1:B:170:MET:HE2	1:B:286:LEU:HD23	1.93	0.50
1:B:247:VAL:CG1	1:B:251:LYS:HE3	2.42	0.50
1:A:232:ASN:HA	1:A:235:ARG:NH1	2.26	0.50
1:A:163:TYR:CE2	1:A:288:PRO:HB2	2.46	0.50
1:B:252:ALA:HB1	1:B:277:ASP:O	2.12	0.49
1:A:163:TYR:OH	1:A:189:ILE:HG23	2.13	0.49
1:A:186:ARG:NH1	1:A:285:ALA:O	2.45	0.49
1:A:72:ILE:HD11	3:B:455:HOH:O	2.11	0.49
1:B:198:TYR:O	1:B:201:TYR:HB3	2.12	0.49
1:A:65:LEU:CD2	1:B:2:LYS:HG3	2.42	0.49
1:A:15:GLN:NE2	3:A:548:HOH:O	2.40	0.49
1:B:134:LYS:O	1:B:138:ILE:HD13	2.13	0.49
1:A:157:LEU:HD21	1:A:162:PHE:CE2	2.48	0.48
1:A:163:TYR:CZ	1:A:189:ILE:HG23	2.48	0.48
1:A:227:MET:CE	1:A:270:LEU:HD21	2.42	0.48
1:B:223:LEU:O	1:B:227:MET:HG2	2.12	0.48
1:B:231:ASP:O	1:B:235:ARG:HG3	2.12	0.48
1:A:231:ASP:O	1:A:235:ARG:HG3	2.13	0.48
1:B:42:ILE:N	1:B:43:PRO:HD2	2.27	0.48
1:B:243:GLU:O	1:B:244:THR:C	2.56	0.48
1:A:282:ILE:O	1:A:286:LEU:HB2	2.14	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:75:ALA:HB3	1:B:76:PRO:HD3	1.96	0.48
1:A:18:LYS:HE3	1:A:18:LYS:HA	1.96	0.48
1:A:133:ARG:NH2	3:A:527:HOH:O	2.45	0.48
1:A:98:GLU:HA	1:A:98:GLU:OE1	2.14	0.48
1:B:175:ARG:HA	1:B:175:ARG:NE	2.29	0.48
1:B:244:THR:HB	1:B:246:TRP:CE3	2.49	0.48
1:B:2:LYS:HZ2	1:B:2:LYS:CB	2.25	0.48
1:A:163:TYR:HE2	1:A:288:PRO:CB	2.27	0.48
1:B:171:TYR:CZ	1:B:175:ARG:HD2	2.49	0.47
1:A:234:ILE:HG23	1:A:251:LYS:HE2	1.96	0.47
1:B:67:ASP:OD2	1:B:162:PHE:HZ	1.98	0.47
1:A:286:LEU:HG	1:A:288:PRO:HD3	1.97	0.47
1:B:40:ASN:HB2	1:B:180:ASN:HD21	1.77	0.47
1:B:278:VAL:HB	1:B:283:LEU:HD21	1.96	0.47
1:A:287:SER:N	1:A:288:PRO:HD3	2.29	0.47
1:A:132:GLN:HG2	1:B:2:LYS:CA	2.43	0.47
1:A:67:ASP:CG	1:A:162:PHE:CZ	2.93	0.46
1:B:2:LYS:N	1:B:2:LYS:HD3	2.31	0.46
1:A:66:LEU:HB3	1:A:162:PHE:CE2	2.50	0.46
1:A:25:ARG:HE	1:A:25:ARG:HB2	1.53	0.46
1:A:163:TYR:HA	1:A:166:PHE:CD2	2.50	0.46
1:B:39:SER:O	1:B:42:ILE:HG13	2.16	0.46
1:A:130:PRO:HA	1:A:232:ASN:HD21	1.81	0.45
1:A:40:ASN:ND2	3:A:354:HOH:O	2.49	0.45
1:B:163:TYR:O	1:B:253:PHE:HE2	1.98	0.45
1:A:166:PHE:CE2	1:A:189:ILE:HG12	2.52	0.45
1:A:132:GLN:N	1:B:2:LYS:CD	2.77	0.45
1:B:2:LYS:NZ	1:B:2:LYS:CB	2.65	0.45
1:A:5:ARG:HD3	1:B:139:LEU:HD23	1.98	0.44
1:A:132:GLN:HB2	1:B:2:LYS:HE3	1.99	0.44
1:B:114:GLN:O	1:B:117:GLU:HB3	2.17	0.44
1:B:279:ASN:HB3	1:B:282:ILE:HG12	1.99	0.44
1:A:132:GLN:CA	1:B:2:LYS:N	2.68	0.44
1:B:158:GLU:HG2	1:B:192:GLU:OE2	2.17	0.44
1:A:67:ASP:OD2	1:A:162:PHE:CE1	2.71	0.44
1:B:131:LEU:O	1:B:134:LYS:HG2	2.18	0.44
1:A:133:ARG:HH11	1:A:133:ARG:CG	2.30	0.44
1:B:3:LEU:HB3	1:B:4:SER:H	1.63	0.44
1:A:213:ILE:O	1:A:217:GLU:HG3	2.17	0.44
1:A:132:GLN:O	1:A:132:GLN:NE2	2.51	0.44
1:A:145:ASP:O	1:A:147:PRO:HD3	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:184:LEU:C	1:A:184:LEU:HD23	2.43	0.43
1:B:259:ASN:ND2	1:B:271:PHE:H	2.16	0.43
1:A:83:ILE:HG13	1:A:84:THR:HG23	2.01	0.43
1:A:129:PRO:CB	1:A:130:PRO:HD3	2.45	0.43
1:A:209:LYS:NZ	3:A:519:HOH:O	2.51	0.43
1:B:284:ALA:N	3:B:462:HOH:O	2.51	0.43
1:B:101:HIS:O	1:B:104:SER:HB2	2.19	0.43
1:B:170:MET:HE2	1:B:286:LEU:HA	2.01	0.43
1:A:133:ARG:HD2	1:A:133:ARG:HA	1.87	0.43
1:B:5:ARG:HG2	1:B:5:ARG:HH11	1.84	0.42
1:A:162:PHE:O	1:A:163:TYR:C	2.62	0.42
1:B:125:SER:O	1:B:132:GLN:NE2	2.52	0.42
1:A:181:THR:O	1:A:185:ILE:HG12	2.19	0.42
1:B:74:GLY:O	1:B:75:ALA:C	2.62	0.42
1:A:227:MET:HE2	1:A:270:LEU:HD21	2.00	0.42
1:A:94:ILE:O	1:A:98:GLU:HG2	2.20	0.42
1:A:22:VAL:HG21	1:A:198:TYR:CD1	2.55	0.42
1:A:35:LYS:NZ	3:A:451:HOH:O	2.52	0.42
1:A:88:GLU:OE1	1:B:72:ILE:HD13	2.20	0.41
1:A:286:LEU:O	1:A:287:SER:CB	2.68	0.41
1:B:133:ARG:O	1:B:137:ILE:HG13	2.20	0.41
1:B:260:LYS:HD3	3:B:385:HOH:O	2.19	0.41
1:A:166:PHE:O	1:A:170:MET:HG2	2.21	0.41
1:B:94:ILE:O	1:B:98:GLU:HG2	2.20	0.41
1:B:134:LYS:HG3	1:B:135:ALA:N	2.35	0.41
1:A:33:PRO:HG2	1:A:34:GLU:OE1	2.20	0.41
1:B:139:LEU:O	1:B:143:VAL:HG23	2.21	0.41
1:A:5:ARG:HH21	1:B:136:GLN:CG	2.33	0.41
1:B:234:ILE:O	1:B:238:GLU:HG3	2.21	0.41
1:A:286:LEU:HG	1:A:288:PRO:CD	2.51	0.41
1:A:132:GLN:CB	1:B:2:LYS:NZ	2.83	0.41
3:A:456:HOH:O	1:B:79:MET:HG2	2.21	0.41
1:B:48:LEU:HD11	1:B:177:LYS:HD3	2.03	0.41
1:B:204:GLN:O	1:B:208:GLN:HG2	2.21	0.41
1:A:286:LEU:HD21	1:A:288:PRO:HB3	2.02	0.40
1:B:65:LEU:O	1:B:69:ILE:HG13	2.21	0.40
1:B:82:ALA:HA	1:B:87:GLU:OE2	2.21	0.40
1:B:160:PHE:CE1	1:B:254:LEU:O	2.74	0.40
1:A:36:VAL:HA	1:A:37:PRO:HD3	1.83	0.40
1:B:138:ILE:N	1:B:138:ILE:CD1	2.85	0.40
1:B:66:LEU:HB3	1:B:157:LEU:HD11	2.03	0.40

All (1) 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)
3:A:563:HOH:O	3:A:577:HOH:O[2_646]	1.95	0.25

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	284/319 (89%)	267 (94%)	12 (4%)	5 (2%)	6	3
1	B	283/319 (89%)	259 (92%)	20 (7%)	4 (1%)	9	5
All	All	567/638 (89%)	526 (93%)	32 (6%)	9 (2%)	7	4

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	5	ARG
1	A	244	THR
1	B	5	ARG
1	B	243	GLU
1	B	244	THR
1	A	243	GLU
1	A	288	PRO
1	B	74	GLY
1	A	74	GLY

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	246/275 (90%)	242 (98%)	4 (2%)	55	66
1	B	245/275 (89%)	242 (99%)	3 (1%)	63	74
All	All	491/550 (89%)	484 (99%)	7 (1%)	59	70

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	LYS
1	A	46	GLN
1	A	132	GLN
1	A	288	PRO
1	B	2	LYS
1	B	55	LEU
1	B	162	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	15	GLN
1	A	40	ASN
1	A	46	GLN
1	A	71	ASN
1	A	128	ASN
1	A	136	GLN
1	A	232	ASN
1	A	248	ASN
1	B	29	ASN
1	B	40	ASN
1	B	46	GLN
1	B	53	GLN
1	B	71	ASN
1	B	128	ASN
1	B	208	GLN
1	B	232	ASN
1	B	259	ASN
1	B	264	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	FEO	B	320	1,3	0,2,2	-	-	-		
2	FEO	A	320	1,3	0,2,2	-	-	-		

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

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	286/319 (89%)	0.05	15 (5%) 33 31	19, 30, 47, 63	0
1	B	285/319 (89%)	1.23	73 (25%) 1 1	22, 57, 80, 84	0
All	All	571/638 (89%)	0.64	88 (15%) 5 4	19, 37, 74, 84	0

All (88) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	4	SER	8.4
1	B	2	LYS	7.8
1	B	3	LEU	5.3
1	A	287	SER	5.1
1	A	289	ASN	4.7
1	A	288	PRO	4.6
1	B	246	TRP	4.5
1	B	247	VAL	4.2
1	B	121	ALA	4.0
1	B	278	VAL	3.9
1	B	172	PHE	3.9
1	A	163	TYR	3.9
1	B	257	ASN	3.9
1	B	245	GLY	3.8
1	B	239	ALA	3.7
1	B	167	TRP	3.6
1	B	224	ASP	3.6
1	B	51	ALA	3.5
1	B	269	ALA	3.4
1	B	67	ASP	3.4
1	B	171	TYR	3.3
1	B	234	ILE	3.3
1	B	282	ILE	3.3
1	A	132	GLN	3.2

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Mol	Chain	Res	Type	RSRZ
1	B	244	THR	3.2
1	B	276	ALA	3.1
1	B	53	GLN	3.1
1	B	120	ALA	3.1
1	B	112	LEU	3.0
1	B	249	ASP	3.0
1	A	243	GLU	3.0
1	B	241	TYR	2.9
1	B	272	PRO	2.9
1	A	4	SER	2.8
1	B	240	LEU	2.8
1	A	145	ASP	2.8
1	B	242	ALA	2.8
1	A	5	ARG	2.8
1	B	286	LEU	2.7
1	A	285	ALA	2.7
1	B	162	PHE	2.7
1	B	114	GLN	2.7
1	B	118	VAL	2.7
1	B	145	ASP	2.7
1	B	236	TYR	2.7
1	B	229	LEU	2.7
1	A	6	ILE	2.6
1	B	237	THR	2.6
1	B	271	PHE	2.6
1	B	256	TYR	2.6
1	B	122	TYR	2.5
1	B	254	LEU	2.5
1	B	57	ILE	2.5
1	B	263	MET	2.5
1	B	50	ALA	2.5
1	B	274	GLU	2.4
1	B	252	ALA	2.4
1	B	179	THR	2.4
1	B	226	LEU	2.4
1	B	44	ALA	2.3
1	B	182	ALA	2.3
1	A	164	SER	2.3
1	A	244	THR	2.3
1	B	48	LEU	2.3
1	B	45	TRP	2.3
1	B	285	ALA	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	46	GLN	2.3
1	B	117	GLU	2.3
1	B	283	LEU	2.2
1	B	113	CYS	2.2
1	B	165	GLY	2.2
1	B	124	TRP	2.2
1	B	62	GLY	2.2
1	A	220	LEU	2.2
1	B	5	ARG	2.2
1	B	177	LYS	2.2
1	B	225	LEU	2.2
1	B	43	PRO	2.2
1	B	163	TYR	2.1
1	B	235	ARG	2.1
1	B	261	ALA	2.1
1	B	143	VAL	2.1
1	B	215	ARG	2.1
1	A	79	MET	2.0
1	B	181	THR	2.0
1	B	243	GLU	2.0
1	B	284	ALA	2.0
1	B	186	ARG	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
2	FEO	B	320	3/3	0.98	0.04	41,41,42,47	1

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	FEO	A	320	3/3	0.99	0.04	32,32,32,36	1

6.5 Other polymers [i](#)

There are no such residues in this entry.