



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 11:52 PM GMT

PDB ID : 1YQ3
Title : Avian respiratory complex ii with oxaloacetate and ubiquinone
Authors : Huang, L.; Cobessi, D.; Tung, E.Y.; Berry, E.A.
Deposited on : 2005-02-01
Resolution : 2.20 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
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

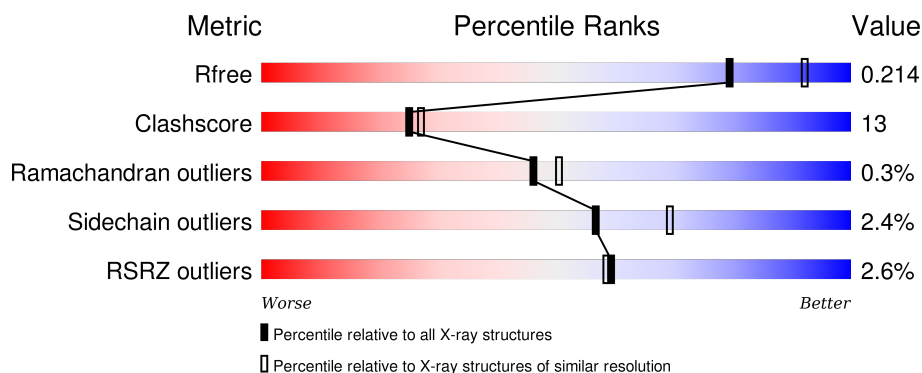
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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}	91344	3774 (2.20-2.20)
Clashscore	102246	4477 (2.20-2.20)
Ramachandran outliers	100387	4404 (2.20-2.20)
Sidechain outliers	100360	4405 (2.20-2.20)
RSRZ outliers	91569	3781 (2.20-2.20)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	621	<div> <div>2%</div> <div>73%</div> <div>24%</div> <div>..</div> </div>
2	B	252	<div> <div>5%</div> <div>73%</div> <div>18%</div> <div>..</div> </div>
3	C	141	<div> <div>3%</div> <div>70%</div> <div>28%</div> <div>..</div> </div>
4	D	103	<div> <div>74%</div> <div>22%</div> <div>..</div> </div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
11	TEO	A	1002	X	-	X	-
12	UQ	B	1005	-	-	-	X
13	PEE	C	144	-	-	-	X
14	UNL	B	1007	-	-	-	X
5	BHG	C	142	X	-	-	X

2 Entry composition

There are 16 unique types of molecules in this entry. The entry contains 9576 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 Succinate dehydrogenase flavoprotein subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	614	Total	C	N	O	S	0	0	0
			4736	2962	845	900	29			

- Molecule 2 is a protein called succinate dehydrogenase Ip subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	242	Total	C	N	O	S	0	0	0
			1930	1220	327	361	22			

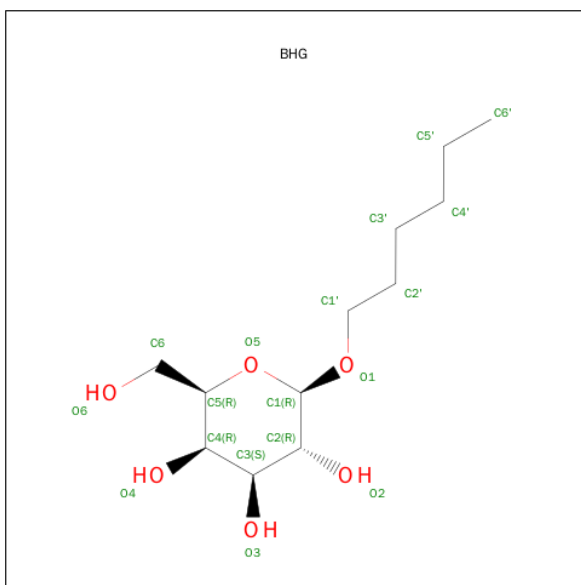
- Molecule 3 is a protein called SUCCINATE DEHYDROGENASE CYTOCHROME B, LARGE SUBUNIT.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	140	Total	C	N	O	S	0	0	1
			1071	703	179	185	4			

- Molecule 4 is a protein called SUCCINATE DEHYDROGENASE CYTOCHROME B, SMALL SUBUNIT.

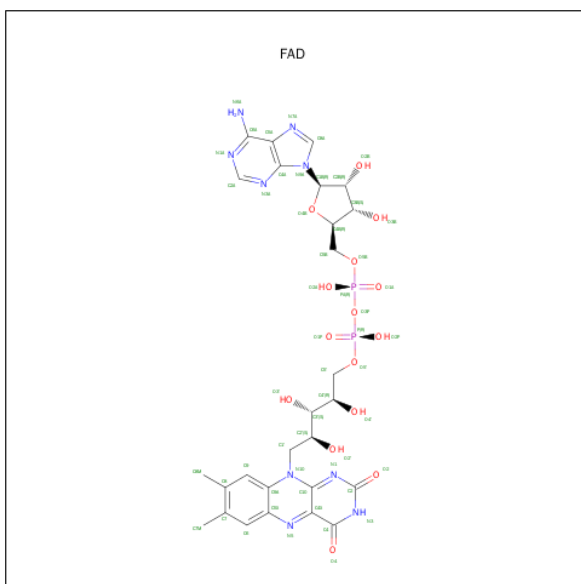
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	102	Total	C	N	O	S	0	0	0
			770	508	122	137	3			

- Molecule 5 is SUGAR (2-HEXYLOXY-6-HYDROXYMETHYL-TETRAHYDRO-PYRAN-3,4,5-TRIOL) (three-letter code: BHG) (formula: C₁₂H₂₄O₆).



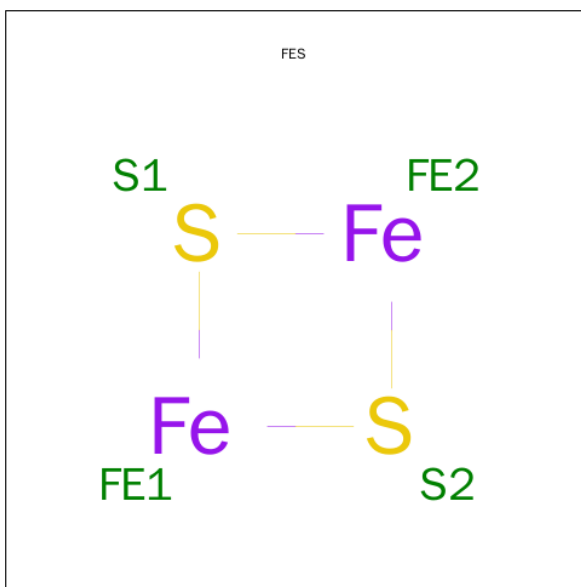
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	C	1	Total	C	O	0	0
			18	12	6		

- Molecule 6 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



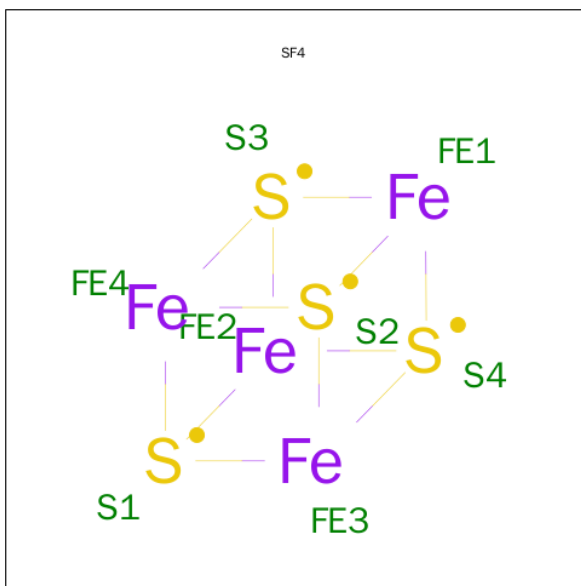
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 7 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe_2S_2).



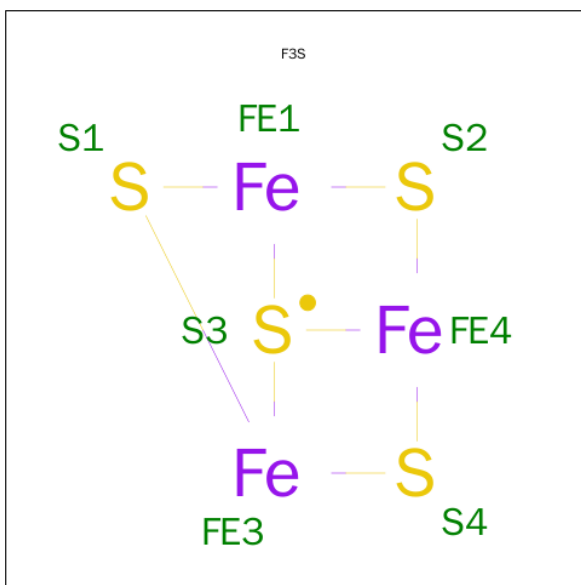
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	B	1	Total	Fe	S	0	0
			4	2	2		

- Molecule 8 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe_4S_4).



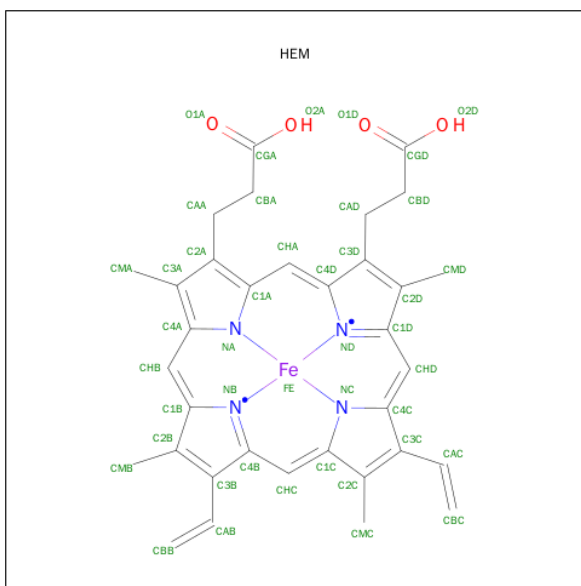
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	B	1	Total	Fe	S	0	0
			8	4	4		

- Molecule 9 is FE3-S4 CLUSTER (three-letter code: F3S) (formula: Fe_3S_4).



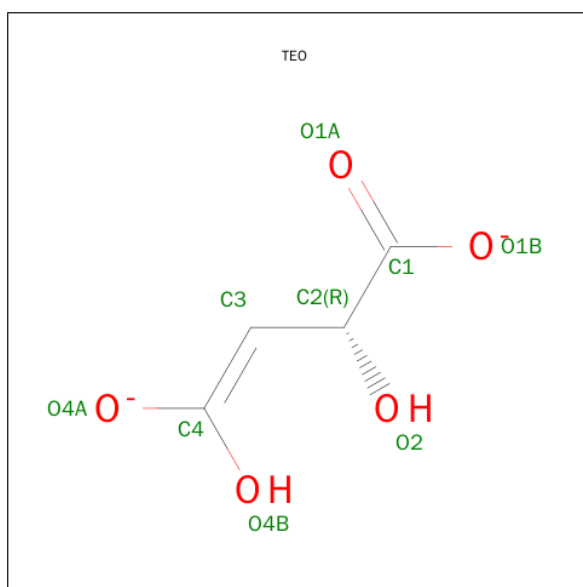
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
9	B	1	Total	Fe	S		0	0
			7	3	4			

- Molecule 10 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).



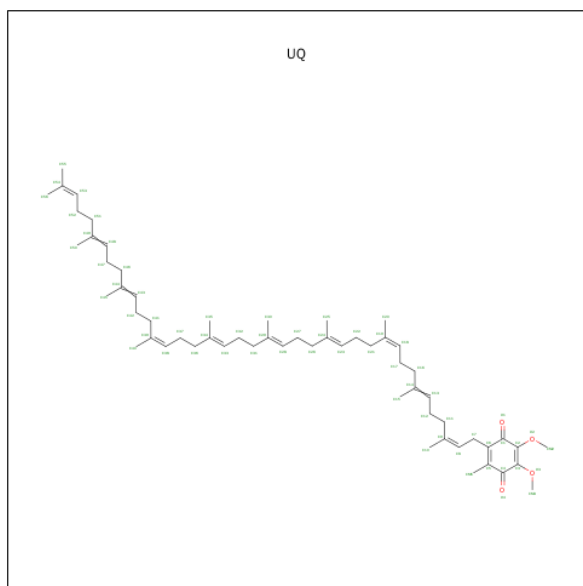
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
10	C	1	Total	C	Fe	N	O	0	0
			41	32	1	4	4		

- Molecule 11 is MALATE LIKE INTERMEDIATE (three-letter code: TEO) (formula: $C_4H_4O_5$).



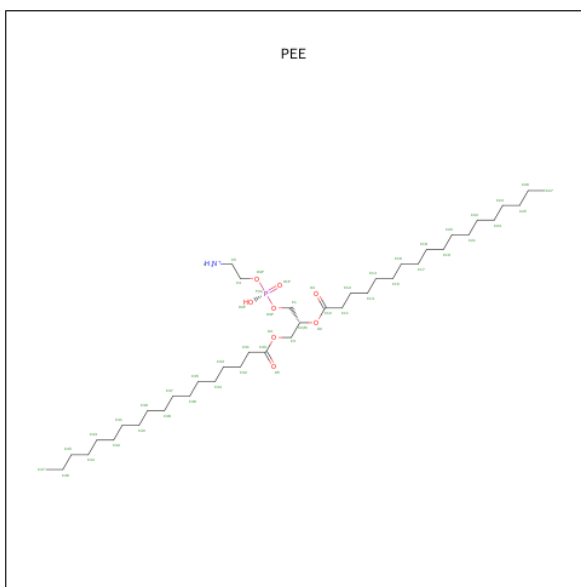
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
11	A	1	Total	C	O	0	0
			9	4	5		

- Molecule 12 is COENZYME Q10, (2Z,6E,10Z,14E,18E,22E,26Z)-ISOMER (three-letter code: UQ) (formula: C₅₉H₉₀O₄).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
12	B	1	Total	C	O	0	0
			14	10	4		

- Molecule 13 is 1,2-DIOLEOYL-SN-GLYCERO-3-PHOSPHOETHANOLAMINE (three-letter code: PEE) (formula: C₄₁H₈₃NO₈P).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
13	D	1	Total C 24 24	0	0
13	C	1	Total C O 21 19 2	0	0

- Molecule 14 is UNKNOWN LIGAND (three-letter code: UNL) (formula:).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
14	B	6	Total O 6 6	0	0
14	A	15	Total O 15 15	0	0
14	D	5	Total O 5 5	0	0
14	C	4	Total O 4 4	0	0

- Molecule 15 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
15	B	1	Total	C	O	0	0
			6	3	3		

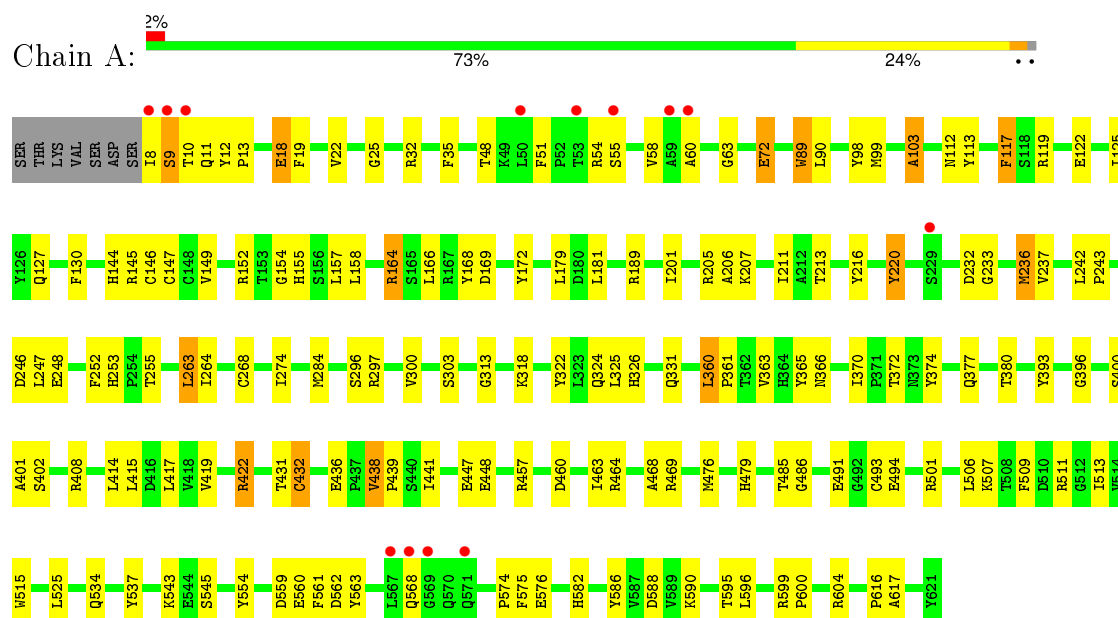
- Molecule 16 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
16	A	440	Total	O	0	0
			440	440		
16	B	213	Total	O	0	0
			213	213		
16	C	96	Total	O	0	0
			96	96		
16	D	85	Total	O	0	0
			85	85		

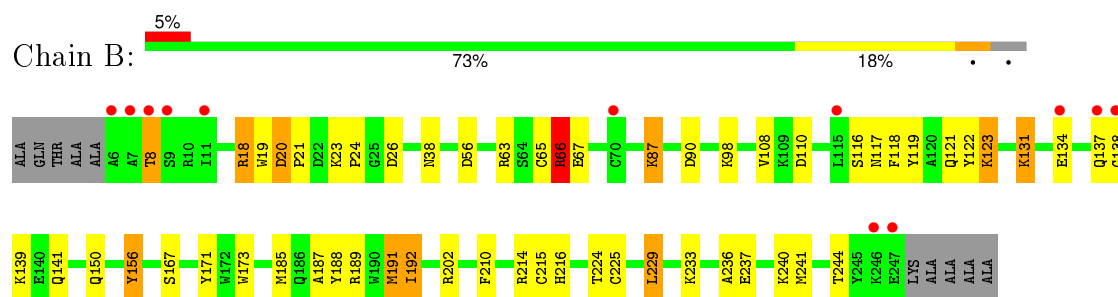
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

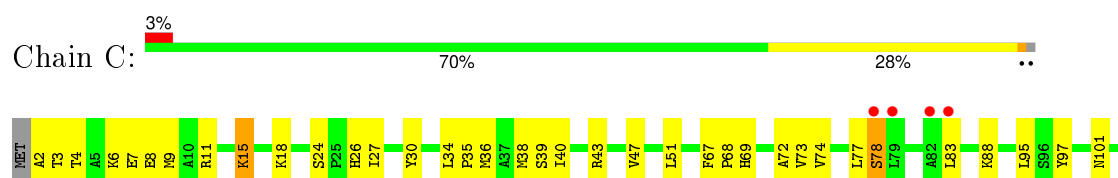
• Molecule 1: Succinate dehydrogenase flavoprotein subunit



• Molecule 2: succinate dehydrogenase Ip subunit



• Molecule 3: SUCCINATE DEHYDROGENASE CYTOCHROME B, LARGE SUBUNIT





● Molecule 4: SUCCINATE DEHYDROGENASE CYTOCHROME B, SMALL SUBUNIT



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	70.01 Å 84.40 Å 289.50 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.66 – 2.20 38.66 – 2.20	Depositor EDS
% Data completeness (in resolution range)	89.2 (38.66-2.20) 89.3 (38.66-2.20)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.12	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.69 (at 2.20 Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.175 , 0.223 0.169 , 0.214	Depositor DCC
R_{free} test set	3842 reflections (5.13%)	DCC
Wilson B-factor (Å ²)	39.5	Xtriage
Anisotropy	0.642	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 65.0	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.28$	Xtriage
Outliers	0 of 78719 reflections	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	9576	wwPDB-VP
Average B, all atoms (Å ²)	44.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.22% 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, 0.375 respectively for untwinned datasets, and 0.333, 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: GOL, TEO, SF4, UQ, BHG, F3S, FES, PEE, HEM, UNL, FAD

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	1.32	15/4837 (0.3%)	1.17	23/6550 (0.4%)
2	B	1.38	10/1972 (0.5%)	1.24	12/2661 (0.5%)
3	C	1.30	3/1100 (0.3%)	1.07	2/1497 (0.1%)
4	D	1.34	1/793 (0.1%)	1.05	1/1089 (0.1%)
All	All	1.33	29/8702 (0.3%)	1.16	38/11797 (0.3%)

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
1	A	0	5
3	C	0	1
4	D	0	1
All	All	0	7

All (29) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	494	GLU	CG-CD	8.65	1.65	1.51
2	B	215	CYS	CB-SG	8.55	1.96	1.82
1	A	22	VAL	CB-CG2	-8.31	1.35	1.52
2	B	191	MET	SD-CE	-8.28	1.31	1.77
1	A	220	TYR	CD2-CE2	8.02	1.51	1.39
2	B	123	LYS	CE-NZ	7.75	1.68	1.49
3	C	36	MET	SD-CE	-7.60	1.35	1.77
1	A	103	ALA	CA-CB	6.87	1.66	1.52
1	A	18	GLU	CG-CD	6.57	1.61	1.51
3	C	126	VAL	CA-CB	6.51	1.68	1.54
2	B	67	GLU	CG-CD	-6.50	1.42	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	89	TRP	CB-CG	6.36	1.61	1.50
1	A	494	GLU	CB-CG	6.26	1.64	1.52
1	A	432	CYS	CB-SG	-6.25	1.71	1.82
4	D	73	TYR	CE1-CZ	6.24	1.46	1.38
2	B	116	SER	CB-OG	-5.89	1.34	1.42
2	B	167	SER	CB-OG	5.87	1.49	1.42
2	B	156	TYR	CD2-CE2	5.84	1.48	1.39
2	B	118	PHE	CD2-CE2	5.72	1.50	1.39
1	A	448	GLU	CG-CD	5.53	1.60	1.51
3	C	97	TYR	CE2-CZ	5.45	1.45	1.38
1	A	51	PHE	CE2-CZ	5.23	1.47	1.37
2	B	122	TYR	CG-CD2	5.21	1.46	1.39
1	A	617	ALA	CA-CB	5.15	1.63	1.52
1	A	374	TYR	CD1-CE1	-5.13	1.31	1.39
1	A	331	GLN	CG-CD	5.12	1.62	1.51
1	A	117	PHE	CE2-CZ	5.06	1.47	1.37
1	A	248	GLU	CD-OE2	5.04	1.31	1.25
2	B	241	MET	SD-CE	-5.01	1.49	1.77

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	18	ARG	NE-CZ-NH2	-16.70	111.95	120.30
1	A	422	ARG	NE-CZ-NH1	10.79	125.69	120.30
2	B	18	ARG	NE-CZ-NH1	10.29	125.45	120.30
1	A	119	ARG	NE-CZ-NH1	-9.73	115.43	120.30
1	A	422	ARG	NE-CZ-NH2	-8.70	115.95	120.30
1	A	408	ARG	NE-CZ-NH2	-8.34	116.13	120.30
2	B	66	ARG	NE-CZ-NH2	-8.13	116.24	120.30
2	B	191	MET	CG-SD-CE	-7.73	87.83	100.20
2	B	18	ARG	CG-CD-NE	-7.00	97.09	111.80
2	B	66	ARG	NE-CZ-NH1	6.87	123.74	120.30
1	A	604	ARG	NE-CZ-NH1	6.71	123.66	120.30
2	B	20	ASP	CB-CG-OD2	-6.64	112.32	118.30
1	A	255	THR	N-CA-C	6.50	128.56	111.00
1	A	236	MET	CG-SD-CE	-6.39	89.98	100.20
2	B	20	ASP	CB-CG-OD1	6.25	123.93	118.30
2	B	202	ARG	NE-CZ-NH1	6.22	123.41	120.30
1	A	22	VAL	CB-CA-C	-6.14	99.73	111.40
3	C	38	MET	CG-SD-CE	5.97	109.75	100.20
1	A	152	ARG	NE-CZ-NH2	-5.89	117.36	120.30
1	A	588	ASP	CB-CG-OD1	-5.81	113.07	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	604	ARG	NE-CZ-NH2	-5.77	117.42	120.30
1	A	263	LEU	CB-CG-CD2	5.71	120.70	111.00
1	A	164	ARG	NE-CZ-NH2	-5.60	117.50	120.30
1	A	246	ASP	CB-CG-OD2	5.58	123.32	118.30
1	A	460	ASP	CB-CG-OD2	-5.49	113.36	118.30
1	A	119	ARG	NE-CZ-NH2	5.44	123.02	120.30
1	A	263	LEU	CB-CG-CD1	-5.42	101.79	111.00
1	A	360	LEU	CA-CB-CG	5.34	127.59	115.30
1	A	54	ARG	NE-CZ-NH1	5.33	122.97	120.30
2	B	210	PHE	N-CA-C	5.30	125.32	111.00
3	C	15	LYS	CD-CE-NZ	5.26	123.79	111.70
1	A	274	ILE	CG1-CB-CG2	-5.25	99.85	111.40
1	A	501	ARG	NE-CZ-NH1	-5.25	117.68	120.30
1	A	164	ARG	NE-CZ-NH1	5.24	122.92	120.30
4	D	36	ASP	CB-CG-OD2	-5.24	113.59	118.30
2	B	192	ILE	CB-CG1-CD1	-5.18	99.39	113.90
1	A	464	ARG	NE-CZ-NH1	5.18	122.89	120.30
2	B	87	LYS	CD-CE-NZ	-5.08	100.02	111.70

There are no chirality outliers.

All (7) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	113	TYR	Sidechain
1	A	172	TYR	Sidechain
1	A	322	TYR	Sidechain
1	A	365	TYR	Sidechain
1	A	98	TYR	Sidechain
3	C	30	TYR	Sidechain
4	D	58	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	A	4736	0	4616	110	0
2	B	1930	0	1916	53	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	C	1071	0	1106	39	0
4	D	770	0	763	30	0
5	C	18	0	24	1	0
6	A	53	0	29	6	0
7	B	4	0	0	0	0
8	B	8	0	0	0	0
9	B	7	0	0	0	0
10	C	41	0	24	1	0
11	A	9	0	2	4	0
12	B	14	0	9	13	0
13	C	21	0	35	3	0
13	D	24	0	40	4	0
14	A	15	0	0	0	0
14	B	6	0	0	0	0
14	C	4	0	0	0	0
14	D	5	0	0	1	0
15	B	6	0	8	0	0
16	A	440	0	0	18	0
16	B	213	0	0	7	0
16	C	96	0	0	7	0
16	D	85	0	0	2	0
All	All	9576	0	8572	219	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 13.

All (219) 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:B:123:LYS:CE	2:B:123:LYS:NZ	1.68	1.51
1:A:476:MET:CE	1:A:476:MET:SD	2.01	1.48
2:B:185:MET:CE	2:B:185:MET:SD	2.01	1.47
2:B:123:LYS:HE3	3:C:8:GLU:OE1	1.62	0.98
1:A:164:ARG:HH22	2:B:137:GLN:HE22	1.03	0.94
1:A:216:TYR:H	1:A:366:ASN:ND2	1.68	0.90
2:B:134:GLU:O	2:B:137:GLN:HG3	1.71	0.89
1:A:438:VAL:HG23	1:A:439:PRO:HD2	1.53	0.88
1:A:112:ASN:HD22	2:B:138:GLY:H	1.23	0.86
2:B:214:ARG:HH22	4:D:53:GLN:HE22	1.22	0.81
1:A:297:ARG:HH22	11:A:1002:TEO:C3	1.94	0.81
1:A:181:LEU:HD21	1:A:211:ILE:HD11	1.64	0.79

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
12:B:1005:UQ:HM21	3:C:43:ARG:CZ	2.13	0.78
1:A:164:ARG:HH22	2:B:137:GLN:NE2	1.81	0.77
3:C:18:LYS:HB3	16:C:1673:HOH:O	1.84	0.76
16:A:1254:HOH:O	2:B:123:LYS:HG2	1.85	0.76
3:C:101:ASN:HD21	3:C:104:ARG:HH11	1.34	0.75
1:A:284:MET:HE1	1:A:303:SER:HB2	1.69	0.75
1:A:284:MET:CE	1:A:303:SER:HB2	2.17	0.74
1:A:13:PRO:HA	16:A:1370:HOH:O	1.88	0.73
1:A:72:GLU:OE1	1:A:144:HIS:HD2	1.71	0.73
3:C:26:HIS:CD2	3:C:27:ILE:H	2.06	0.73
1:A:122:GLU:HG3	16:A:1087:HOH:O	1.90	0.71
2:B:123:LYS:NZ	2:B:123:LYS:CD	2.54	0.69
1:A:469:ARG:HD2	16:A:1050:HOH:O	1.93	0.69
1:A:401:ALA:N	1:A:402:SER:HA	2.09	0.68
2:B:150:GLN:NE2	16:B:1152:HOH:O	2.27	0.67
3:C:74:VAL:HA	3:C:77:LEU:HD12	1.77	0.67
1:A:563:TYR:HE1	16:A:1351:HOH:O	1.77	0.66
1:A:237:VAL:HG21	1:A:370:ILE:HG12	1.78	0.65
12:B:1005:UQ:CM2	3:C:43:ARG:NH1	2.60	0.64
1:A:479:HIS:CE1	1:A:491:GLU:HG2	2.33	0.64
1:A:207:LYS:NZ	1:A:436:GLU:OE2	2.18	0.63
1:A:263:LEU:HB3	6:A:1001:FAD:HM73	1.79	0.63
4:D:95:LYS:HE3	4:D:99:MET:HG3	1.79	0.63
2:B:18:ARG:NH2	2:B:56:ASP:OD2	2.31	0.62
16:A:1254:HOH:O	2:B:123:LYS:CG	2.44	0.62
1:A:568:GLN:HA	1:A:568:GLN:OE1	1.99	0.62
1:A:112:ASN:HD22	2:B:138:GLY:N	1.94	0.62
1:A:576:GLU:CD	1:A:576:GLU:H	2.03	0.62
1:A:297:ARG:HH22	11:A:1002:TEO:C2	2.13	0.62
3:C:140:ILE:CB	16:C:1187:HOH:O	2.47	0.62
3:C:83:LEU:O	3:C:83:LEU:HD12	2.00	0.61
2:B:117:ASN:O	2:B:121:GLN:HG3	1.99	0.61
1:A:485:THR:HG22	1:A:486:GLY:N	2.15	0.61
2:B:139:LYS:HE3	16:B:1176:HOH:O	2.00	0.61
2:B:216:HIS:HB2	16:B:1077:HOH:O	2.00	0.61
4:D:29:LEU:C	4:D:30:TYR:CD1	2.74	0.61
2:B:8:THR:O	2:B:38:ASN:ND2	2.34	0.61
1:A:32:ARG:NH2	1:A:422:ARG:HD2	2.16	0.60
1:A:568:GLN:HB3	16:A:1264:HOH:O	2.00	0.60
1:A:543:LYS:HG2	1:A:554:TYR:CE1	2.35	0.60
12:B:1005:UQ:CM2	3:C:43:ARG:CZ	2.80	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:284:MET:HE1	1:A:300:VAL:HA	1.83	0.60
1:A:438:VAL:CG2	1:A:439:PRO:HD2	2.28	0.59
1:A:507:LYS:HE3	16:A:1427:HOH:O	2.02	0.59
3:C:74:VAL:HG11	4:D:103:ILE:HD13	1.84	0.58
1:A:263:LEU:CB	6:A:1001:FAD:HM73	2.34	0.57
1:A:72:GLU:OE1	1:A:144:HIS:CD2	2.55	0.57
3:C:77:LEU:O	3:C:78:SER:C	2.42	0.57
12:B:1005:UQ:HM23	3:C:43:ARG:NH1	2.20	0.57
3:C:69:HIS:O	3:C:73:VAL:HG23	2.05	0.57
1:A:252:PHE:CE2	1:A:363:VAL:HG23	2.39	0.57
1:A:324:GLN:HG3	1:A:326:HIS:CE1	2.38	0.57
1:A:216:TYR:H	1:A:366:ASN:HD22	1.52	0.57
1:A:25:GLY:HA2	6:A:1001:FAD:H1B	1.85	0.57
1:A:155:HIS:HE1	2:B:156:TYR:O	1.87	0.57
1:A:10:THR:O	1:A:10:THR:HG23	2.04	0.57
12:B:1005:UQ:CM2	12:B:1005:UQ:HM33	2.34	0.57
3:C:77:LEU:HB3	16:C:1621:HOH:O	2.04	0.56
4:D:33:PRO:HG2	14:D:205:UNL:O1	2.05	0.56
2:B:121:GLN:NE2	2:B:171:TYR:OH	2.38	0.56
2:B:24:PRO:HA	16:B:1131:HOH:O	2.04	0.56
2:B:131:LYS:O	2:B:134:GLU:HG3	2.06	0.56
3:C:26:HIS:CG	3:C:27:ILE:H	2.23	0.56
4:D:63:THR:O	4:D:67:VAL:HG23	2.06	0.55
4:D:30:TYR:CD1	4:D:30:TYR:N	2.75	0.55
1:A:117:PHE:HA	1:A:149:VAL:HG22	1.89	0.55
2:B:240:LYS:O	2:B:244:THR:HG23	2.05	0.55
3:C:6:LYS:HA	3:C:9:MET:HE2	1.89	0.55
1:A:360:LEU:HD12	1:A:361:PRO:HD2	1.89	0.55
1:A:155:HIS:HD2	16:A:1309:HOH:O	1.89	0.54
2:B:65:CYS:O	2:B:66:ARG:HB3	2.06	0.54
1:A:247:LEU:HD12	1:A:534:GLN:CB	2.37	0.54
12:B:1005:UQ:HM31	3:C:39:SER:OG	2.08	0.54
3:C:88:LYS:HB3	4:D:101:TRP:CZ2	2.43	0.54
1:A:247:LEU:HD12	1:A:534:GLN:HB2	1.89	0.54
3:C:4:THR:OG1	3:C:7:GLU:HG3	2.09	0.53
4:D:21:LEU:O	4:D:25:PRO:HD2	2.09	0.53
12:B:1005:UQ:HM23	4:D:58:TYR:OH	2.08	0.53
1:A:60:ALA:HB3	1:A:154:GLY:HA3	1.89	0.53
1:A:297:ARG:HH22	11:A:1002:TEO:C4	2.21	0.53
1:A:595:THR:O	1:A:596:LEU:HD23	2.09	0.53
2:B:119:TYR:O	2:B:123:LYS:HG3	2.10	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:C:142:BHG:H5'2	16:C:1519:HOH:O	2.09	0.52
4:D:29:LEU:HB3	4:D:30:TYR:CE1	2.44	0.52
4:D:4:LYS:HE2	16:D:1614:HOH:O	2.09	0.52
3:C:95:LEU:HD23	13:C:144:PEE:H38	1.91	0.51
4:D:53:GLN:NE2	4:D:53:GLN:HA	2.25	0.51
2:B:214:ARG:HH12	4:D:53:GLN:NE2	2.09	0.51
12:B:1005:UQ:HM33	12:B:1005:UQ:O2	2.11	0.51
1:A:396:GLY:HA2	1:A:417:LEU:HD23	1.92	0.51
1:A:10:THR:OG1	1:A:12:TYR:O	2.27	0.51
1:A:559:ASP:HB2	16:A:1351:HOH:O	2.11	0.51
2:B:141:GLN:HG3	16:B:1094:HOH:O	2.11	0.51
4:D:101:TRP:CD1	13:D:104:PEE:H28	2.46	0.50
1:A:463:ILE:O	1:A:506:LEU:HA	2.11	0.50
12:B:1005:UQ:HM21	3:C:43:ARG:NH1	2.22	0.50
1:A:559:ASP:CB	16:A:1351:HOH:O	2.59	0.50
1:A:485:THR:CG2	1:A:486:GLY:N	2.74	0.50
1:A:169:ASP:HA	3:C:2:ALA:HB2	1.93	0.50
1:A:205:ARG:HD2	1:A:441:ILE:HD11	1.92	0.50
1:A:284:MET:HE2	1:A:303:SER:HB2	1.91	0.49
1:A:561:PHE:N	16:A:1351:HOH:O	2.24	0.49
3:C:67:PHE:HB3	3:C:68:PRO:HD3	1.94	0.49
1:A:179:LEU:HA	16:A:1136:HOH:O	2.11	0.49
1:A:55:SER:O	1:A:58:VAL:HG12	2.12	0.49
2:B:214:ARG:NH2	4:D:53:GLN:HE22	2.01	0.49
3:C:95:LEU:CD2	13:C:144:PEE:H38	2.43	0.49
1:A:457:ARG:O	1:A:511:ARG:NH1	2.41	0.49
1:A:263:LEU:HG	1:A:264:ILE:N	2.27	0.49
2:B:23:LYS:HB3	2:B:26:ASP:HB2	1.95	0.49
1:A:125:ILE:HG21	1:A:147:CYS:HB3	1.94	0.48
2:B:19:TRP:CZ3	2:B:21:PRO:HB3	2.47	0.48
1:A:112:ASN:ND2	2:B:138:GLY:H	2.03	0.48
3:C:34:LEU:N	3:C:35:PRO:CD	2.76	0.48
1:A:313:GLY:O	1:A:318:LYS:HD3	2.13	0.48
1:A:431:THR:HG22	1:A:432:CYS:SG	2.54	0.48
1:A:562:ASP:C	1:A:562:ASP:OD1	2.52	0.48
1:A:243:PRO:HB3	1:A:586:TYR:CZ	2.48	0.48
2:B:214:ARG:HH12	4:D:53:GLN:HE21	1.62	0.47
4:D:90:ASP:OD1	4:D:91:VAL:N	2.38	0.47
1:A:58:VAL:HB	1:A:158:LEU:HD23	1.96	0.47
1:A:103:ALA:HB2	1:A:415:LEU:HD21	1.96	0.47
3:C:101:ASN:HD21	3:C:104:ARG:NH1	2.09	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:99:MET:HA	1:A:419:VAL:HG11	1.96	0.47
1:A:166:LEU:HD22	2:B:123:LYS:HD3	1.97	0.47
2:B:185:MET:CG	2:B:185:MET:CE	2.90	0.47
1:A:268:CYS:HB3	1:A:325:LEU:HD21	1.97	0.47
2:B:87:LYS:HE2	16:B:1115:HOH:O	2.15	0.47
4:D:25:PRO:HB2	16:D:1805:HOH:O	2.15	0.46
1:A:89:TRP:CD2	1:A:616:PRO:HA	2.50	0.46
4:D:63:THR:HB	4:D:64:PRO:HD3	1.98	0.46
1:A:560:GLU:N	16:A:1351:HOH:O	2.48	0.46
3:C:72:ALA:O	3:C:73:VAL:C	2.54	0.46
1:A:372:THR:HA	1:A:377:GLN:O	2.16	0.46
1:A:563:TYR:CE1	16:A:1351:HOH:O	2.55	0.46
1:A:297:ARG:HH12	11:A:1002:TEO:C4	2.29	0.46
1:A:253:HIS:O	1:A:361:PRO:HA	2.15	0.46
2:B:173:TRP:HZ2	12:B:1005:UQ:C7	2.29	0.46
4:D:101:TRP:CG	13:D:104:PEE:H28	2.51	0.45
1:A:63:GLY:HA3	1:A:146:CYS:SG	2.55	0.45
2:B:188:TYR:HA	2:B:191:MET:HE2	1.98	0.45
2:B:150:GLN:NE2	16:B:1114:HOH:O	2.38	0.45
1:A:515:TRP:CD1	2:B:108:VAL:HG11	2.51	0.45
3:C:101:ASN:ND2	3:C:104:ARG:HH11	2.06	0.45
2:B:216:HIS:NE2	4:D:57:ASP:OD2	2.48	0.45
4:D:29:LEU:CB	4:D:30:TYR:CD1	3.00	0.45
1:A:8:ILE:O	1:A:9:SER:CB	2.65	0.45
3:C:47:VAL:O	3:C:51:LEU:HG	2.17	0.45
3:C:11:ARG:NH2	16:C:1803:HOH:O	2.50	0.45
1:A:127:GLN:NE2	1:A:145:ARG:HA	2.32	0.45
1:A:318:LYS:NZ	16:A:1029:HOH:O	2.50	0.44
1:A:19:PHE:O	1:A:206:ALA:HA	2.17	0.44
10:C:143:HEM:ND	4:D:46:HIS:CE1	2.84	0.44
1:A:89:TRP:CE2	1:A:616:PRO:HA	2.53	0.44
1:A:213:THR:OG1	1:A:233:GLY:HA3	2.18	0.44
3:C:34:LEU:HB3	3:C:35:PRO:HD3	1.99	0.44
2:B:134:GLU:HB3	2:B:137:GLN:OE1	2.18	0.44
1:A:189:ARG:HD2	1:A:439:PRO:HB2	1.98	0.44
2:B:192:ILE:HD13	2:B:192:ILE:HG21	1.61	0.44
2:B:233:LYS:NZ	2:B:237:GLU:OE2	2.50	0.44
3:C:15:LYS:NZ	16:C:1733:HOH:O	2.50	0.44
1:A:574:PRO:O	1:A:575:PHE:C	2.56	0.44
2:B:20:ASP:OD2	2:B:23:LYS:HE3	2.18	0.43
1:A:493:CYS:HB3	1:A:537:TYR:CZ	2.54	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:468:ALA:HB3	1:A:525:LEU:HD21	1.99	0.43
1:A:60:ALA:HA	6:A:1001:FAD:C5X	2.49	0.43
3:C:137:ILE:C	3:C:139:ALA:H	2.21	0.43
1:A:157:LEU:C	1:A:157:LEU:HD23	2.39	0.43
1:A:296:SER:O	1:A:300:VAL:HG23	2.19	0.43
13:C:144:PEE:H39	4:D:24:LEU:HD13	2.00	0.43
2:B:187:ALA:O	2:B:191:MET:HG3	2.18	0.43
1:A:232:ASP:O	1:A:236:MET:HG3	2.18	0.43
2:B:236:ALA:HB2	3:C:114:PHE:CZ	2.54	0.43
2:B:66:ARG:HB3	2:B:66:ARG:HE	1.28	0.43
6:A:1001:FAD:H9	6:A:1001:FAD:H1'1	1.84	0.42
2:B:131:LYS:HB2	2:B:134:GLU:HG2	2.00	0.42
12:B:1005:UQ:HM22	3:C:43:ARG:HD2	2.01	0.42
4:D:27:ALA:HB1	13:D:104:PEE:H60	2.01	0.42
1:A:35:PHE:HB2	1:A:168:TYR:CD1	2.55	0.42
3:C:74:VAL:O	3:C:77:LEU:HD12	2.19	0.42
4:D:53:GLN:HE21	4:D:53:GLN:HA	1.85	0.42
16:A:1342:HOH:O	2:B:66:ARG:HG3	2.20	0.42
1:A:377:GLN:HG2	1:A:393:TYR:CE1	2.55	0.41
1:A:509:PHE:N	1:A:509:PHE:CD1	2.88	0.41
1:A:90:LEU:O	1:A:90:LEU:HG	2.21	0.41
4:D:45:LEU:HA	4:D:45:LEU:HD12	1.88	0.41
1:A:400:SER:OG	1:A:402:SER:HB2	2.21	0.41
4:D:22:GLY:O	4:D:25:PRO:HG2	2.21	0.41
2:B:173:TRP:CZ2	12:B:1005:UQ:C7	3.04	0.41
1:A:207:LYS:HE2	1:A:432:CYS:SG	2.61	0.41
1:A:201:ILE:HG23	1:A:201:ILE:HD12	1.84	0.41
1:A:599:ARG:HA	1:A:600:PRO:HD3	1.85	0.41
4:D:27:ALA:CB	13:D:104:PEE:H60	2.50	0.41
2:B:225:CYS:SG	2:B:229:LEU:HB2	2.61	0.41
1:A:284:MET:CE	1:A:303:SER:CB	2.93	0.41
1:A:220:TYR:CD2	1:A:363:VAL:HG21	2.56	0.41
1:A:63:GLY:O	1:A:414:LEU:HD12	2.21	0.40
3:C:24:SER:HB2	16:C:1427:HOH:O	2.22	0.40
1:A:90:LEU:O	1:A:582:HIS:HE1	2.03	0.40
2:B:90:ASP:OD1	2:B:90:ASP:C	2.60	0.40
2:B:18:ARG:HD2	2:B:110:ASP:OD1	2.21	0.40
3:C:137:ILE:C	3:C:139:ALA:N	2.75	0.40
12:B:1005:UQ:HM22	12:B:1005:UQ:HM33	2.02	0.40
1:A:60:ALA:HA	6:A:1001:FAD:C6	2.51	0.40
1:A:252:PHE:CE2	1:A:363:VAL:CG2	3.04	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:18:GLU:CG	1:A:205:ARG:NH1	2.84	0.40
1:A:242:LEU:HB3	16:A:1068:HOH:O	2.21	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	612/621 (99%)	583 (95%)	28 (5%)	1 (0%)	52	59
2	B	240/252 (95%)	227 (95%)	12 (5%)	1 (0%)	39	42
3	C	138/141 (98%)	132 (96%)	5 (4%)	1 (1%)	26	25
4	D	100/103 (97%)	97 (97%)	3 (3%)	0	100	100
All	All	1090/1117 (98%)	1039 (95%)	48 (4%)	3 (0%)	46	50

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	8	THR
1	A	9	SER
3	C	78	SER

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	498/506 (98%)	488 (98%)	10 (2%)	63	76
2	B	214/219 (98%)	207 (97%)	7 (3%)	45	56
3	C	116/119 (98%)	114 (98%)	2 (2%)	68	81
4	D	78/79 (99%)	75 (96%)	3 (4%)	40	49
All	All	906/923 (98%)	884 (98%)	22 (2%)	57	69

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	11	GLN
1	A	48	THR
1	A	72	GLU
1	A	130	PHE
1	A	380	THR
1	A	438	VAL
1	A	447	GLU
1	A	513	ILE
1	A	545	SER
1	A	590	LYS
2	B	63	ARG
2	B	66	ARG
2	B	98	LYS
2	B	131	LYS
2	B	189	ARG
2	B	224	THR
2	B	229	LEU
3	C	3	THR
3	C	40	ILE
4	D	14	ARG
4	D	30	TYR
4	D	101	TRP

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

Mol	Chain	Res	Type
1	A	11	GLN
1	A	43	ASN
1	A	112	ASN
1	A	144	HIS
1	A	155	HIS

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Mol	Chain	Res	Type
1	A	326	HIS
1	A	331	GLN
1	A	366	ASN
1	A	383	ASN
1	A	534	GLN
2	B	104	HIS
2	B	121	GLN
2	B	137	GLN
3	C	26	HIS
3	C	42	HIS
3	C	101	ASN
4	D	9	HIS
4	D	53	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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 41 ligands modelled in this entry, 30 are unknown - leaving 11 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$
6	FAD	A	1001	1	48,58,58	2.67	18 (37%)	54,89,89	2.76	20 (37%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
11	TEO	A	1002	-	0,8,8	0.00	-	1,10,10	4.96	1 (100%)
7	FES	B	1002	2	0,4,4	0.00	-	0,4,4	0.00	-
8	SF4	B	1003	2	0,12,12	0.00	-	0,24,24	0.00	-
9	F3S	B	1004	2	0,9,9	0.00	-	0,15,15	0.00	-
12	UQ	B	1005	-	14,14,63	2.14	6 (42%)	18,20,79	0.87	0
15	GOL	B	1012	-	5,5,5	1.68	1 (20%)	5,5,5	0.90	0
5	BHG	C	142	-	18,18,18	2.08	6 (33%)	23,23,23	1.46	4 (17%)
10	HEM	C	143	3,4	29,48,50	2.84	13 (44%)	24,80,82	3.07	12 (50%)
13	PEE	C	144	-	16,19,50	1.20	2 (12%)	16,19,55	1.23	4 (25%)
13	PEE	D	104	-	22,22,50	0.96	1 (4%)	20,20,55	1.04	2 (10%)

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	FAD	A	1001	1	-	0/30/50/50	0/6/6/6
11	TEO	A	1002	-	1/1/3/4	0/1/8/8	0/0/0/0
7	FES	B	1002	2	-	0/0/4/4	0/1/1/1
8	SF4	B	1003	2	-	0/0/48/48	0/6/5/5
9	F3S	B	1004	2	-	0/0/24/24	0/0/3/3
12	UQ	B	1005	-	-	0/4/28/87	0/1/1/1
15	GOL	B	1012	-	-	0/4/4/4	0/0/0/0
5	BHG	C	142	-	1/1/5/5	0/9/29/29	0/1/1/1
10	HEM	C	143	3,4	-	0/6/50/54	0/0/8/8
13	PEE	C	144	-	-	0/15/17/54	0/0/0/0
13	PEE	D	104	-	-	0/18/18/54	0/0/0/0

All (47) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	C	143	HEM	C2D-C3D	-7.21	1.32	1.54
6	A	1001	FAD	PA-O2A	-3.72	1.39	1.54
10	C	143	HEM	C2D-C1D	-3.28	1.41	1.51
6	A	1001	FAD	C2'-C3'	-3.07	1.47	1.53
6	A	1001	FAD	PA-O1A	-3.02	1.40	1.51
13	C	144	PEE	C22-C21	-2.98	1.34	1.51
6	A	1001	FAD	O4B-C1B	-2.85	1.37	1.41
13	D	104	PEE	C19-C18	-2.55	1.36	1.51
10	C	143	HEM	C2B-C1B	-2.49	1.43	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	C	143	HEM	C3D-C4D	-2.43	1.48	1.51
13	C	144	PEE	C19-C18	-2.42	1.37	1.51
10	C	143	HEM	FE-NB	-2.34	1.85	1.97
6	A	1001	FAD	P-O1P	-2.32	1.42	1.51
10	C	143	HEM	CAB-C3B	-2.25	1.47	1.53
6	A	1001	FAD	P-O2P	-2.15	1.45	1.54
10	C	143	HEM	C2A-C3A	-2.08	1.31	1.37
5	C	142	BHG	O5-C5	2.03	1.49	1.44
5	C	142	BHG	C4-C3	2.03	1.57	1.52
15	B	1012	GOL	O2-C2	2.07	1.49	1.43
12	B	1005	UQ	O3-C3	2.09	1.42	1.37
6	A	1001	FAD	C4A-N3A	2.11	1.38	1.35
5	C	142	BHG	C2'-C1'	2.20	1.60	1.50
6	A	1001	FAD	C2A-N1A	2.25	1.38	1.33
10	C	143	HEM	CAD-C3D	2.39	1.58	1.54
6	A	1001	FAD	C6-C7	2.48	1.44	1.37
12	B	1005	UQ	C2-C1	2.51	1.56	1.48
10	C	143	HEM	FE-NC	2.53	2.05	1.95
6	A	1001	FAD	C8-C7	2.53	1.47	1.41
5	C	142	BHG	O4-C4	2.62	1.49	1.43
5	C	142	BHG	O1-C1'	2.70	1.50	1.42
12	B	1005	UQ	C7-C6	2.81	1.56	1.50
6	A	1001	FAD	O2B-C2B	2.84	1.49	1.43
12	B	1005	UQ	C3-C4	2.85	1.57	1.48
6	A	1001	FAD	C9-C8	2.99	1.46	1.37
6	A	1001	FAD	C4'-C3'	3.00	1.59	1.53
12	B	1005	UQ	O1-C1	3.21	1.30	1.23
6	A	1001	FAD	C2A-N3A	3.28	1.38	1.32
10	C	143	HEM	CHD-C4C	3.57	1.44	1.36
6	A	1001	FAD	C4-C4X	4.25	1.49	1.41
10	C	143	HEM	CAA-C2A	4.25	1.59	1.52
12	B	1005	UQ	C6-C1	4.28	1.63	1.47
6	A	1001	FAD	C4-N3	4.81	1.42	1.33
10	C	143	HEM	CMB-C2B	5.81	1.66	1.53
6	A	1001	FAD	C5X-N5	5.90	1.44	1.35
5	C	142	BHG	O1-C1	6.22	1.51	1.40
10	C	143	HEM	CMC-C2C	6.77	1.68	1.53
6	A	1001	FAD	C10-N10	11.10	1.52	1.39

All (43) bond angle outliers are listed below:

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	1001	FAD	N3A-C2A-N1A	-13.75	118.37	128.89
10	C	143	HEM	CAA-C2A-C1A	-5.69	120.83	127.01
6	A	1001	FAD	C1B-N9A-C4A	-5.47	118.69	126.94
6	A	1001	FAD	C5X-C9A-N10	-3.12	115.25	117.62
6	A	1001	FAD	C4-C4X-C10	-3.03	118.00	119.94
6	A	1001	FAD	C4X-C4-N3	-2.83	119.72	123.59
6	A	1001	FAD	O2'-C2'-C3'	-2.72	102.18	109.02
10	C	143	HEM	CBD-CAD-C3D	-2.68	105.75	113.55
5	C	142	BHG	C3-C4-C5	-2.67	105.54	110.20
10	C	143	HEM	CBA-CAA-C2A	-2.66	107.76	112.53
6	A	1001	FAD	O3P-P-O5'	-2.62	95.98	102.94
6	A	1001	FAD	O3P-PA-O5B	-2.34	96.73	102.94
6	A	1001	FAD	C4X-C10-N10	-2.21	119.22	120.52
5	C	142	BHG	O5-C1-C2	-2.18	105.79	110.28
6	A	1001	FAD	C7M-C7-C6	-2.13	114.48	120.28
6	A	1001	FAD	O3'-C3'-C2'	-2.06	103.55	108.75
6	A	1001	FAD	P-O3P-PA	2.19	138.89	132.73
5	C	142	BHG	O5-C1-O1	2.20	115.35	110.05
6	A	1001	FAD	C8M-C8-C7	2.20	125.56	120.73
13	C	144	PEE	C22-C21-C20	2.22	125.98	114.53
6	A	1001	FAD	C7M-C7-C8	2.29	125.76	120.73
13	C	144	PEE	C23-C22-C21	2.39	126.89	114.53
10	C	143	HEM	CMD-C2D-C3D	2.40	124.96	114.35
13	C	144	PEE	C19-C18-C17	2.43	127.07	114.53
6	A	1001	FAD	O2P-P-O3P	2.51	116.46	105.09
13	C	144	PEE	C20-C19-C18	2.59	127.88	114.53
13	D	104	PEE	C19-C18-C17	2.68	128.38	114.53
10	C	143	HEM	CMB-C2B-C3B	2.71	122.70	116.20
10	C	143	HEM	C2D-C3D-C4D	2.74	106.14	101.50
6	A	1001	FAD	C1'-C2'-C3'	2.93	118.20	109.82
13	D	104	PEE	C20-C19-C18	2.97	129.85	114.53
6	A	1001	FAD	C4B-O4B-C1B	3.10	113.12	109.72
10	C	143	HEM	CAD-C3D-C2D	3.15	122.27	113.22
6	A	1001	FAD	C4-C4X-N5	3.78	123.31	118.72
5	C	142	BHG	C1'-O1-C1	3.87	120.70	113.94
10	C	143	HEM	C4B-CHC-C1C	4.05	132.60	125.82
6	A	1001	FAD	C4-N3-C2	4.34	119.00	115.25
10	C	143	HEM	C2C-C1C-NC	4.89	118.46	110.21
11	A	1002	TEO	O2-C2-C3	4.96	119.84	109.53
10	C	143	HEM	CAD-C3D-C4D	4.96	129.98	112.47
10	C	143	HEM	CMC-C2C-C3C	5.83	130.16	116.20

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Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
6	A	1001	FAD	C4X-N5-C5X	5.91	123.56	116.76
10	C	143	HEM	CAC-C3C-C2C	6.02	130.62	116.20

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
5	C	142	BHG	C4
11	A	1002	TEO	C2

There are no torsion outliers.

There are no ring outliers.

7 monomers are involved in 32 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	1001	FAD	6	0
11	A	1002	TEO	4	0
12	B	1005	UQ	13	0
5	C	142	BHG	1	0
10	C	143	HEM	1	0
13	C	144	PEE	3	0
13	D	104	PEE	4	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	614/621 (98%)	-0.27	13 (2%) 67 65	27, 42, 64, 130	0
2	B	242/252 (96%)	-0.21	12 (4%) 32 32	25, 37, 66, 105	0
3	C	140/141 (99%)	-0.51	4 (2%) 55 54	28, 42, 69, 80	0
4	D	102/103 (99%)	-0.75	0 100 100	33, 40, 61, 72	0
All	All	1098/1117 (98%)	-0.33	29 (2%) 59 58	25, 41, 66, 130	0

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	8	ILE	8.1
2	B	7	ALA	7.1
1	A	9	SER	6.9
2	B	6	ALA	6.5
2	B	8	THR	4.2
1	A	10	THR	3.9
3	C	78	SER	3.8
2	B	138	GLY	3.7
3	C	79	LEU	3.2
2	B	247	GLU	2.8
1	A	569	GLY	2.8
3	C	82	ALA	2.8
1	A	50	LEU	2.8
2	B	134	GLU	2.7
1	A	567	LEU	2.6
1	A	53	THR	2.6
1	A	55	SER	2.5
1	A	568	GLN	2.4
1	A	59	ALA	2.4
1	A	571	GLN	2.3
2	B	11	ILE	2.3

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Mol	Chain	Res	Type	RSRZ
2	B	9	SER	2.2
3	C	83	LEU	2.2
2	B	246	LYS	2.2
2	B	115	LEU	2.1
2	B	70	CYS	2.1
1	A	60	ALA	2.1
1	A	229	SER	2.0
2	B	137	GLN	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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
14	UNL	B	1007	1/-	0.77	0.59	16.80	63,63,63,63	0
12	UQ	B	1005	14/63	0.80	0.37	12.84	59,72,82,86	0
13	PEE	C	144	21/51	0.81	0.17	3.42	56,64,74,77	0
5	BHG	C	142	18/18	0.94	0.13	2.14	41,47,63,67	0
11	TEO	A	1002	9/9	0.98	0.20	1.27	35,37,38,42	0
13	PEE	D	104	24/51	0.89	0.13	1.08	47,62,73,77	0
6	FAD	A	1001	53/53	0.99	0.20	0.34	23,32,37,37	0
9	F3S	B	1004	7/7	1.00	0.11	-0.25	28,29,31,31	0
10	HEM	C	143	41/43	0.99	0.09	-0.27	32,36,44,49	0
8	SF4	B	1003	8/8	0.99	0.08	-1.62	31,32,35,36	0
7	FES	B	1002	4/4	1.00	0.11	-1.87	31,33,34,34	0
14	UNL	A	1014	1/-	0.96	0.10	-	59,59,59,59	0
14	UNL	D	209	1/-	0.71	0.24	-	61,61,61,61	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
14	UNL	B	1008	1/-	0.81	0.13	-	59,59,59,59	0
14	UNL	C	212	1/-	0.92	0.55	-	76,76,76,76	0
14	UNL	A	1006	1/-	0.85	0.26	-	47,47,47,47	0
14	UNL	C	211	1/-	0.77	0.14	-	68,68,68,68	0
15	GOL	B	1012	6/6	0.39	0.75	-	112,113,114,114	0
14	UNL	A	1015	1/-	0.77	0.09	-	76,76,76,76	0
14	UNL	A	1010	1/-	0.86	0.24	-	58,58,58,58	0
14	UNL	D	204	1/-	0.78	0.13	-	65,65,65,65	0
14	UNL	A	1008	1/-	0.87	0.09	-	58,58,58,58	0
14	UNL	D	228	1/-	0.95	0.29	-	59,59,59,59	0
14	UNL	A	1011	1/-	0.96	0.22	-	54,54,54,54	0
14	UNL	C	226	1/-	0.88	0.10	-	56,56,56,56	0
14	UNL	A	1012	1/-	0.93	0.43	-	63,63,63,63	0
14	UNL	A	1003	1/-	0.82	0.21	-	65,65,65,65	0
14	UNL	A	1005	1/-	0.95	0.23	-	64,64,64,64	0
14	UNL	B	1009	1/-	0.89	0.32	-	60,60,60,60	0
14	UNL	C	203	1/-	0.61	0.27	-	61,61,61,61	0
14	UNL	A	1013	1/-	0.92	0.23	-	77,77,77,77	0
14	UNL	A	1017	1/-	0.83	0.34	-	66,66,66,66	0
14	UNL	B	1011	1/-	0.80	0.15	-	50,50,50,50	0
14	UNL	A	1016	1/-	0.68	0.24	-	63,63,63,63	0
14	UNL	A	1009	1/-	0.91	0.11	-	65,65,65,65	0
14	UNL	A	1007	1/-	0.71	0.15	-	66,66,66,66	0
14	UNL	B	1006	1/-	0.90	0.07	-	57,57,57,57	0
14	UNL	D	205	1/-	0.75	0.26	-	59,59,59,59	0
14	UNL	B	1010	1/-	0.70	0.22	-	75,75,75,75	0
14	UNL	D	218	1/-	0.98	0.14	-	47,47,47,47	0
14	UNL	A	1004	1/-	0.70	0.16	-	63,63,63,63	0

6.5 Other polymers [i](#)

There are no such residues in this entry.