



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 12, 2024 – 05:20 PM EDT

PDB ID : 3VMI
Title : Carbazole- and oxygen-bound complex between oxygenase and ferredoxin in carbazole 1,9a-dioxygenase
Authors : Ashikawa, Y.; Nojiri, H.
Deposited on : 2011-12-12
Resolution : 2.00 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 : 4.02b-467
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 1.20.1
EDS : 2.36.2
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36.2

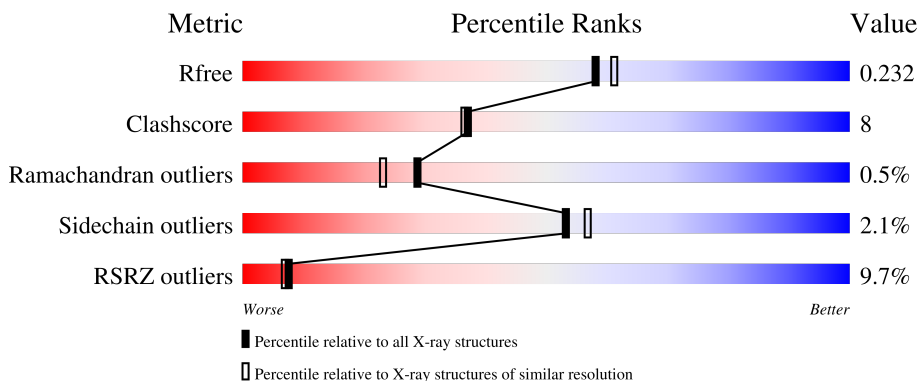
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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.



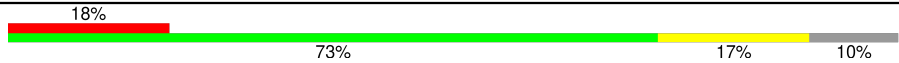
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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	392	 6% 84% 15%
1	B	392	 8% 77% 21%
1	C	392	 8% 79% 20%
2	D	115	 29% 77% 13% 10%
2	E	115	 3% 77% 16% 7%

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Mol	Chain	Length	Quality of chain
2	F	115	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into four segments: a red segment on the left labeled '18%', a large green segment labeled '73%', a yellow segment labeled '17%', and a grey segment on the far right labeled '10%'.</p>

2 Entry composition i

There are 7 unique types of molecules in this entry. The entry contains 12638 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 Terminal oxygenase component of carbazole.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	389	3136	2004	535	583	14	0	0	0
1	B	388	3126	1998	532	582	14	0	0	0
1	C	389	3136	2004	535	583	14	0	0	0

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	385	LEU	-	expression tag	UNP Q84II6
A	386	GLU	-	expression tag	UNP Q84II6
A	387	HIS	-	expression tag	UNP Q84II6
A	388	HIS	-	expression tag	UNP Q84II6
A	389	HIS	-	expression tag	UNP Q84II6
A	390	HIS	-	expression tag	UNP Q84II6
A	391	HIS	-	expression tag	UNP Q84II6
A	392	HIS	-	expression tag	UNP Q84II6
B	385	LEU	-	expression tag	UNP Q84II6
B	386	GLU	-	expression tag	UNP Q84II6
B	387	HIS	-	expression tag	UNP Q84II6
B	388	HIS	-	expression tag	UNP Q84II6
B	389	HIS	-	expression tag	UNP Q84II6
B	390	HIS	-	expression tag	UNP Q84II6
B	391	HIS	-	expression tag	UNP Q84II6
B	392	HIS	-	expression tag	UNP Q84II6
C	385	LEU	-	expression tag	UNP Q84II6
C	386	GLU	-	expression tag	UNP Q84II6
C	387	HIS	-	expression tag	UNP Q84II6
C	388	HIS	-	expression tag	UNP Q84II6
C	389	HIS	-	expression tag	UNP Q84II6
C	390	HIS	-	expression tag	UNP Q84II6
C	391	HIS	-	expression tag	UNP Q84II6

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Chain	Residue	Modelled	Actual	Comment	Reference
C	392	HIS	-	expression tag	UNP Q84II6

- Molecule 2 is a protein called Ferredoxin component of carbazole.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	104	Total	C	N	O	S	0	0	0
			768	483	129	149	7			
2	E	107	Total	C	N	O	S	0	0	0
			794	499	133	155	7			
2	F	104	Total	C	N	O	S	0	0	0
			768	483	129	149	7			

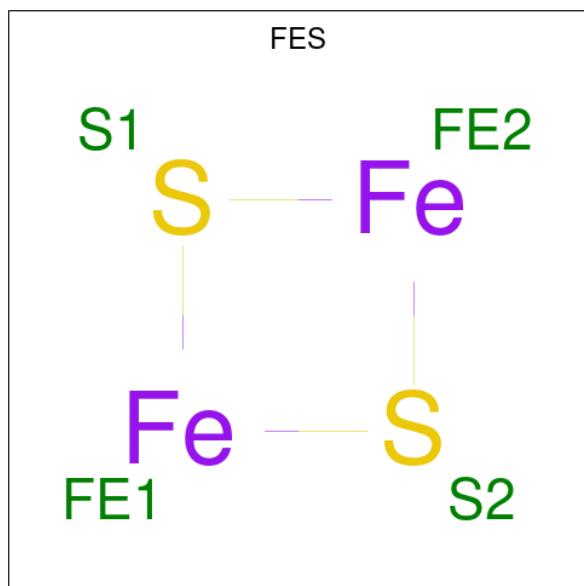
There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	108	LEU	-	expression tag	UNP Q8GI16
D	109	GLU	-	expression tag	UNP Q8GI16
D	110	HIS	-	expression tag	UNP Q8GI16
D	111	HIS	-	expression tag	UNP Q8GI16
D	112	HIS	-	expression tag	UNP Q8GI16
D	113	HIS	-	expression tag	UNP Q8GI16
D	114	HIS	-	expression tag	UNP Q8GI16
D	115	HIS	-	expression tag	UNP Q8GI16
E	108	LEU	-	expression tag	UNP Q8GI16
E	109	GLU	-	expression tag	UNP Q8GI16
E	110	HIS	-	expression tag	UNP Q8GI16
E	111	HIS	-	expression tag	UNP Q8GI16
E	112	HIS	-	expression tag	UNP Q8GI16
E	113	HIS	-	expression tag	UNP Q8GI16
E	114	HIS	-	expression tag	UNP Q8GI16
E	115	HIS	-	expression tag	UNP Q8GI16
F	108	LEU	-	expression tag	UNP Q8GI16
F	109	GLU	-	expression tag	UNP Q8GI16
F	110	HIS	-	expression tag	UNP Q8GI16
F	111	HIS	-	expression tag	UNP Q8GI16
F	112	HIS	-	expression tag	UNP Q8GI16
F	113	HIS	-	expression tag	UNP Q8GI16
F	114	HIS	-	expression tag	UNP Q8GI16
F	115	HIS	-	expression tag	UNP Q8GI16

- Molecule 3 is FE (II) ION (three-letter code: FE2) (formula: Fe).

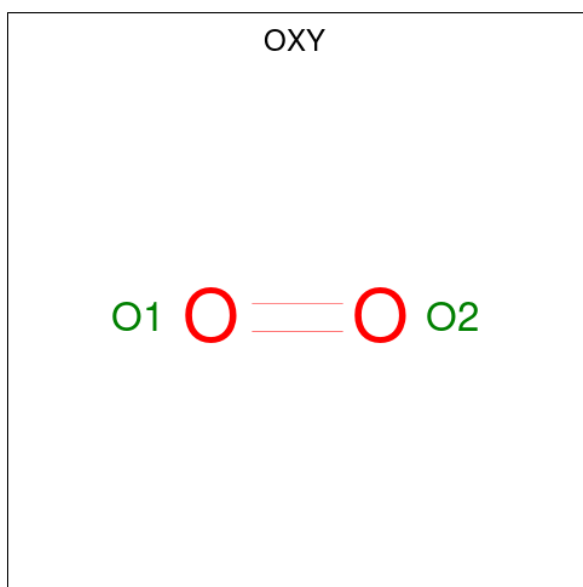
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Fe 1 1	0	0
3	B	1	Total Fe 1 1	0	0
3	C	1	Total Fe 1 1	0	0

- Molecule 4 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe₂S₂).



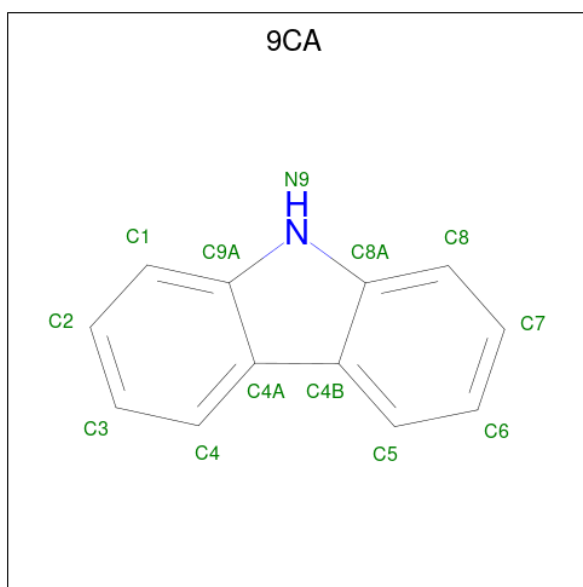
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total Fe S 4 2 2	0	0
4	B	1	Total Fe S 4 2 2	0	0
4	C	1	Total Fe S 4 2 2	0	0
4	D	1	Total Fe S 4 2 2	0	0
4	E	1	Total Fe S 4 2 2	0	0
4	F	1	Total Fe S 4 2 2	0	0

- Molecule 5 is OXYGEN MOLECULE (three-letter code: OXY) (formula: O₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total O 2 2	0	0
5	B	1	Total O 2 2	0	0
5	C	1	Total O 2 2	0	0

- Molecule 6 is 9H-CARBAZOLE (three-letter code: 9CA) (formula: C₁₂H₉N).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	B	1	Total C N 13 12 1	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	C	1	Total	C	N	0	0
			13	12	1		

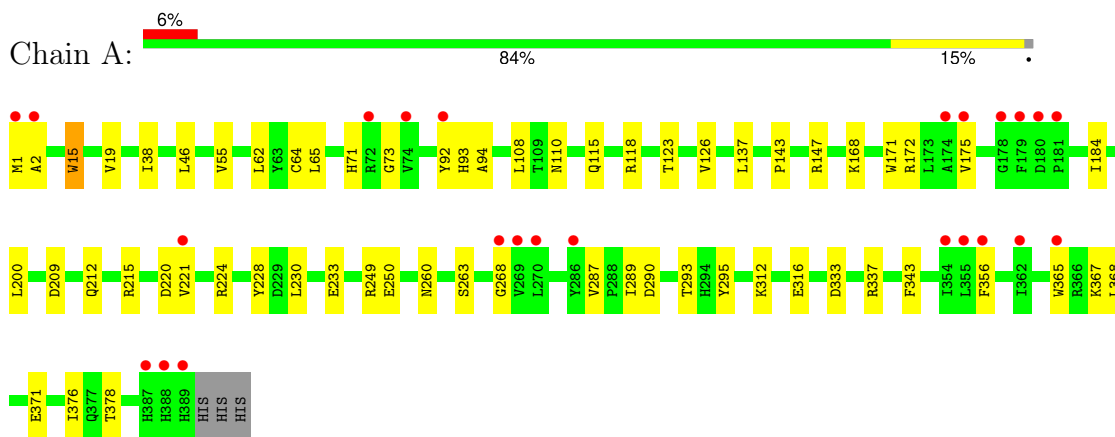
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	284	Total	O	0	0
			284	284		
7	B	237	Total	O	0	0
			237	237		
7	C	234	Total	O	0	0
			234	234		
7	D	18	Total	O	0	0
			18	18		
7	E	45	Total	O	0	0
			45	45		
7	F	33	Total	O	0	0
			33	33		

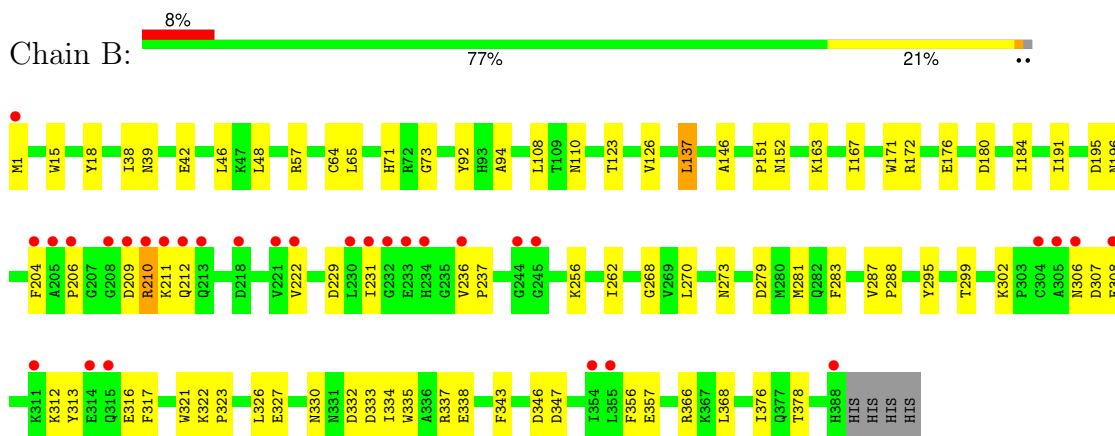
3 Residue-property plots [i](#)

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.

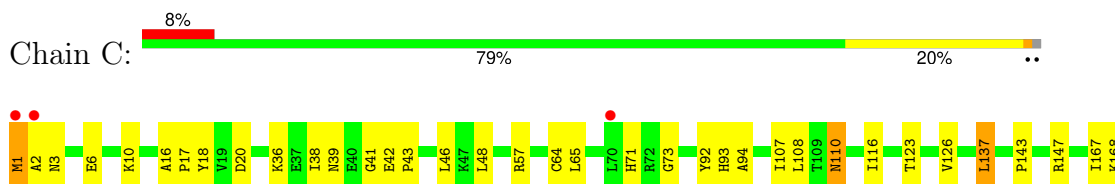
- Molecule 1: Terminal oxygenase component of carbazole

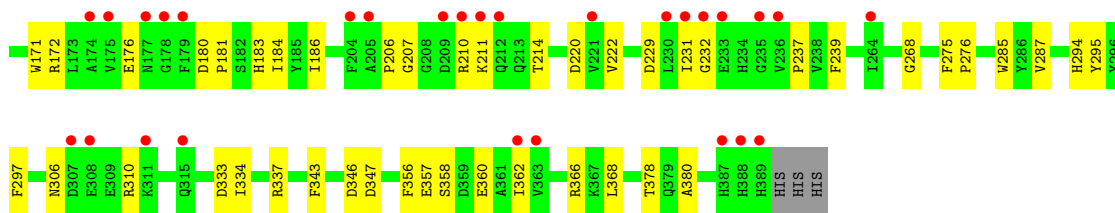


- Molecule 1: Terminal oxygenase component of carbazole

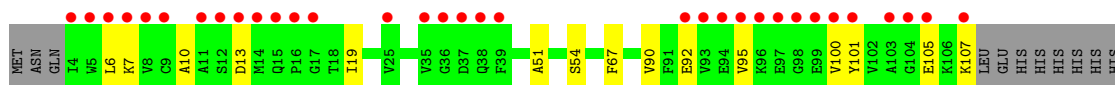
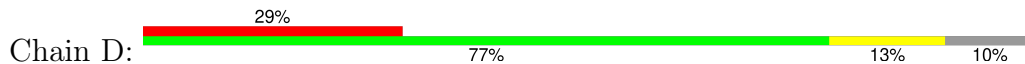


- Molecule 1: Terminal oxygenase component of carbazole

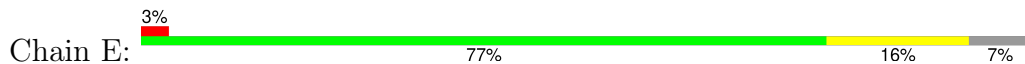




● Molecule 2: Ferredoxin component of carbazole



● Molecule 2: Ferredoxin component of carbazole



● Molecule 2: Ferredoxin component of carbazole



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	98.01Å 89.61Å 104.82Å 90.00° 104.18° 90.00°	Depositor
Resolution (Å)	32.68 – 2.00 33.43 – 2.00	Depositor EDS
% Data completeness (in resolution range)	98.8 (32.68-2.00) 99.0 (33.43-2.00)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.08 (at 2.00Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.205 , 0.240 0.199 , 0.232	Depositor DCC
R_{free} test set	5889 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	37.3	Xtrriage
Anisotropy	0.025	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 46.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	12638	wwPDB-VP
Average B, all atoms (Å ²)	40.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.64% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: FE2, OXY, FES, 9CA

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	0.38	1/3221 (0.0%)	0.63	0/4372
1	B	0.37	1/3210 (0.0%)	0.61	0/4357
1	C	0.32	0/3221	0.59	0/4372
2	D	0.30	0/784	0.56	0/1066
2	E	0.33	0/810	0.59	0/1101
2	F	0.33	0/784	0.60	0/1066
All	All	0.35	2/12030 (0.0%)	0.60	0/16334

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	15	TRP	NE1-CE2	8.37	1.48	1.37
1	B	15	TRP	NE1-CE2	7.56	1.47	1.37

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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	3136	0	3042	38	0
1	B	3126	0	3035	58	0
1	C	3136	0	3042	50	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	768	0	745	10	0
2	E	794	0	770	13	0
2	F	768	0	745	14	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
4	A	4	0	0	1	0
4	B	4	0	0	0	0
4	C	4	0	0	1	0
4	D	4	0	0	0	0
4	E	4	0	0	0	0
4	F	4	0	0	0	0
5	A	2	0	0	0	0
5	B	2	0	0	0	0
5	C	2	0	0	0	0
6	B	13	0	9	1	0
6	C	13	0	9	1	0
7	A	284	0	0	1	0
7	B	237	0	0	2	0
7	C	234	0	0	6	0
7	D	18	0	0	0	0
7	E	45	0	0	1	0
7	F	33	0	0	3	0
All	All	12638	0	11397	180	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 8.

All (180) 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:230:LEU:HB3	1:A:233:GLU:HG3	1.61	0.81
1:C:210:ARG:HG3	1:C:211:LYS:H	1.45	0.79
1:C:65:LEU:HD23	1:C:123:THR:HG22	1.65	0.78
1:A:65:LEU:HD23	1:A:123:THR:HG22	1.68	0.76
2:E:92:GLU:HB2	2:E:107:LYS:HE3	1.66	0.75
1:C:6:GLU:O	1:C:10:LYS:HG2	1.86	0.75
1:A:290:ASP:OD1	1:A:293:THR:HG22	1.85	0.75
2:F:4:ILE:HG13	2:F:5:TRP:H	1.53	0.73
1:B:209:ASP:OD2	1:B:212:GLN:HB2	1.89	0.73
1:B:322:LYS:HB3	1:B:323:PRO:HD3	1.73	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:7:LYS:HG2	2:D:101:TYR:CE1	2.26	0.70
2:E:108:LEU:O	2:E:109:GLU:HB3	1.91	0.69
1:A:1:MET:HB2	1:A:378:THR:HG21	1.73	0.69
1:B:38:ILE:HG23	1:B:57:ARG:HH21	1.58	0.68
1:A:289:ILE:HB	1:A:293:THR:HG23	1.74	0.68
1:C:220:ASP:OD1	1:C:222:VAL:HG22	1.98	0.64
1:B:210:ARG:HG3	7:B:817:HOH:O	1.97	0.63
1:C:1:MET:HB2	1:C:378:THR:HG21	1.81	0.61
1:B:206:PRO:HG3	1:B:357:GLU:HB3	1.82	0.61
1:B:210:ARG:HD3	1:B:211:LYS:HG3	1.81	0.61
2:F:53:LEU:CD1	2:F:88:LEU:HD11	2.30	0.61
1:C:2:ALA:HA	7:C:818:HOH:O	2.00	0.60
2:D:6:LEU:HD23	2:D:7:LYS:N	2.17	0.59
1:C:206:PRO:HG2	1:C:357:GLU:HB3	1.84	0.59
2:D:51:ALA:HB2	2:D:67:PHE:CG	2.39	0.58
1:B:210:ARG:HH11	1:B:211:LYS:NZ	2.01	0.58
2:E:108:LEU:O	2:E:109:GLU:CB	2.51	0.58
2:E:4:ILE:HG23	2:E:5:TRP:CD1	2.39	0.58
1:C:94:ALA:HB1	1:C:108:LEU:HB2	1.85	0.58
1:C:48:LEU:HD23	1:C:137:LEU:HD23	1.85	0.57
1:B:163:LYS:HD3	7:B:546:HOH:O	2.04	0.57
1:B:1:MET:HB3	1:B:378:THR:HG21	1.85	0.57
1:A:312:LYS:HE2	1:A:316:GLU:OE2	2.03	0.57
1:C:38:ILE:HG23	1:C:57:ARG:HH21	1.69	0.56
1:B:1:MET:CE	1:B:376:ILE:H	2.17	0.56
1:C:287:VAL:HB	1:C:295:TYR:HB2	1.87	0.56
1:A:94:ALA:HB1	1:A:108:LEU:HB2	1.88	0.56
1:C:360:GLU:HG3	7:C:525:HOH:O	2.04	0.56
2:F:4:ILE:HG13	2:F:5:TRP:N	2.20	0.56
1:B:287:VAL:HB	1:B:295:TYR:HB2	1.87	0.56
1:B:191:ILE:O	1:B:195:ASP:HB2	2.06	0.56
1:B:38:ILE:HG23	1:B:57:ARG:NH2	2.22	0.55
2:F:19:ILE:HG21	2:F:54:SER:HA	1.89	0.55
1:C:39:ASN:HB2	1:C:42:GLU:OE2	2.07	0.55
1:B:204:PHE:CD2	1:B:231:ILE:HD12	2.41	0.55
1:B:333:ASP:O	1:B:337:ARG:HG3	2.06	0.55
1:A:220:ASP:HB2	1:A:224:ARG:HB2	1.89	0.54
1:A:287:VAL:HB	1:A:295:TYR:HB2	1.89	0.54
2:F:96:LYS:HE2	2:F:101:TYR:CZ	2.43	0.54
1:B:94:ALA:HB1	1:B:108:LEU:HB2	1.90	0.54
1:C:306:ASN:O	1:C:310:ARG:HG3	2.08	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:167:ILE:HD12	1:B:334:ILE:HG23	1.89	0.53
1:B:210:ARG:HH11	1:B:211:LYS:HZ3	1.55	0.53
1:C:181:PRO:HG2	1:C:358:SER:HB2	1.89	0.53
1:C:176:GLU:O	1:C:180:ASP:HB2	2.07	0.53
1:B:48:LEU:HD23	1:B:137:LEU:HD23	1.91	0.53
1:B:39:ASN:HB2	1:B:42:GLU:OE1	2.09	0.53
1:C:210:ARG:HA	7:C:615:HOH:O	2.09	0.52
1:A:228:TYR:CD1	1:A:263:SER:HB3	2.44	0.52
2:D:7:LYS:HG2	2:D:101:TYR:HE1	1.73	0.52
1:B:334:ILE:O	1:B:338:GLU:HG3	2.09	0.52
1:A:184:ILE:HD11	1:A:200:LEU:CD1	2.40	0.52
1:C:210:ARG:HG3	1:C:211:LYS:N	2.21	0.52
2:E:5:TRP:CZ3	2:E:94:GLU:HG2	2.45	0.52
1:A:1:MET:O	1:A:2:ALA:HB3	2.10	0.52
1:A:143:PRO:HG3	1:A:147:ARG:CZ	2.40	0.52
1:B:176:GLU:O	1:B:180:ASP:HB2	2.11	0.51
1:B:262:ILE:CG2	1:B:270:LEU:HD11	2.40	0.51
1:B:262:ILE:HG22	1:B:270:LEU:HD11	1.92	0.51
1:C:107:ILE:HG13	1:C:116:ILE:HG12	1.92	0.51
2:D:19:ILE:HG21	2:D:54:SER:HA	1.94	0.51
1:A:168:LYS:HE2	7:A:784:HOH:O	2.11	0.50
1:C:183:HIS:O	1:C:186:ILE:HG12	2.11	0.50
2:F:99:GLU:HB3	2:F:101:TYR:HE1	1.77	0.50
1:C:171:TRP:CE2	1:C:172:ARG:HG3	2.46	0.50
1:C:285:TRP:HB2	1:C:297:PHE:HB3	1.94	0.50
2:F:106:LYS:O	2:F:107:LYS:HB2	2.11	0.50
1:B:312:LYS:O	1:B:316:GLU:HG3	2.12	0.50
1:A:171:TRP:CE2	1:A:172:ARG:HG3	2.47	0.50
1:B:94:ALA:CB	1:B:108:LEU:HB2	2.42	0.50
1:B:229:ASP:OD2	1:B:231:ILE:HG23	2.13	0.49
1:C:38:ILE:HG23	1:C:57:ARG:NH2	2.28	0.49
2:D:90:VAL:HG23	2:D:107:LYS:HG2	1.94	0.49
2:F:39:PHE:O	2:F:93:VAL:HG11	2.13	0.49
2:F:92:GLU:HG2	2:F:103:ALA:HB2	1.95	0.49
2:D:92:GLU:HG2	2:D:107:LYS:HE2	1.95	0.49
2:E:10:ALA:HB3	2:E:13:ASP:OD2	2.13	0.48
1:A:93:HIS:HB2	4:A:401:FES:S1	2.53	0.48
1:B:171:TRP:CE2	1:B:172:ARG:HG3	2.48	0.48
1:B:210:ARG:HD2	1:B:211:LYS:HZ3	1.78	0.48
1:B:283:PHE:HB2	1:B:299:THR:OG1	2.13	0.48
1:A:290:ASP:CG	1:A:293:THR:HG22	2.33	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1:MET:HB2	1:A:378:THR:CG2	2.42	0.48
1:A:215:ARG:HB2	1:A:230:LEU:HD11	1.94	0.48
1:C:168:LYS:HE2	7:C:605:HOH:O	2.14	0.48
1:B:1:MET:HE3	1:B:376:ILE:H	1.77	0.48
1:A:15:TRP:HD1	1:A:19:VAL:HG23	1.79	0.47
1:A:73:GLY:HA3	1:C:343:PHE:CG	2.49	0.47
1:A:333:ASP:O	1:A:337:ARG:HG3	2.15	0.47
2:E:51:ALA:HB2	2:E:67:PHE:CG	2.48	0.47
1:A:367:LYS:O	1:A:371:GLU:HG3	2.14	0.47
1:B:326:LEU:O	1:B:330:ASN:HB2	2.15	0.47
2:E:19:ILE:HD11	2:E:58:LEU:HB2	1.97	0.47
1:A:38:ILE:CD1	1:A:55:VAL:HG12	2.45	0.47
2:F:51:ALA:HB2	2:F:67:PHE:CG	2.49	0.47
1:A:94:ALA:CB	1:A:108:LEU:HB2	2.45	0.47
1:B:222:VAL:O	1:B:222:VAL:HG12	2.14	0.47
1:C:93:HIS:HB2	4:C:401:FES:S1	2.56	0.46
1:A:118:ARG:HG3	7:F:116:HOH:O	2.15	0.46
2:D:95:VAL:HG22	2:D:100:VAL:HG22	1.97	0.46
1:C:333:ASP:O	1:C:337:ARG:HG3	2.16	0.46
1:C:143:PRO:HG3	1:C:147:ARG:CZ	2.46	0.46
1:C:176:GLU:HG2	1:C:362:ILE:HG23	1.96	0.46
1:A:249:ARG:HG3	1:A:250:GLU:N	2.31	0.46
2:F:93:VAL:HG23	2:F:101:TYR:O	2.16	0.46
1:A:1:MET:N	1:A:376:ILE:HG21	2.31	0.46
1:A:175:VAL:HG11	1:A:365:TRP:CE2	2.52	0.45
1:B:210:ARG:C	1:B:212:GLN:H	2.20	0.45
1:B:343:PHE:CG	1:C:73:GLY:HA3	2.52	0.45
1:C:167:ILE:HB	1:C:294:HIS:CE1	2.52	0.45
2:F:106:LYS:NZ	7:F:591:HOH:O	2.49	0.45
1:B:332:ASP:HA	1:B:335:TRP:NE1	2.32	0.45
1:C:231:ILE:HG13	1:C:232:GLY:N	2.31	0.45
1:C:3:ASN:HB2	1:C:20:ASP:OD1	2.17	0.45
1:A:38:ILE:HD13	1:A:62:LEU:HD22	1.98	0.44
1:C:346:ASP:O	1:C:347:ASP:HB2	2.17	0.44
1:C:39:ASN:HB2	1:C:42:GLU:CD	2.37	0.44
1:C:94:ALA:CB	1:C:108:LEU:HB2	2.48	0.44
2:E:4:ILE:HG23	2:E:5:TRP:N	2.32	0.44
1:B:306:ASN:OD1	1:B:308:GLU:HB2	2.18	0.44
1:A:1:MET:H2	1:A:376:ILE:HG21	1.83	0.44
1:A:220:ASP:OD1	1:A:221:VAL:N	2.49	0.44
1:B:65:LEU:HD23	1:B:123:THR:HG22	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:206:PRO:HG3	1:B:357:GLU:CB	2.48	0.43
1:B:236:VAL:HA	1:B:237:PRO:HD3	1.86	0.43
1:C:64:CYS:HB2	1:C:126:VAL:HG21	2.00	0.43
2:E:92:GLU:OE1	2:E:107:LYS:NZ	2.51	0.43
1:B:1:MET:HB3	1:B:378:THR:CG2	2.48	0.43
1:B:196:ASN:O	1:B:256:LYS:HD2	2.19	0.43
1:A:175:VAL:HG11	1:A:365:TRP:CZ2	2.54	0.43
1:B:273:ASN:OD1	1:B:281:MET:HG2	2.18	0.43
1:C:36:LYS:NZ	7:C:466:HOH:O	2.51	0.43
1:A:65:LEU:CD2	1:A:123:THR:HG22	2.45	0.43
1:B:1:MET:HE1	1:B:376:ILE:H	1.83	0.43
2:E:86:VAL:HA	2:E:87:PRO:HD3	1.89	0.43
1:C:275:PHE:CG	1:C:276:PRO:HA	2.54	0.43
1:C:18:TYR:CE2	1:C:366:ARG:HG2	2.54	0.42
1:B:287:VAL:HA	1:B:288:PRO:HD3	1.91	0.42
1:B:346:ASP:O	1:B:347:ASP:HB2	2.20	0.42
1:C:237:PRO:HB2	1:C:239:PHE:CE2	2.55	0.42
2:F:5:TRP:CH2	2:F:94:GLU:HG3	2.55	0.42
1:B:322:LYS:O	1:B:327:GLU:HG3	2.20	0.42
1:A:64:CYS:HB2	1:A:126:VAL:CG2	2.50	0.42
1:B:279:ASP:OD2	1:B:302:LYS:NZ	2.51	0.42
2:F:7:LYS:HE3	7:F:806:HOH:O	2.20	0.42
1:C:184:ILE:HG21	6:C:2002:9CA:C6	2.50	0.42
1:A:343:PHE:CG	1:B:73:GLY:HA3	2.55	0.41
1:B:302:LYS:HD3	1:B:313:TYR:CD1	2.55	0.41
1:B:210:ARG:CD	1:B:211:LYS:HZ3	2.33	0.41
1:B:18:TYR:CE2	1:B:366:ARG:HG2	2.55	0.41
1:B:151:PRO:O	1:B:152:ASN:HB2	2.21	0.41
1:A:115:GLN:HA	1:A:115:GLN:OE1	2.20	0.41
2:D:10:ALA:HB3	2:D:13:ASP:OD2	2.21	0.41
1:B:184:ILE:HG21	6:B:2001:9CA:C6	2.50	0.41
1:C:380:ALA:HB3	7:C:486:HOH:O	2.20	0.41
1:C:229:ASP:OD1	1:C:231:ILE:HG23	2.21	0.41
1:A:209:ASP:OD1	1:A:212:GLN:HG3	2.21	0.41
1:B:210:ARG:HH11	1:B:211:LYS:HG3	1.86	0.41
1:C:16:ALA:N	1:C:17:PRO:CD	2.84	0.41
2:E:20:ARG:HD3	7:E:850:HOH:O	2.21	0.41
1:C:38:ILE:HG23	1:C:38:ILE:O	2.20	0.41
1:C:41:GLY:O	1:C:43:PRO:HD3	2.21	0.41
1:B:317:PHE:HA	1:B:321:TRP:HB2	2.02	0.40
1:B:64:CYS:HB2	1:B:126:VAL:CG2	2.51	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:110:ASN:C	1:C:110:ASN:HD22	2.24	0.40
1:B:146:ALA:HB3	1:B:222:VAL:HG11	2.02	0.40
1:C:167:ILE:HD12	1:C:334:ILE:HG23	2.02	0.40
1:C:231:ILE:HG13	1:C:232:GLY:H	1.86	0.40
2:D:90:VAL:HG23	2:D:107:LYS:CG	2.51	0.40
2:E:19:ILE:HG21	2:E:54:SER:HA	2.04	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	387/392 (99%)	369 (95%)	16 (4%)	2 (0%)	29	23
1	B	386/392 (98%)	354 (92%)	30 (8%)	2 (0%)	29	23
1	C	387/392 (99%)	362 (94%)	22 (6%)	3 (1%)	19	13
2	D	102/115 (89%)	94 (92%)	8 (8%)	0	100	100
2	E	105/115 (91%)	100 (95%)	5 (5%)	0	100	100
2	F	102/115 (89%)	100 (98%)	2 (2%)	0	100	100
All	All	1469/1521 (97%)	1379 (94%)	83 (6%)	7 (0%)	29	23

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	268	GLY
1	A	268	GLY
1	C	268	GLY
1	A	71	HIS
1	C	71	HIS
1	B	71	HIS
1	C	207	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	336/339 (99%)	329 (98%)	7 (2%)	53	57
1	B	335/339 (99%)	327 (98%)	8 (2%)	49	51
1	C	336/339 (99%)	328 (98%)	8 (2%)	49	51
2	D	82/93 (88%)	81 (99%)	1 (1%)	71	76
2	E	85/93 (91%)	84 (99%)	1 (1%)	71	76
2	F	82/93 (88%)	81 (99%)	1 (1%)	71	76
All	All	1256/1296 (97%)	1230 (98%)	26 (2%)	53	57

All (26) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	46	LEU
1	A	92	TYR
1	A	110	ASN
1	A	137	LEU
1	A	260	ASN
1	A	356	PHE
1	A	368	LEU
1	B	46	LEU
1	B	92	TYR
1	B	110	ASN
1	B	137	LEU
1	B	210	ARG
1	B	307	ASP
1	B	356	PHE
1	B	368	LEU
1	C	1	MET
1	C	46	LEU
1	C	92	TYR
1	C	110	ASN
1	C	137	LEU
1	C	214	THR
1	C	356	PHE

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Mol	Chain	Res	Type
1	C	368	LEU
2	D	105	GLU
2	E	37	ASP
2	F	37	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	110	ASN
1	A	165	GLN
1	B	110	ASN
1	B	234	HIS
1	C	110	ASN
1	C	212	GLN
1	C	234	HIS
1	C	379	GLN
1	C	388	HIS

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 14 ligands modelled in this entry, 3 are monoatomic - 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	$\# Z > 2$
5	OXY	C	603	3	1,1,1	0.99	0	-		
4	FES	F	201	2	0,4,4	-	-	-		
6	9CA	C	2002	-	15,15,15	1.30	1 (6%)	21,21,21	0.69	0
4	FES	C	401	1	0,4,4	-	-	-		
6	9CA	B	2001	-	15,15,15	1.31	1 (6%)	21,21,21	0.71	0
4	FES	B	401	1	0,4,4	-	-	-		
5	OXY	B	602	3	1,1,1	1.01	0	-		
4	FES	A	401	1	0,4,4	-	-	-		
5	OXY	A	601	3	1,1,1	0.99	0	-		
4	FES	E	201	2	0,4,4	-	-	-		
4	FES	D	201	2	0,4,4	-	-	-		

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
4	FES	F	201	2	-	-	0/1/1/1
6	9CA	C	2002	-	-	-	0/3/3/3
4	FES	C	401	1	-	-	0/1/1/1
6	9CA	B	2001	-	-	-	0/3/3/3
4	FES	B	401	1	-	-	0/1/1/1
4	FES	A	401	1	-	-	0/1/1/1
4	FES	E	201	2	-	-	0/1/1/1
4	FES	D	201	2	-	-	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	C	2002	9CA	C4B-C4A	-2.19	1.39	1.45
6	B	2001	9CA	C4B-C4A	-2.16	1.39	1.45

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	C	2002	9CA	1	0
4	C	401	FES	1	0
6	B	2001	9CA	1	0
4	A	401	FES	1	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 [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	389/392 (99%)	0.16	24 (6%) 20 19	25, 36, 49, 59	0
1	B	388/392 (98%)	0.26	31 (7%) 12 11	27, 39, 54, 59	0
1	C	389/392 (99%)	0.27	31 (7%) 12 11	29, 39, 52, 62	0
2	D	104/115 (90%)	1.12	33 (31%) 0 0	33, 48, 56, 58	0
2	E	107/115 (93%)	0.13	3 (2%) 53 51	31, 42, 51, 57	0
2	F	104/115 (90%)	0.82	21 (20%) 1 0	35, 46, 53, 58	0
All	All	1481/1521 (97%)	0.33	143 (9%) 7 7	25, 39, 53, 62	0

All (143) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	1	MET	12.0
1	A	1	MET	9.2
1	B	1	MET	7.1
1	B	212	GLN	6.9
1	C	209	ASP	6.4
1	B	209	ASP	5.9
2	D	98	GLY	5.5
1	B	221	VAL	5.5
2	D	37	ASP	5.4
1	C	2	ALA	5.4
2	F	25	VAL	5.2
1	A	389	HIS	4.9
1	B	204	PHE	4.9
2	D	5	TRP	4.8
1	C	230	LEU	4.8
1	A	2	ALA	4.7
2	D	11	ALA	4.7
2	D	12	SER	4.5
2	D	95	VAL	4.4

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Mol	Chain	Res	Type	RSRZ
2	D	4	ILE	4.4
1	C	221	VAL	4.3
2	F	93	VAL	4.2
2	D	16	PRO	4.1
1	C	233	GLU	4.1
1	B	230	LEU	4.1
2	F	107	LYS	4.1
2	D	97	GLU	4.0
1	C	204	PHE	3.9
2	D	99	GLU	3.8
1	C	389	HIS	3.8
1	A	221	VAL	3.8
2	D	9	CYS	3.8
1	B	308	GLU	3.8
2	F	95	VAL	3.8
1	A	387	HIS	3.8
1	B	233	GLU	3.7
2	D	101	TYR	3.6
2	F	106	LYS	3.6
1	B	305	ALA	3.6
1	B	210	ARG	3.6
2	F	105	GLU	3.6
1	C	315	GLN	3.5
1	A	269	VAL	3.3
1	C	388	HIS	3.3
2	D	6	LEU	3.3
2	D	25	VAL	3.3
1	C	235	GLY	3.2
1	B	311	LYS	3.2
2	D	13	ASP	3.2
1	C	211	LYS	3.2
2	F	5	TRP	3.2
2	D	8	VAL	3.2
1	B	205	ALA	3.1
1	A	175	VAL	3.1
2	D	38	GLN	3.1
2	D	14	MET	3.0
2	D	104	GLY	3.0
1	C	212	GLN	3.0
1	A	174	ALA	3.0
1	C	175	VAL	3.0
1	C	205	ALA	3.0

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Mol	Chain	Res	Type	RSRZ
1	C	308	GLU	3.0
1	C	178	GLY	3.0
2	D	92	GLU	3.0
1	B	208	GLY	2.9
2	F	101	TYR	2.9
2	E	97	GLU	2.9
1	B	222	VAL	2.9
1	C	179	PHE	2.9
2	F	91	PHE	2.8
2	E	98	GLY	2.8
1	C	362	ILE	2.8
2	F	4	ILE	2.8
2	F	97	GLU	2.8
2	D	93	VAL	2.8
1	B	206	PRO	2.8
1	C	307	ASP	2.7
1	A	270	LEU	2.7
2	F	27	ALA	2.7
1	C	236	VAL	2.7
1	B	314	GLU	2.7
2	D	94	GLU	2.6
1	A	362	ILE	2.6
1	B	236	VAL	2.6
1	A	179	PHE	2.6
2	D	17	GLY	2.6
2	D	36	GLY	2.6
1	A	388	HIS	2.6
1	A	72	ARG	2.6
2	D	103	ALA	2.6
2	F	103	ALA	2.6
2	F	92	GLU	2.6
1	C	264	ILE	2.5
2	D	96	LYS	2.5
1	C	177	ASN	2.5
1	B	234	HIS	2.5
1	A	178	GLY	2.5
2	E	37	ASP	2.5
1	C	70	LEU	2.5
2	D	105	GLU	2.5
2	D	7	LYS	2.5
2	D	107	LYS	2.5
2	D	100	VAL	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	355	LEU	2.4
1	C	210	ARG	2.4
1	C	232	GLY	2.4
2	F	23	ASN	2.4
1	C	363	VAL	2.4
1	B	232	GLY	2.4
1	B	388	HIS	2.4
1	C	387	HIS	2.4
2	D	39	PHE	2.3
2	F	90	VAL	2.3
2	F	94	GLU	2.3
1	A	286	TYR	2.3
2	F	104	GLY	2.3
1	C	174	ALA	2.3
1	C	311	LYS	2.3
2	F	28	ALA	2.3
2	D	15	GLN	2.3
1	B	211	LYS	2.3
1	B	315	GLN	2.3
1	A	356	PHE	2.2
1	A	268	GLY	2.2
1	A	180	ASP	2.2
1	B	213	GLN	2.2
1	B	245	GLY	2.2
2	F	6	LEU	2.2
2	D	35	VAL	2.2
1	A	92	TYR	2.2
1	A	355	LEU	2.1
1	A	181	PRO	2.1
1	C	231	ILE	2.1
1	A	74	VAL	2.1
1	B	231	ILE	2.1
2	F	100	VAL	2.0
1	B	244	GLY	2.0
1	A	365	TRP	2.0
1	B	306	ASN	2.0
1	B	304	CYS	2.0
1	B	354	ILE	2.0
1	B	218	ASP	2.0
1	A	354	ILE	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 monosaccharides 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(\AA^2)	Q<0.9
6	9CA	C	2002	13/13	0.83	0.19	44,47,48,48	0
6	9CA	B	2001	13/13	0.89	0.19	47,48,50,50	0
4	FES	C	401	4/4	0.98	0.14	35,35,36,37	0
5	OXY	A	601	2/2	0.98	0.35	43,43,43,45	0
3	FE2	A	501	1/1	0.99	0.14	33,33,33,33	0
4	FES	D	201	4/4	0.99	0.11	33,33,33,33	0
4	FES	E	201	4/4	0.99	0.15	32,33,33,33	0
4	FES	F	201	4/4	0.99	0.05	31,34,35,36	0
3	FE2	B	501	1/1	0.99	0.07	44,44,44,44	0
5	OXY	B	602	2/2	0.99	0.07	57,57,57,57	0
5	OXY	C	603	2/2	0.99	0.14	49,49,49,51	0
4	FES	A	401	4/4	0.99	0.17	30,31,32,33	0
4	FES	B	401	4/4	0.99	0.15	24,29,29,30	0
3	FE2	C	501	1/1	1.00	0.07	35,35,35,35	0

6.5 Other polymers [i](#)

There are no such residues in this entry.