



# Full wwPDB X-ray Structure Validation Report ⓘ

May 23, 2020 – 07:39 am BST

PDB ID : 4FUQ  
Title : Crystal structure of apo MatB from *Rhodopseudomonas palustris*  
Authors : Rank, K.C.; Crosby, H.A.; Escalante-Semerena, J.C.; Rayment, I.  
Deposited on : 2012-06-28  
Resolution : 1.70 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](mailto: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.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.11  
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) : 2.11

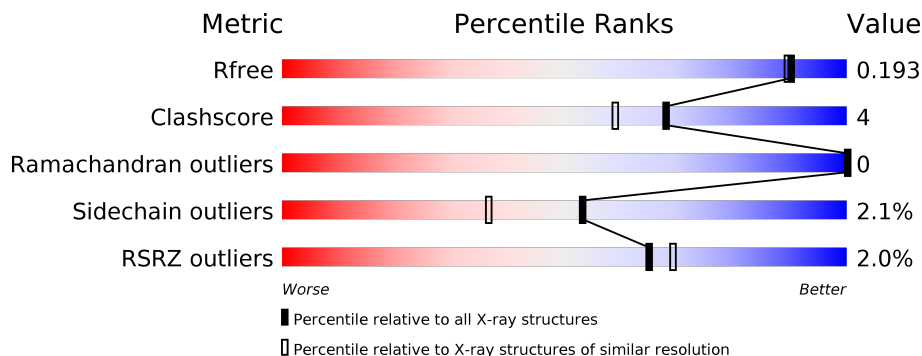
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.70 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	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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  $\geq 3$ , 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	503	 2% 91% 8%
1	B	503	 2% 92% 7%
1	C	503	 % 92% 7%
1	D	503	 2% 91% 8%

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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	GOL	A	605	-	-	X	-
3	GOL	D	606	-	-	X	-

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 18181 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 Malonyl CoA synthetase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	501	Total 3849	C 2444	N 665	O 725	S 1	Se 14	0	5	0
1	B	501	Total 3852	C 2448	N 662	O 728	S 1	Se 13	0	6	0
1	C	502	Total 3856	C 2449	N 663	O 730	S 1	Se 13	0	6	0
1	D	501	Total 3856	C 2451	N 662	O 728	S 1	Se 14	0	8	0

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



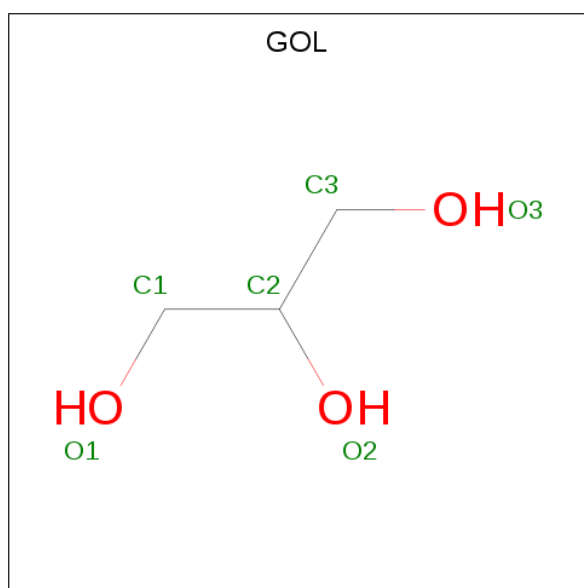
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
2	A	1	Total 5	O 4	S 1	0	0
2	B	1	Total 5	O 4	S 1	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	0
			5	4	1		

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



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

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

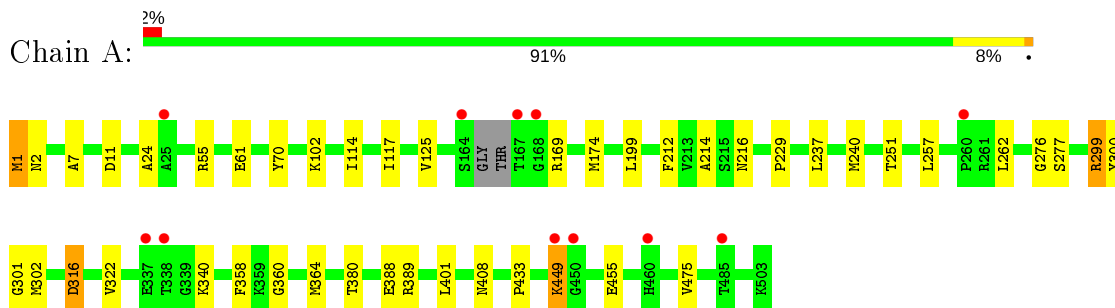
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	645	Total O 645 645	0	0
4	B	587	Total O 587 587	0	0
4	C	664	Total O 664 664	0	0
4	D	711	Total O 711 711	0	0

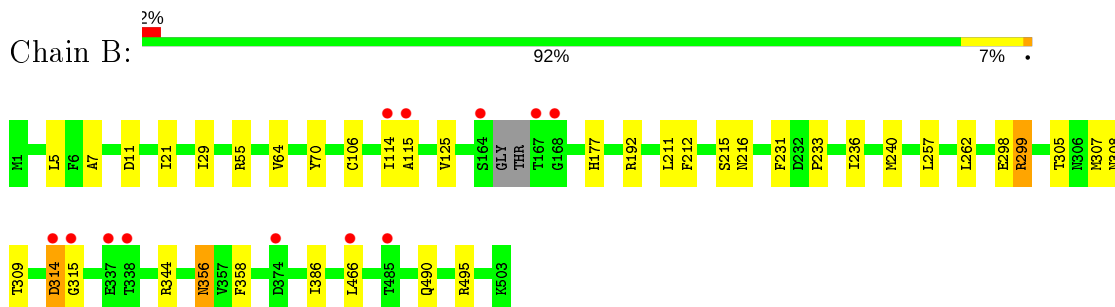
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

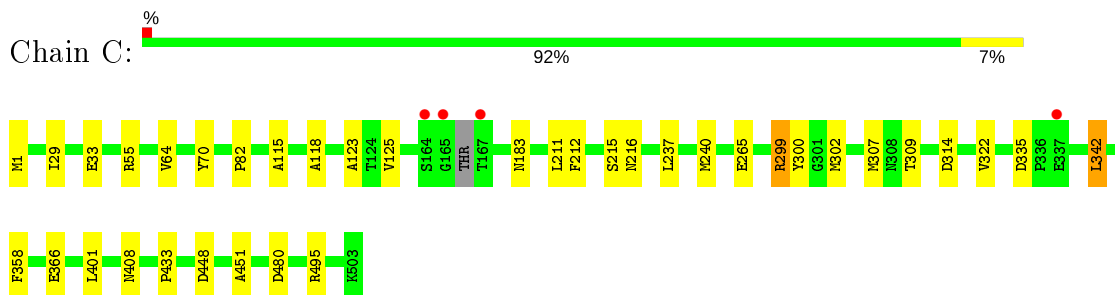
- Molecule 1: Malonyl CoA synthetase



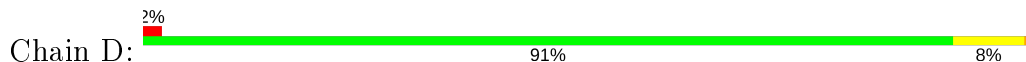
- Molecule 1: Malonyl CoA synthetase

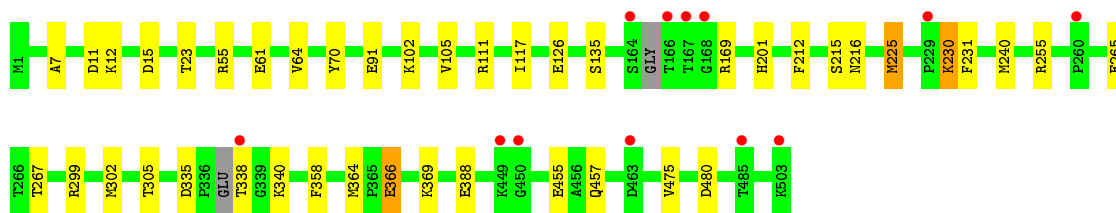


- Molecule 1: Malonyl CoA synthetase



- Molecule 1: Malonyl CoA synthetase







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	133.87Å 58.81Å 138.96Å 90.00° 91.66° 90.00°	Depositor
Resolution (Å)	24.91 – 1.70 24.91 – 1.70	Depositor EDS
% Data completeness (in resolution range)	94.9 (24.91-1.70) 94.9 (24.91-1.70)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	0.09	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	5.59 (at 1.71Å)	Xtriage
Refinement program	PHENIX 1.6_289	Depositor
R, $R_{free}$	0.158 , 0.197 0.155 , 0.193	Depositor DCC
$R_{free}$ test set	11555 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	17.6	Xtriage
Anisotropy	0.027	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 50.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.007 for l,k,-h 0.076 for h,-k,-l 0.014 for l,-k,h	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	18181	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.20% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup> Intensities estimated from amplitudes.

<sup>2</sup> Theoretical 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: GOL, SO4

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	0.32	0/3928	0.53	0/5303
1	B	0.29	0/3934	0.50	0/5316
1	C	0.32	0/3938	0.51	0/5320
1	D	0.34	0/3943	0.53	0/5325
All	All	0.32	0/15743	0.52	0/21264

There are no bond length outliers.

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	3849	0	3888	33	0
1	B	3852	0	3886	29	0
1	C	3856	0	3887	21	0
1	D	3856	0	3899	32	0
2	A	5	0	0	0	0
2	B	10	0	0	0	0
2	C	15	0	0	0	0
2	D	5	0	0	0	0
3	A	30	0	40	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	30	0	40	4	0
3	C	30	0	40	7	0
3	D	36	0	48	7	0
4	A	645	0	0	7	0
4	B	587	0	0	4	0
4	C	664	0	0	3	0
4	D	711	0	0	9	0
All	All	18181	0	15728	119	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 4.

All (119) 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:D:231:PHE:HB3	3:D:606:GOL:H12	1.45	0.99
1:B:5:LEU:H	1:B:177:HIS:HD2	1.11	0.98
1:A:169:ARG:CZ	1:A:364:MSE:HE2	2.02	0.89
1:B:356:ASN:HD22	1:B:356:ASN:H	1.14	0.88
1:B:495:ARG:HH22	3:D:607:GOL:H2	1.49	0.78
1:D:169:ARG:CZ	1:D:364:MSE:HE2	2.15	0.77
1:D:61:GLU:HG2	4:D:1076:HOH:O	1.84	0.76
1:A:61:GLU:HG2	4:A:1317:HOH:O	1.88	0.72
1:B:5:LEU:H	1:B:177:HIS:CD2	2.01	0.72
1:C:366:GLU:HB2	3:C:608:GOL:H2	1.71	0.72
1:A:449:LYS:HD2	1:A:449:LYS:H	1.55	0.71
1:D:335:ASP:HB3	1:D:338:THR:HG22	1.72	0.71
1:D:255:ARG:HH22	3:D:606:GOL:H32	1.56	0.70
1:B:307:MSE:HE1	3:B:606:GOL:H32	1.73	0.70
1:A:299:ARG:HH22	3:A:605:GOL:H32	1.57	0.69
1:C:115:ALA:HA	1:C:125:VAL:HG21	1.73	0.69
1:B:356:ASN:ND2	1:B:356:ASN:H	1.89	0.68
1:B:495:ARG:NH2	3:D:607:GOL:H2	2.09	0.67
1:B:305:THR:HB	1:B:308:ASN:HD21	1.60	0.67
1:A:301:GLY:O	3:A:605:GOL:H12	1.97	0.65
1:D:23:THR:HG22	1:D:64[B]:VAL:HG21	1.78	0.65
1:C:322:VAL:HG11	3:C:604:GOL:H11	1.79	0.65
1:A:117:ILE:HG13	4:A:1202:HOH:O	1.97	0.64
3:A:604:GOL:H32	4:A:760:HOH:O	1.97	0.63
1:A:299:ARG:HH12	3:A:605:GOL:H11	1.63	0.63
1:A:300:TYR:HB2	1:A:322:VAL:HG21	1.82	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:237:LEU:HD23	1:C:240:MSE:HE2	1.82	0.61
1:A:237:LEU:HD23	1:A:240:MSE:HE2	1.81	0.61
1:A:316:ASP:CG	1:A:389:ARG:HH22	2.02	0.61
1:C:82:PRO:O	3:C:607:GOL:H12	1.99	0.61
1:D:364:MSE:HE3	4:D:701:HOH:O	2.01	0.61
1:B:298:GLU:HB3	3:B:605:GOL:H11	1.83	0.60
1:D:366:GLU:HG3	4:D:1218:HOH:O	2.01	0.60
1:B:115:ALA:HB1	4:B:1106:HOH:O	2.01	0.60
1:A:102:LYS:HE3	4:A:1082:HOH:O	2.02	0.59
1:B:106:CYS:CB	1:B:114:ILE:HD12	2.35	0.56
1:D:231:PHE:CB	3:D:606:GOL:H12	2.26	0.56
1:C:265:GLU:HG3	4:C:1287:HOH:O	2.07	0.54
1:A:455:GLU:HG3	1:A:475:VAL:HB	1.89	0.54
1:C:183:ASN:HD21	1:C:307:MSE:H	1.55	0.54
1:A:299:ARG:HH12	3:A:605:GOL:C1	2.21	0.53
1:C:33:GLU:OE1	3:C:605:GOL:H12	2.07	0.53
1:D:255:ARG:HH22	3:D:606:GOL:C3	2.22	0.53
1:C:183:ASN:ND2	1:C:307:MSE:H	2.07	0.53
3:A:604:GOL:H11	1:C:433:PRO:HD3	1.89	0.53
1:D:215:SER:HA	1:D:225[A]:MSE:HE1	1.92	0.52
1:D:338:THR:HG23	1:D:340:LYS:H	1.74	0.52
3:C:608:GOL:H31	4:C:1234:HOH:O	2.09	0.52
1:D:169:ARG:NH2	1:D:364:MSE:HE2	2.25	0.51
1:D:455:GLU:HG3	1:D:475:VAL:HB	1.92	0.51
1:B:212:PHE:O	1:B:216:ASN:HB2	2.10	0.51
1:A:276:GLY:O	1:A:277:SER:HB2	2.11	0.51
1:B:7:ALA:O	1:B:11:ASP:HB2	2.11	0.51
3:C:604:GOL:H12	4:C:846:HOH:O	2.10	0.51
1:B:231:PHE:CE2	1:B:233:PRO:HG3	2.45	0.50
1:A:237:LEU:HD23	1:A:240:MSE:CE	2.41	0.50
1:D:111:ARG:NH2	1:D:135:SER:HB3	2.27	0.50
1:B:344:ARG:HD2	1:B:386:ILE:HG22	1.94	0.50
1:D:15:ASP:OD1	4:D:1208:HOH:O	2.20	0.50
1:B:115:ALA:HA	1:B:125:VAL:HG21	1.93	0.49
1:B:21:ILE:HG21	1:B:64[B]:VAL:HG22	1.93	0.49
1:C:335:ASP:HB2	1:C:342:LEU:HD11	1.92	0.49
1:D:111:ARG:HH22	1:D:135:SER:HB3	1.78	0.49
1:B:211:LEU:O	1:B:215:SER:HB2	2.13	0.49
1:D:117:ILE:HG13	4:D:1240:HOH:O	2.13	0.49
1:A:169:ARG:NH1	1:A:364:MSE:HE2	2.27	0.48
1:A:114:ILE:HD11	1:A:125:VAL:HG13	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:230:LYS:HG3	1:D:231:PHE:N	2.28	0.48
1:C:29:ILE:HD13	1:C:64:VAL:HG11	1.95	0.48
1:D:457:GLN:HG3	4:D:1050:HOH:O	2.13	0.48
1:A:316:ASP:OD1	1:A:389:ARG:NH2	2.46	0.48
1:B:299:ARG:HB2	1:B:309:THR:O	2.14	0.48
1:A:257:LEU:HD23	1:A:262:LEU:HD23	1.96	0.47
1:B:106:CYS:HB2	1:B:114:ILE:HD12	1.96	0.46
1:A:251:THR:HG23	4:A:1144:HOH:O	2.15	0.45
1:D:7:ALA:O	1:D:11:ASP:HB2	2.17	0.45
1:A:169:ARG:NH2	1:A:364:MSE:HE2	2.28	0.45
1:A:24:ALA:HB2	1:A:229:PRO:HD3	1.97	0.45
1:B:236:ILE:O	1:B:240:MSE:HG3	2.17	0.45
1:B:299:ARG:HH12	3:B:606:GOL:C1	2.29	0.45
1:C:299:ARG:HB2	1:C:309:THR:O	2.16	0.45
1:A:7:ALA:O	1:A:11:ASP:HB2	2.17	0.45
1:D:105:VAL:HA	1:D:126:GLU:O	2.17	0.45
1:D:91:GLU:OE2	3:D:607:GOL:H12	2.17	0.45
1:A:302[B]:MSE:HE1	1:A:380:THR:HB	1.99	0.44
1:A:299:ARG:HH22	3:A:605:GOL:C3	2.27	0.44
1:C:300:TYR:OH	1:C:302:MSE:HE1	2.18	0.44
1:C:448:ASP:HB3	1:C:451:ALA:HB2	1.99	0.44
1:A:364:MSE:HE3	4:A:701:HOH:O	2.17	0.44
1:B:490:GLN:HG3	4:B:1208:HOH:O	2.18	0.44
1:B:466:LEU:HD23	4:B:1178:HOH:O	2.17	0.43
1:A:1:MSE:HB2	1:A:2:ASN:H	1.71	0.43
1:B:257:LEU:HD23	1:B:262:LEU:HD23	1.99	0.43
1:A:199:LEU:HD21	1:A:214:ALA:HB1	2.00	0.43
1:C:118:ALA:HB1	1:C:123:ALA:HB3	2.01	0.43
1:A:401:LEU:HD11	1:A:408:ASN:HB3	2.01	0.43
1:B:356:ASN:HD22	1:B:356:ASN:N	1.96	0.43
3:B:606:GOL:H31	4:B:862:HOH:O	2.17	0.43
1:B:314:ASP:HB2	1:B:315:GLY:HA2	2.00	0.43
1:A:388:GLU:HG3	4:A:1076:HOH:O	2.19	0.43
1:C:300:TYR:HB2	1:C:322:VAL:HG21	2.01	0.43
1:D:102:LYS:HE3	4:D:1316:HOH:O	2.19	0.42
1:C:211:LEU:O	1:C:215:SER:HB2	2.19	0.42
1:D:369:LYS:HE2	4:D:1218:HOH:O	2.19	0.42
1:D:201:HIS:HD2	1:D:225[A]:MSE:HE2	1.84	0.42
1:D:240:MSE:SE	1:D:267:THR:HG22	2.69	0.42
1:A:174:MSE:HE2	1:A:360:GLY:C	2.40	0.42
1:A:433:PRO:HD3	3:C:606:GOL:H32	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:265:GLU:HG3	4:D:974:HOH:O	2.20	0.42
1:B:231:PHE:HE2	1:B:233:PRO:HG3	1.84	0.41
3:A:604:GOL:H31	1:C:495:ARG:HD2	2.02	0.41
1:D:302:MSE:HG2	1:D:305:THR:OG1	2.20	0.41
1:D:335:ASP:CB	1:D:338:THR:HG22	2.45	0.41
1:B:29:ILE:HD13	1:B:64[A]:VAL:HG21	2.03	0.41
1:C:212:PHE:O	1:C:216:ASN:HB2	2.20	0.41
1:A:212:PHE:O	1:A:216:ASN:HB2	2.22	0.40
1:C:401:LEU:HD11	1:C:408:ASN:HB3	2.03	0.40
1:D:230:LYS:CG	1:D:231:PHE:N	2.84	0.40
1:D:212:PHE:O	1:D:216:ASN:HB2	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	502/503 (100%)	498 (99%)	4 (1%)	0	100	100
1	B	503/503 (100%)	494 (98%)	9 (2%)	0	100	100
1	C	504/503 (100%)	499 (99%)	5 (1%)	0	100	100
1	D	503/503 (100%)	499 (99%)	4 (1%)	0	100	100
All	All	2012/2012 (100%)	1990 (99%)	22 (1%)	0	100	100

There are no Ramachandran outliers to report.

### 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	407/390 (104%)	399 (98%)	8 (2%)	55	38
1	B	408/390 (105%)	401 (98%)	7 (2%)	60	46
1	C	408/390 (105%)	400 (98%)	8 (2%)	55	38
1	D	410/390 (105%)	398 (97%)	12 (3%)	42	23
All	All	1633/1560 (105%)	1598 (98%)	35 (2%)	53	36

All (35) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MSE
1	A	55	ARG
1	A	70	TYR
1	A	299	ARG
1	A	316	ASP
1	A	340	LYS
1	A	358	PHE
1	A	449	LYS
1	B	55	ARG
1	B	70	TYR
1	B	192	ARG
1	B	299	ARG
1	B	314	ASP
1	B	356	ASN
1	B	358	PHE
1	C	1	MSE
1	C	55	ARG
1	C	70	TYR
1	C	299	ARG
1	C	314	ASP
1	C	342	LEU
1	C	358	PHE
1	C	480	ASP
1	D	12	LYS
1	D	55	ARG
1	D	70	TYR
1	D	225[A]	MSE
1	D	225[B]	MSE
1	D	230	LYS
1	D	299	ARG

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Mol	Chain	Res	Type
1	D	358	PHE
1	D	366	GLU
1	D	388[A]	GLU
1	D	388[B]	GLU
1	D	480	ASP

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

Mol	Chain	Res	Type
1	B	177	HIS
1	B	216	ASN
1	B	308	ASN
1	B	356	ASN
1	C	183	ASN
1	C	216	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

### 5.6 Ligand geometry [i](#)

28 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
3	GOL	D	603	-	5,5,5	0.33	0	5,5,5	0.29	0
3	GOL	B	605	-	5,5,5	0.37	0	5,5,5	0.39	0
3	GOL	C	605	-	5,5,5	0.33	0	5,5,5	0.45	0
3	GOL	A	602	-	5,5,5	0.41	0	5,5,5	0.14	0
3	GOL	D	604	-	5,5,5	0.33	0	5,5,5	0.36	0
3	GOL	B	607	-	5,5,5	0.35	0	5,5,5	0.22	0
2	SO4	B	601	-	4,4,4	0.20	0	6,6,6	0.16	0
2	SO4	A	601	-	4,4,4	0.19	0	6,6,6	0.36	0
3	GOL	D	606	-	5,5,5	0.36	0	5,5,5	0.38	0
3	GOL	D	605	-	5,5,5	0.35	0	5,5,5	0.32	0
3	GOL	D	602	-	5,5,5	0.38	0	5,5,5	0.28	0
3	GOL	C	606	-	5,5,5	0.37	0	5,5,5	0.21	0
2	SO4	C	601	-	4,4,4	0.26	0	6,6,6	0.25	0
3	GOL	A	605	-	5,5,5	0.36	0	5,5,5	0.66	0
3	GOL	D	607	-	5,5,5	0.37	0	5,5,5	0.41	0
3	GOL	A	604	-	5,5,5	0.34	0	5,5,5	0.27	0
3	GOL	C	604	-	5,5,5	0.37	0	5,5,5	0.41	0
3	GOL	A	606	-	5,5,5	0.33	0	5,5,5	0.30	0
2	SO4	B	602	-	4,4,4	0.15	0	6,6,6	0.06	0
2	SO4	D	601	-	4,4,4	0.18	0	6,6,6	0.27	0
3	GOL	C	607	-	5,5,5	0.33	0	5,5,5	0.22	0
3	GOL	C	608	-	5,5,5	0.42	0	5,5,5	0.20	0
3	GOL	A	603	-	5,5,5	0.35	0	5,5,5	0.34	0
2	SO4	C	602	-	4,4,4	0.14	0	6,6,6	0.13	0
3	GOL	B	606	-	5,5,5	0.42	0	5,5,5	0.22	0
2	SO4	C	603	-	4,4,4	0.15	0	6,6,6	0.05	0
3	GOL	B	603	-	5,5,5	0.42	0	5,5,5	0.18	0
3	GOL	B	604	-	5,5,5	0.36	0	5,5,5	0.25	0

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
3	GOL	D	607	-	-	4/4/4/4	-
3	GOL	C	608	-	-	2/4/4/4	-
3	GOL	B	607	-	-	3/4/4/4	-
3	GOL	A	603	-	-	2/4/4/4	-
3	GOL	D	603	-	-	1/4/4/4	-
3	GOL	C	607	-	-	4/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GOL	A	604	-	-	2/4/4/4	-
3	GOL	D	606	-	-	0/4/4/4	-
3	GOL	C	604	-	-	4/4/4/4	-
3	GOL	B	606	-	-	2/4/4/4	-
3	GOL	D	605	-	-	4/4/4/4	-
3	GOL	D	602	-	-	2/4/4/4	-
3	GOL	B	605	-	-	4/4/4/4	-
3	GOL	A	605	-	-	4/4/4/4	-
3	GOL	C	605	-	-	2/4/4/4	-
3	GOL	A	602	-	-	0/4/4/4	-
3	GOL	D	604	-	-	2/4/4/4	-
3	GOL	C	606	-	-	1/4/4/4	-
3	GOL	A	606	-	-	2/4/4/4	-
3	GOL	B	603	-	-	0/4/4/4	-
3	GOL	B	604	-	-	0/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (45) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	605	GOL	C1-C2-C3-O3
3	C	605	GOL	O1-C1-C2-O2
3	C	605	GOL	O1-C1-C2-C3
3	D	605	GOL	O1-C1-C2-C3
3	D	602	GOL	C1-C2-C3-O3
3	D	607	GOL	O1-C1-C2-C3
3	C	604	GOL	O1-C1-C2-C3
3	C	604	GOL	C1-C2-C3-O3
3	A	606	GOL	O1-C1-C2-C3
3	C	607	GOL	O1-C1-C2-C3
3	A	603	GOL	O1-C1-C2-O2
3	A	603	GOL	O1-C1-C2-C3
3	B	605	GOL	O1-C1-C2-C3
3	D	604	GOL	O1-C1-C2-C3
3	B	607	GOL	C1-C2-C3-O3
3	D	605	GOL	C1-C2-C3-O3
3	A	605	GOL	O1-C1-C2-C3

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Mol	Chain	Res	Type	Atoms
3	A	605	GOL	C1-C2-C3-O3
3	D	607	GOL	C1-C2-C3-O3
3	A	604	GOL	C1-C2-C3-O3
3	C	607	GOL	C1-C2-C3-O3
3	B	606	GOL	C1-C2-C3-O3
3	B	607	GOL	O2-C2-C3-O3
3	D	605	GOL	O2-C2-C3-O3
3	D	607	GOL	O1-C1-C2-O2
3	C	604	GOL	O1-C1-C2-O2
3	C	604	GOL	O2-C2-C3-O3
3	C	607	GOL	O1-C1-C2-O2
3	D	602	GOL	O2-C2-C3-O3
3	A	605	GOL	O1-C1-C2-O2
3	D	607	GOL	O2-C2-C3-O3
3	B	605	GOL	O2-C2-C3-O3
3	A	604	GOL	O2-C2-C3-O3
3	B	606	GOL	O2-C2-C3-O3
3	B	605	GOL	O1-C1-C2-O2
3	D	604	GOL	O1-C1-C2-O2
3	D	605	GOL	O1-C1-C2-O2
3	A	605	GOL	O2-C2-C3-O3
3	C	608	GOL	O2-C2-C3-O3
3	A	606	GOL	O1-C1-C2-O2
3	C	607	GOL	O2-C2-C3-O3
3	D	603	GOL	O1-C1-C2-C3
3	C	606	GOL	O1-C1-C2-C3
3	B	607	GOL	O1-C1-C2-O2
3	C	608	GOL	C1-C2-C3-O3

There are no ring outliers.

11 monomers are involved in 26 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	605	GOL	1	0
3	C	605	GOL	1	0
3	D	606	GOL	4	0
3	C	606	GOL	1	0
3	A	605	GOL	5	0
3	D	607	GOL	3	0
3	A	604	GOL	3	0
3	C	604	GOL	2	0
3	C	607	GOL	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	608	GOL	2	0
3	B	606	GOL	3	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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	488/503 (97%)	-0.20	11 (2%) 60 65	8, 18, 41, 77	26 (5%)
1	B	488/503 (97%)	-0.16	12 (2%) 57 61	10, 22, 44, 69	20 (4%)
1	C	489/503 (97%)	-0.25	4 (0%) 86 88	10, 19, 38, 71	13 (2%)
1	D	488/503 (97%)	-0.25	12 (2%) 57 61	8, 17, 37, 88	13 (2%)
All	All	1953/2012 (97%)	-0.21	39 (1%) 65 69	8, 19, 40, 88	72 (3%)

All (39) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	167	THR	8.7
1	D	167	THR	5.6
1	D	450	GLY	5.3
1	B	338	THR	5.3
1	D	166	THR	5.2
1	B	167	THR	4.9
1	D	338	THR	4.3
1	B	337	GLU	4.3
1	C	164	SER	4.2
1	B	315	GLY	4.1
1	C	167	THR	4.0
1	B	314	ASP	3.8
1	A	338	THR	3.7
1	A	485	THR	3.2
1	A	450	GLY	3.2
1	A	25	ALA	3.1
1	D	485	THR	3.0
1	A	337	GLU	3.0
1	A	164	SER	3.0
1	B	164	SER	2.9
1	D	164	SER	2.9

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Mol	Chain	Res	Type	RSRZ
1	B	466	LEU	2.8
1	C	165	GLY	2.8
1	A	260	PRO	2.8
1	D	168	GLY	2.7
1	A	449	LYS	2.6
1	D	449	LYS	2.6
1	B	168	GLY	2.5
1	B	115	ALA	2.4
1	D	260	PRO	2.4
1	A	168	GLY	2.3
1	D	463	ASP	2.1
1	B	485	THR	2.1
1	B	374	ASP	2.1
1	B	114	ILE	2.1
1	A	460	HIS	2.1
1	D	503	LYS	2.1
1	C	337	GLU	2.0
1	D	229	PRO	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. The B-factors column lists the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
3	GOL	C	605	6/6	0.60	0.24	31,43,46,49	0
3	GOL	D	605	6/6	0.66	0.30	50,58,62,65	0
3	GOL	A	606	6/6	0.70	0.17	33,43,47,49	0
2	SO4	C	602	5/5	0.72	0.22	40,58,63,67	1
2	SO4	C	603	5/5	0.74	0.23	54,55,62,66	1

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	GOL	B	607	6/6	0.76	0.16	50,52,57,60	0
3	GOL	A	604	6/6	0.77	0.21	38,50,51,59	0
3	GOL	D	606	6/6	0.85	0.19	42,50,56,62	0
3	GOL	A	605	6/6	0.88	0.15	23,41,42,46	0
3	GOL	D	607	6/6	0.88	0.22	29,43,45,52	0
3	GOL	D	604	6/6	0.89	0.17	30,47,50,52	0
2	SO4	B	602	5/5	0.90	0.17	41,50,54,56	1
3	GOL	B	605	6/6	0.90	0.12	21,44,45,46	0
3	GOL	D	603	6/6	0.90	0.13	18,41,44,55	0
3	GOL	B	604	6/6	0.91	0.11	24,28,34,36	0
3	GOL	C	608	6/6	0.92	0.35	37,56,69,74	0
3	GOL	D	602	6/6	0.93	0.12	17,31,34,36	0
3	GOL	C	607	6/6	0.93	0.18	19,40,48,59	0
3	GOL	B	603	6/6	0.93	0.10	28,31,36,36	0
3	GOL	C	606	6/6	0.93	0.11	27,32,37,44	0
3	GOL	B	606	6/6	0.94	0.15	32,44,53,60	0
3	GOL	C	604	6/6	0.94	0.10	16,40,44,46	0
3	GOL	A	603	6/6	0.94	0.10	20,40,42,44	0
3	GOL	A	602	6/6	0.94	0.10	16,23,28,28	0
2	SO4	B	601	5/5	0.98	0.08	17,18,24,25	1
2	SO4	C	601	5/5	0.98	0.06	16,17,23,25	1
2	SO4	A	601	5/5	0.99	0.07	17,18,27,28	1
2	SO4	D	601	5/5	0.99	0.07	18,18,24,27	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.