



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 1, 2020 – 11:47 pm BST

PDB ID : 1H2A  
Title : SINGLE CRYSTALS OF HYDROGENASE FROM DESULFOVIBRIO VULGARIS  
Authors : Higuchi, Y.; Yasuoka, N.  
Deposited on : 1997-10-17  
Resolution : 1.80 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)  
Xtrriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.11

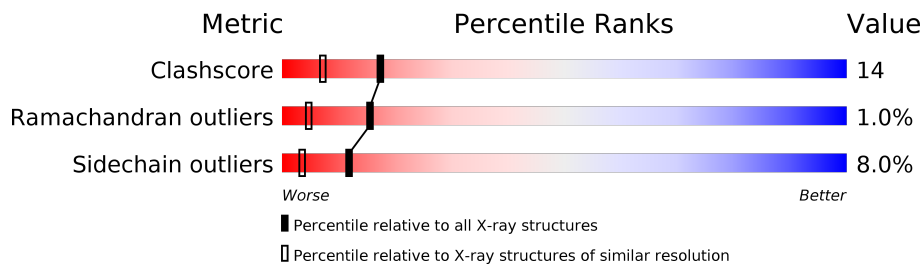
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	6793 (1.80-1.80)
Ramachandran outliers	138981	6697 (1.80-1.80)
Sidechain outliers	138945	6696 (1.80-1.80)

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  $\leq 5\%$

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	S	317	
2	L	567	

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
6	NFE	L	1004	-	-	X	-

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 6864 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.

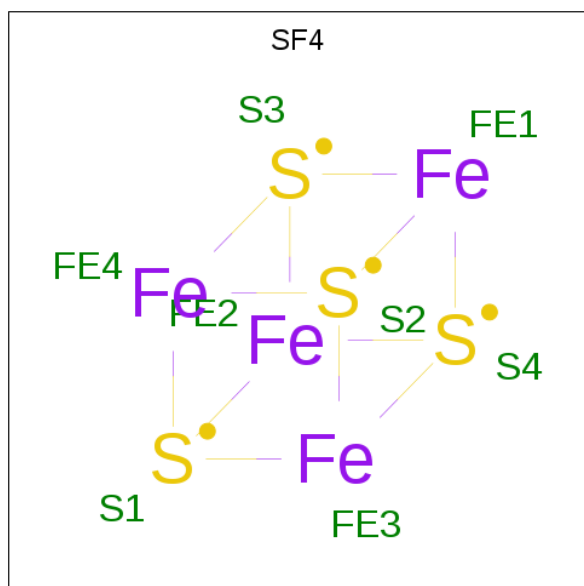
- Molecule 1 is a protein called HYDROGENASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	S	267	2019	1282	342	378	17	0	0	0

- Molecule 2 is a protein called HYDROGENASE.

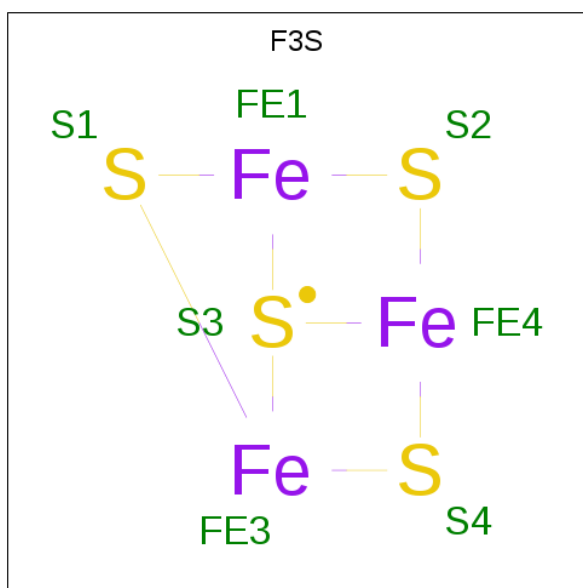
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	L	534	4174	2671	725	763	15	0	0	0

- Molecule 3 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe<sub>4</sub>S<sub>4</sub>).



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

- Molecule 4 is FE3-S4 CLUSTER (three-letter code: F3S) (formula: Fe<sub>3</sub>S<sub>4</sub>).

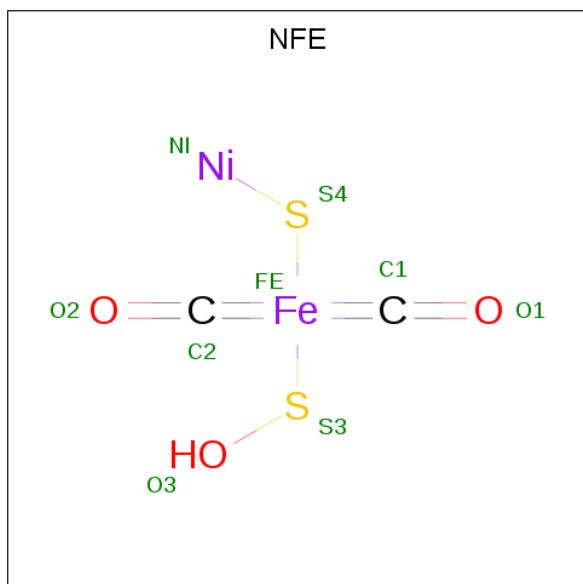


Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	S	1	Total	Fe S	0	0
			7	3 4		

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	L	1	Total	Mg	0	0
			1	1		

- Molecule 6 is NI-FE ACTIVE CENTER (three-letter code: NFE) (formula: C<sub>2</sub>HFeNiO<sub>3</sub>S<sub>2</sub>).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
			Total	C	Fe	Ni	O	S		
6	L	1	9	2	1	1	3	2	0	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	S	250	Total 250	O 250	0	0
7	L	388	Total 388	O 388	0	0

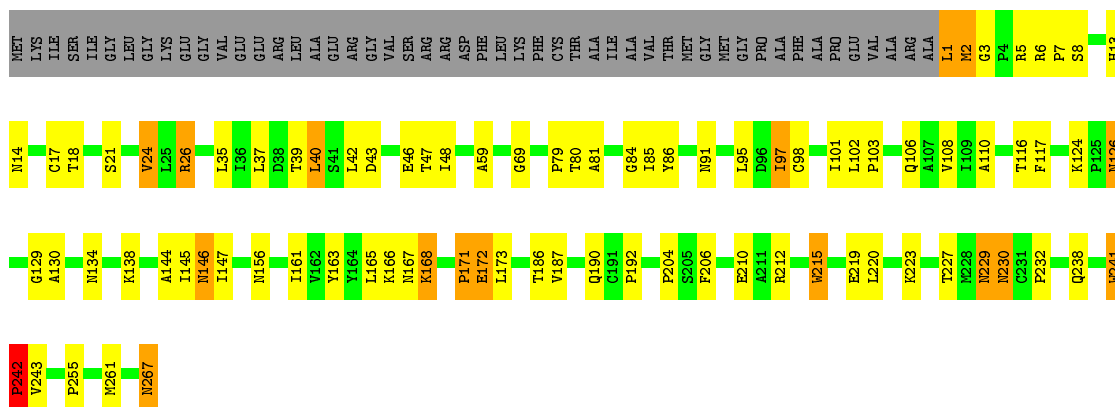
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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. 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.

Note EDS was not executed.

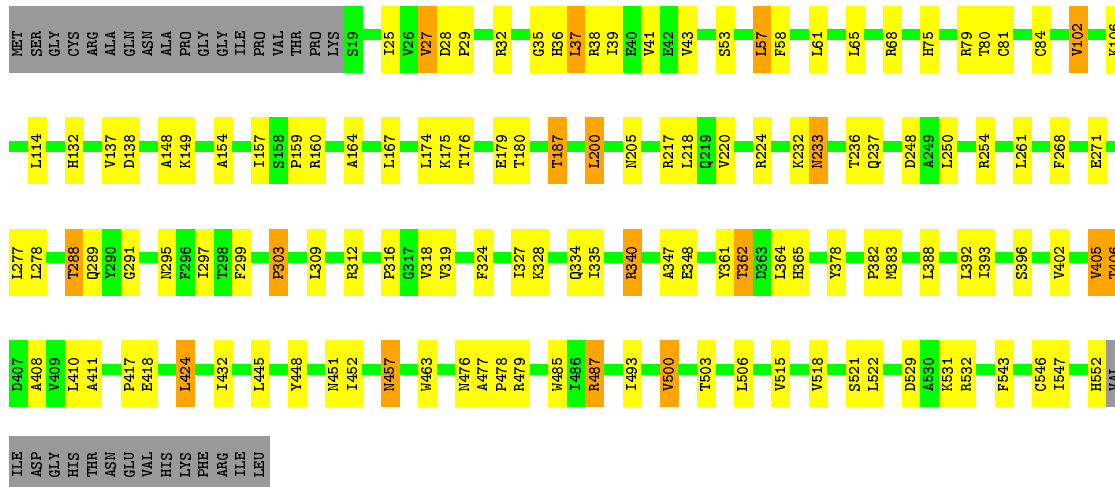
- Molecule 1: HYDROGENASE

Chain S: 



- Molecule 2: HYDROGENASE

Chain L: 



## 4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	101.50Å 126.50Å 66.51Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 1.80	Depositor
% Data completeness (in resolution range)	73.7 (20.00-1.80)	Depositor
$R_{merge}$	0.10	Depositor
$R_{sym}$	0.04	Depositor
Refinement program	X-PLOR	Depositor
R, $R_{free}$	0.229 , 0.278	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	6864	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	24.0	wwPDB-VP

## 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: MG, F3S, NFE, SF4

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	S	0.48	0/2075	0.74	2/2830 (0.1%)
2	L	0.49	0/4285	0.75	1/5830 (0.0%)
All	All	0.49	0/6360	0.75	3/8660 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	L	362	THR	N-CA-C	-5.61	95.86	111.00
1	S	40	LEU	CA-CB-CG	5.48	127.90	115.30
1	S	146	ASN	N-CA-C	5.17	124.96	111.00

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	S	2019	0	1949	86	0
2	L	4174	0	4120	98	0
3	S	16	0	0	0	0
4	S	7	0	0	0	0
5	L	1	0	0	0	0
6	L	9	0	0	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	L	388	0	0	10	0
7	S	250	0	0	18	0
All	All	6864	0	6069	169	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 14.

All (169) 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:L:546:CYS:CB	6:L:1004:NFE:S4	2.58	0.90
1:S:26:ARG:HH21	2:L:233:ASN:HD21	1.19	0.87
2:L:236:THR:HB	7:L:3545:HOH:O	1.81	0.80
2:L:335:ILE:HD11	2:L:485:TRP:HZ2	1.51	0.75
1:S:126:ASN:HD21	1:S:130:ALA:H	1.34	0.74
1:S:35:LEU:HA	1:S:39:THR:OG1	1.89	0.73
1:S:42:LEU:HD23	1:S:48:ILE:HD11	1.71	0.73
2:L:506:LEU:HD13	2:L:518:VAL:HG21	1.71	0.72
1:S:145:ILE:HG23	7:S:3620:HOH:O	1.89	0.71
2:L:335:ILE:HD11	2:L:485:TRP:CZ2	2.26	0.71
1:S:173:LEU:HD21	7:S:3634:HOH:O	1.91	0.70
1:S:26:ARG:HH21	2:L:233:ASN:ND2	1.89	0.69
1:S:1:LEU:HB3	2:L:187:THR:OG1	1.93	0.69
1:S:241:TRP:HD1	1:S:242:PRO:HD2	1.57	0.69
2:L:457:ASN:H	2:L:457:ASN:HD22	1.40	0.68
2:L:289:GLN:HG3	7:L:3363:HOH:O	1.94	0.68
1:S:241:TRP:CD1	1:S:242:PRO:HD2	2.29	0.67
2:L:236:THR:HG23	7:L:3019:HOH:O	1.94	0.67
1:S:190:GLN:HB2	1:S:232:PRO:HG3	1.76	0.66
2:L:299:PHE:H	2:L:476:ASN:HD22	1.40	0.66
1:S:173:LEU:HD13	7:S:3106:HOH:O	1.94	0.66
2:L:406:THR:HG22	2:L:432:ILE:HG21	1.78	0.66
1:S:145:ILE:HA	7:S:3634:HOH:O	1.96	0.66
2:L:35:GLY:HA3	2:L:547:ILE:HB	1.77	0.66
2:L:402:VAL:O	2:L:406:THR:HG23	1.96	0.65
2:L:529:ASP:OD2	2:L:532:ARG:HD3	1.96	0.65
1:S:134:ASN:HD21	1:S:144:ALA:H	1.44	0.65
1:S:79:PRO:HB2	7:S:3552:HOH:O	1.96	0.65
1:S:86:TYR:HD2	7:S:3447:HOH:O	1.80	0.64
2:L:218:LEU:HD22	2:L:268:PHE:CG	2.34	0.63
1:S:186:THR:HA	1:S:227:THR:O	1.99	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:S:2:MET:SD	1:S:3:GLY:N	2.72	0.63
2:L:102:VAL:CG1	2:L:463:TRP:HB3	2.29	0.63
1:S:172:GLU:N	7:S:3106:HOH:O	2.31	0.62
2:L:303:PRO:HB3	2:L:312:ARG:HG3	1.80	0.62
1:S:17:CYS:HB2	2:L:81:CYS:HA	1.83	0.60
1:S:190:GLN:HB2	1:S:232:PRO:CG	2.31	0.60
2:L:138:ASP:H	2:L:205:ASN:ND2	1.98	0.60
2:L:299:PHE:H	2:L:476:ASN:ND2	1.99	0.59
2:L:200:LEU:HB2	7:L:3091:HOH:O	2.02	0.59
2:L:291:GLY:HA2	2:L:521:SER:HB2	1.84	0.59
2:L:448:TYR:CZ	2:L:452:ILE:HD11	2.39	0.58
1:S:110:ALA:O	1:S:146:ASN:O	2.22	0.57
1:S:97:ILE:HD12	1:S:101:ILE:HD12	1.86	0.57
1:S:2:MET:HG2	1:S:8:SER:HB2	1.87	0.56
2:L:217:ARG:O	2:L:220:VAL:HG22	2.05	0.56
1:S:204:PRO:HD2	1:S:210:GLU:CG	2.35	0.56
2:L:340:ARG:HG2	2:L:347:ALA:HB1	1.86	0.56
2:L:448:TYR:O	2:L:452:ILE:HG13	2.06	0.56
1:S:46:GLU:HG3	7:S:3152:HOH:O	2.07	0.55
2:L:405:VAL:HG22	2:L:432:ILE:HG23	1.87	0.55
1:S:42:LEU:HD13	7:S:3408:HOH:O	2.05	0.55
1:S:204:PRO:HD2	1:S:210:GLU:HG3	1.89	0.53
1:S:97:ILE:CD1	1:S:101:ILE:HD12	2.38	0.53
1:S:26:ARG:NH2	2:L:233:ASN:HD21	1.99	0.53
1:S:1:LEU:HD22	1:S:43:ASP:HB3	1.90	0.53
2:L:102:VAL:HG13	2:L:463:TRP:HB3	1.91	0.53
1:S:80:THR:HB	1:S:129:GLY:O	2.08	0.53
1:S:40:LEU:HD11	1:S:165:LEU:HD11	1.91	0.53
1:S:14:ASN:O	2:L:36:HIS:HE1	1.92	0.52
2:L:176:THR:O	2:L:180:THR:HG23	2.09	0.52
1:S:238:GLN:HE21	2:L:224:ARG:HH21	1.55	0.52
2:L:84:CYS:CB	6:L:1004:NFE:C2	2.88	0.52
1:S:192:PRO:CD	1:S:241:TRP:HH2	2.23	0.51
2:L:297:ILE:HG22	2:L:318:VAL:HB	1.92	0.51
1:S:69:GLY:HA3	1:S:106:GLN:OE1	2.11	0.51
2:L:309:LEU:HB3	2:L:316:PRO:HG2	1.91	0.51
2:L:327:ILE:HD11	2:L:396:SER:HB2	1.92	0.51
2:L:319:VAL:HG23	2:L:393:ILE:HD11	1.91	0.51
2:L:477:ALA:HB1	2:L:478:PRO:HD2	1.92	0.51
1:S:212:ARG:NH2	2:L:457:ASN:O	2.44	0.51
2:L:233:ASN:HD22	2:L:233:ASN:C	2.14	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:S:238:GLN:HE21	2:L:224:ARG:NH2	2.10	0.50
2:L:27:VAL:HG13	2:L:39:ILE:HB	1.93	0.50
2:L:57:LEU:HD22	2:L:58:PHE:N	2.27	0.50
1:S:229:ASN:ND2	1:S:230:ASN:H	2.10	0.50
1:S:79:PRO:O	1:S:84:GLY:HA2	2.12	0.49
1:S:204:PRO:CD	1:S:210:GLU:HG3	2.42	0.49
1:S:166:LYS:HG3	1:S:167:ASN:ND2	2.28	0.49
2:L:546:CYS:HB3	6:L:1004:NFE:S4	2.41	0.48
2:L:288:THR:HG22	2:L:289:GLN:HE21	1.78	0.48
2:L:406:THR:HB	2:L:432:ILE:HD13	1.95	0.48
1:S:242:PRO:HD3	2:L:232:LYS:HD3	1.95	0.48
2:L:361:TYR:CD2	2:L:362:THR:O	2.66	0.48
1:S:230:ASN:HD22	1:S:230:ASN:H	1.60	0.48
2:L:348:GLU:HB3	7:L:3219:HOH:O	2.12	0.48
2:L:80:THR:HG23	2:L:552:HIS:HB3	1.95	0.48
2:L:174:LEU:HD23	7:L:3300:HOH:O	2.14	0.48
1:S:163:TYR:HA	1:S:166:LYS:HE2	1.95	0.48
1:S:47:THR:O	2:L:32:ARG:HA	2.12	0.48
1:S:2:MET:CE	1:S:8:SER:HB2	2.44	0.48
1:S:1:LEU:HD21	1:S:59:ALA:O	2.13	0.48
1:S:85:ILE:CG1	2:L:361:TYR:CE2	2.97	0.47
2:L:518:VAL:HG22	2:L:543:PHE:CD2	2.49	0.47
1:S:206:PHE:CE1	1:S:220:LEU:HD23	2.49	0.47
1:S:24:VAL:HG21	7:S:3284:HOH:O	2.14	0.47
1:S:229:ASN:HD22	1:S:230:ASN:H	1.62	0.47
1:S:168:LYS:HB2	1:S:168:LYS:NZ	2.29	0.46
1:S:6:ARG:HA	1:S:7:PRO:HD3	1.80	0.46
2:L:506:LEU:CD1	2:L:518:VAL:HG21	2.42	0.46
2:L:149:LYS:O	2:L:149:LYS:HG2	2.15	0.46
1:S:102:LEU:HD13	1:S:108:VAL:HG21	1.97	0.46
1:S:1:LEU:HD12	1:S:2:MET:H	1.80	0.46
1:S:97:ILE:HG13	1:S:98:CYS:N	2.31	0.46
2:L:37:LEU:HD22	2:L:38:ARG:H	1.81	0.46
1:S:2:MET:HE1	1:S:3:GLY:O	2.15	0.46
1:S:35:LEU:HA	1:S:39:THR:HG1	1.79	0.46
1:S:156:ASN:HD21	1:S:230:ASN:HD21	1.64	0.46
1:S:26:ARG:HB3	7:S:3128:HOH:O	2.14	0.46
2:L:25:ILE:HB	2:L:41:VAL:HG23	1.98	0.46
1:S:168:LYS:N	1:S:168:LYS:HZ2	2.14	0.45
2:L:546:CYS:HB2	6:L:1004:NFE:S4	2.40	0.45
1:S:116:THR:HG22	1:S:117:PHE:CD1	2.51	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:L:334:GLN:HA	2:L:334:GLN:HE21	1.82	0.45
2:L:457:ASN:N	2:L:457:ASN:HD22	2.06	0.45
2:L:479:ARG:HD2	6:L:1004:NFE:S4	2.57	0.45
1:S:192:PRO:HD3	1:S:241:TRP:HH2	1.81	0.45
2:L:382:PRO:O	2:L:383:MET:HE2	2.17	0.45
2:L:334:GLN:O	2:L:378:TYR:O	2.34	0.45
2:L:319:VAL:HG23	2:L:393:ILE:CD1	2.47	0.45
2:L:500:VAL:HG22	2:L:503:THR:OG1	2.17	0.45
1:S:171:PRO:N	7:S:3106:HOH:O	2.49	0.45
2:L:218:LEU:HG	2:L:218:LEU:O	2.16	0.44
2:L:408:ALA:O	2:L:411:ALA:HB3	2.17	0.44
1:S:116:THR:HG23	1:S:146:ASN:CG	2.37	0.44
1:S:238:GLN:NE2	2:L:224:ARG:HH21	2.14	0.44
2:L:25:ILE:HB	2:L:41:VAL:CG2	2.48	0.44
2:L:28:ASP:HA	2:L:29:PRO:HA	1.84	0.44
2:L:175:LYS:O	2:L:179:GLU:HG3	2.18	0.43
2:L:531:LYS:HB3	2:L:531:LYS:HE3	1.80	0.43
2:L:288:THR:OG1	2:L:424:LEU:HD12	2.18	0.43
2:L:75:HIS:HD2	7:L:3094:HOH:O	2.01	0.43
2:L:68:ARG:O	2:L:493:ILE:HG13	2.18	0.43
1:S:80:THR:HG23	7:S:3267:HOH:O	2.19	0.43
1:S:204:PRO:HD2	1:S:210:GLU:HG2	2.00	0.43
1:S:85:ILE:HG12	2:L:361:TYR:CE2	2.53	0.43
2:L:340:ARG:HG2	2:L:347:ALA:CB	2.48	0.43
2:L:160:ARG:HD3	7:L:3161:HOH:O	2.18	0.43
2:L:487:ARG:HD3	7:L:3066:HOH:O	2.18	0.42
2:L:137:VAL:HG13	2:L:205:ASN:HD22	1.83	0.42
1:S:241:TRP:CD1	1:S:242:PRO:CD	3.00	0.42
2:L:159:PRO:HG2	2:L:271:GLU:HG2	2.00	0.42
2:L:364:LEU:O	2:L:365:HIS:HB2	2.20	0.42
2:L:410:LEU:HD21	2:L:417:PRO:HA	2.02	0.42
2:L:418:GLU:CD	2:L:418:GLU:H	2.22	0.42
2:L:106:LYS:HD2	2:L:451:ASN:ND2	2.35	0.42
1:S:13:HIS:HE1	1:S:21:SER:OG	2.03	0.42
1:S:267:ASN:HA	1:S:267:ASN:HD22	1.57	0.42
2:L:102:VAL:HG11	2:L:463:TRP:HB3	2.00	0.41
1:S:124:LYS:HD2	7:S:3274:HOH:O	2.20	0.41
2:L:324:PHE:CE2	2:L:392:LEU:HB3	2.55	0.41
1:S:161:ILE:HG23	7:S:3635:HOH:O	2.20	0.41
1:S:18:THR:HG22	1:S:18:THR:O	2.21	0.41
2:L:515:VAL:HG23	7:L:3309:HOH:O	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:L:154:ALA:O	2:L:157:ILE:HG12	2.21	0.41
1:S:215:TRP:HZ3	7:S:3287:HOH:O	2.03	0.41
1:S:241:TRP:CZ2	7:S:3107:HOH:O	2.72	0.41
1:S:85:ILE:HG13	2:L:361:TYR:CE2	2.55	0.41
2:L:148:ALA:HA	2:L:164:ALA:HB2	2.03	0.41
2:L:167:LEU:HA	2:L:167:LEU:HD23	1.84	0.41
1:S:223:LYS:HE3	1:S:261:MET:O	2.21	0.41
2:L:340:ARG:NE	2:L:340:ARG:O	2.54	0.41
2:L:318:VAL:HG22	2:L:328:LYS:HB2	2.03	0.40
1:S:102:LEU:N	1:S:103:PRO:HD2	2.37	0.40
1:S:138:LYS:HD3	7:S:3393:HOH:O	2.22	0.40
1:S:163:TYR:CZ	1:S:171:PRO:HA	2.57	0.40
2:L:84:CYS:SG	2:L:84:CYS:O	2.80	0.40
1:S:40:LEU:CD1	1:S:165:LEU:HD11	2.51	0.40
1:S:156:ASN:HD21	1:S:230:ASN:ND2	2.19	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	S	265/317 (84%)	239 (90%)	19 (7%)	7 (3%)	<b>5</b> <b>1</b>
2	L	532/567 (94%)	501 (94%)	30 (6%)	1 (0%)	47 33
All	All	797/884 (90%)	740 (93%)	49 (6%)	8 (1%)	<b>15</b> <b>5</b>

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	S	255	PRO
1	S	5	ARG
2	L	187	THR

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Mol	Chain	Res	Type
1	S	81	ALA
1	S	171	PRO
1	S	242	PRO
1	S	172	GLU
1	S	147	ILE

### 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	S	213/250 (85%)	194 (91%)	19 (9%)	9 2
2	L	438/465 (94%)	405 (92%)	33 (8%)	13 4
All	All	651/715 (91%)	599 (92%)	52 (8%)	12 3

All (52) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	S	1	LEU
1	S	2	MET
1	S	24	VAL
1	S	26	ARG
1	S	37	LEU
1	S	91	ASN
1	S	95	LEU
1	S	97	ILE
1	S	126	ASN
1	S	168	LYS
1	S	187	VAL
1	S	215	TRP
1	S	219	GLU
1	S	229	ASN
1	S	230	ASN
1	S	241	TRP
1	S	242	PRO
1	S	243	VAL

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	S	267	ASN
2	L	27	VAL
2	L	37	LEU
2	L	43	VAL
2	L	53	SER
2	L	57	LEU
2	L	61	LEU
2	L	65	LEU
2	L	79	ARG
2	L	102	VAL
2	L	114	LEU
2	L	132	HIS
2	L	200	LEU
2	L	233	ASN
2	L	237	GLN
2	L	248	ASP
2	L	250	LEU
2	L	254	ARG
2	L	261	LEU
2	L	277	LEU
2	L	278	LEU
2	L	288	THR
2	L	295	ASN
2	L	303	PRO
2	L	340	ARG
2	L	388	LEU
2	L	405	VAL
2	L	406	THR
2	L	424	LEU
2	L	445	LEU
2	L	457	ASN
2	L	487	ARG
2	L	500	VAL
2	L	522	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (26) such sidechains are listed below:

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	S	13	HIS
1	S	91	ASN
1	S	126	ASN
1	S	134	ASN

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Mol	Chain	Res	Type
1	S	229	ASN
1	S	230	ASN
1	S	237	ASN
1	S	238	GLN
1	S	266	GLN
1	S	267	ASN
2	L	36	HIS
2	L	75	HIS
2	L	107	ASN
2	L	113	ASN
2	L	122	HIS
2	L	127	HIS
2	L	132	HIS
2	L	205	ASN
2	L	233	ASN
2	L	235	HIS
2	L	289	GLN
2	L	334	GLN
2	L	390	GLN
2	L	451	ASN
2	L	457	ASN
2	L	476	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](#)

Of 5 ligands modelled in this entry, 1 is monoatomic - leaving 4 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	NFE	L	1004	2	0,8,8	0.00	-	-	-	-
4	F3S	S	1003	1	0,9,9	0.00	-	-	-	-
3	SF4	S	1001	1	0,12,12	0.00	-	-	-	-
3	SF4	S	1002	1	0,12,12	0.00	-	-	-	-

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	F3S	S	1003	1	-	-	0/3/3/3
3	SF4	S	1001	1	-	-	0/6/5/5
3	SF4	S	1002	1	-	-	0/6/5/5

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	L	1004	NFE	5	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

EDS was not executed - this section is therefore empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

### 6.4 Ligands

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers

EDS was not executed - this section is therefore empty.