



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 03:39 AM UTC

PDB ID : 1PSC / pdb_00001psc
Title : PHOSPHOTRIESTERASE FROM PSEUDOMONAS DIMINUTA
Authors : Benning, M.M.; Holden, H.M.
Deposited on : 1995-04-25
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 : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtrriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

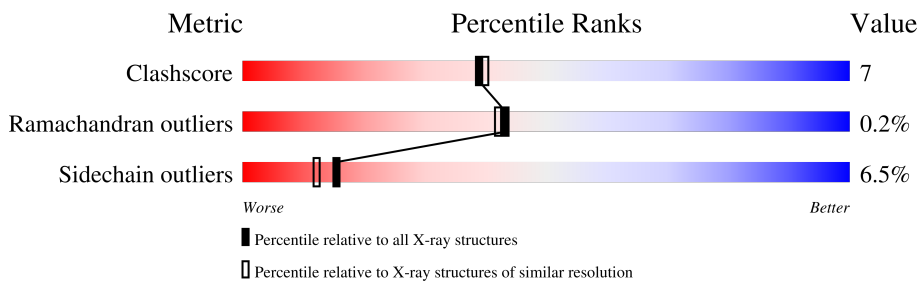
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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))
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	365	
1	B	365	

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 5483 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.

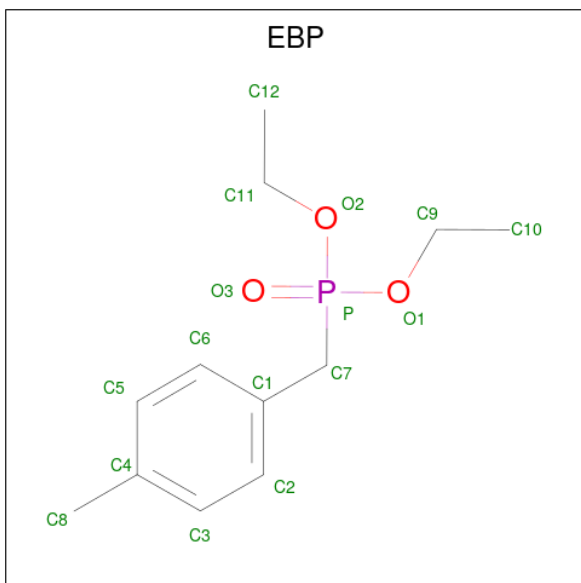
- Molecule 1 is a protein called PHOSPHOTRIESTERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	329	Total 2508	C 1589	N 446	O 466	S 7	0	0	0
1	B	330	Total 2513	C 1592	N 447	O 467	S 7	0	0	0

- Molecule 2 is CADMIUM ION (CCD ID: CD) (formula: Cd).

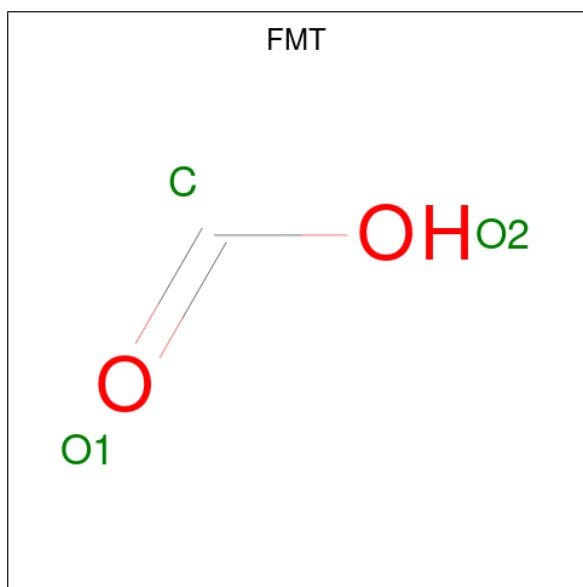
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total 2	Cd 2	0	0
2	B	2	Total 2	Cd 2	0	0

- Molecule 3 is DIETHYL 4-METHYLBENZYLPHOSPHONATE (CCD ID: EBP) (formula: C₁₂H₁₉O₃P).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	O	P	0	0
			16	12	3	1		
3	B	1	Total	C	O	P	0	0
			16	12	3	1		

- Molecule 4 is FORMIC ACID (CCD ID: FMT) (formula: CH₂O₂).



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

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	204	Total	O	0	0
			204	204		
5	B	216	Total	O	0	0
			216	216		

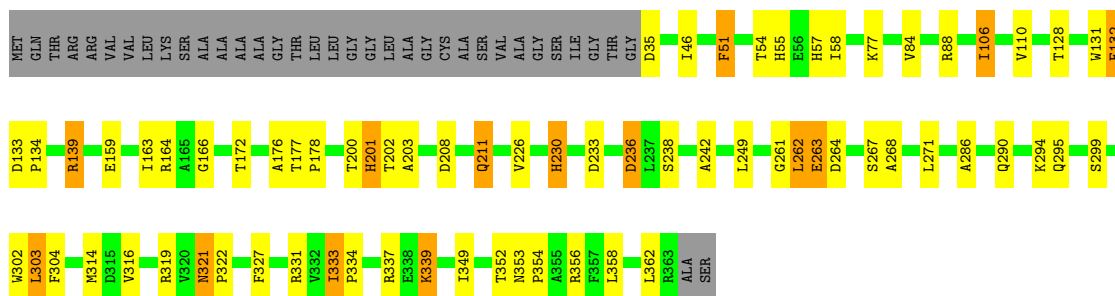
3 Residue-property plots

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

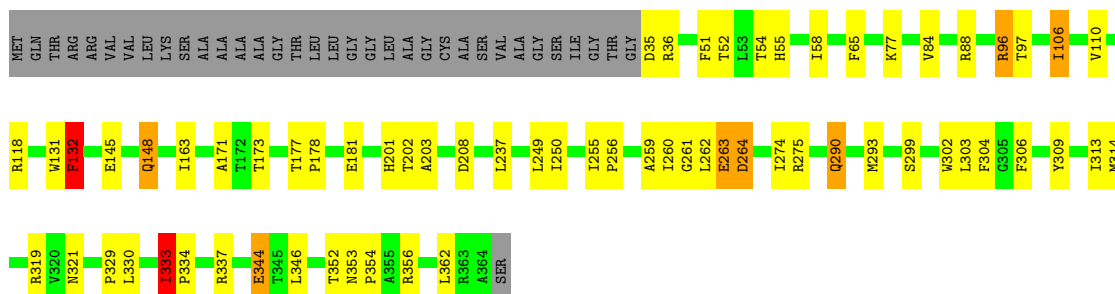
- Molecule 1: PHOSPHOTRIESTERASE

Chain A: 



- Molecule 1: PHOSPHOTRIESTERASE

Chain B: 



4 Data and refinement statistics

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

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	129.50Å 91.40Å 69.40Å 90.00° 91.90° 90.00°	Depositor
Resolution (Å)	30.00 – 2.00	Depositor
% Data completeness (in resolution range)	(Not available) (30.00-2.00)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	TNT	Depositor
R, R_{free}	0.152 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	5483	wwPDB-VP
Average B, all atoms (Å ²)	26.0	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: CD, FMT, EBP

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	1.38	9/2556 (0.4%)	1.58	26/3472 (0.7%)
1	B	1.27	1/2561 (0.0%)	1.56	20/3479 (0.6%)
All	All	1.33	10/5117 (0.2%)	1.57	46/6951 (0.7%)

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	230	HIS	CE1-NE2	9.74	1.42	1.32
1	A	333	ILE	CA-CB	7.13	1.58	1.53
1	A	55	HIS	CE1-NE2	6.97	1.39	1.32
1	A	55	HIS	CA-CB	6.72	1.61	1.52
1	B	333	ILE	CA-CB	6.65	1.57	1.54
1	A	139	ARG	CZ-NH1	6.04	1.41	1.32
1	A	236	ASP	CG-OD1	5.75	1.36	1.25
1	A	166	GLY	CA-C	5.40	1.57	1.51
1	A	55	HIS	CB-CG	5.35	1.57	1.50
1	A	55	HIS	CD2-NE2	5.11	1.43	1.37

All (46) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	139	ARG	NE-CZ-NH1	13.06	134.56	121.50
1	A	139	ARG	NH1-CZ-NH2	-9.01	107.58	119.30
1	B	132	PHE	CA-CB-CG	8.77	122.56	113.80
1	A	54	THR	N-CA-C	8.18	123.07	113.18
1	A	58	ILE	N-CA-C	-7.46	104.51	111.45
1	B	333	ILE	CA-C-O	7.36	123.62	118.69
1	B	54	THR	N-CA-C	6.96	121.61	113.18
1	A	203	ALA	N-CA-C	-6.79	95.51	107.73
1	A	164	ARG	NE-CZ-NH1	6.70	128.20	121.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	356	ARG	NE-CZ-NH2	-6.66	113.20	119.20
1	A	304	PHE	CA-CB-CG	-6.65	107.15	113.80
1	A	55	HIS	CE1-NE2-CD2	-6.64	102.36	109.00
1	B	344	GLU	CB-CG-CD	-6.54	101.48	112.60
1	B	203	ALA	N-CA-C	-6.51	94.93	107.57
1	B	58	ILE	N-CA-C	-6.28	104.92	111.58
1	A	230	HIS	CE1-NE2-CD2	-6.23	102.77	109.00
1	B	275	ARG	NE-CZ-NH2	-6.17	113.65	119.20
1	B	106	ILE	N-CA-C	-5.90	106.01	112.80
1	A	159	GLU	CB-CA-C	-5.76	109.92	116.54
1	A	352	THR	N-CA-C	5.75	117.22	111.07
1	B	55	HIS	CE1-NE2-CD2	-5.74	103.26	109.00
1	A	331	ARG	N-CA-C	5.69	120.49	112.93
1	B	250	ILE	CA-C-N	-5.59	117.32	122.29
1	B	250	ILE	C-N-CA	-5.59	117.32	122.29
1	B	356	ARG	NE-CZ-NH1	5.57	127.07	121.50
1	A	295	GLN	CB-CA-C	-5.54	101.37	110.72
1	A	200	THR	N-CA-C	5.52	118.08	109.52
1	A	321	ASN	CA-C-N	5.52	125.35	119.28
1	A	321	ASN	C-N-CA	5.52	125.35	119.28
1	B	352	THR	N-CA-C	5.50	117.08	111.14
1	B	333	ILE	N-CA-CB	5.38	114.65	110.45
1	A	128	THR	N-CA-CB	5.36	119.65	110.65
1	A	106	ILE	N-CA-C	-5.31	106.70	112.80
1	A	268	ALA	CA-C-O	5.31	126.05	120.42
1	B	344	GLU	CB-CA-C	-5.28	102.02	110.79
1	B	304	PHE	CA-CB-CG	-5.21	108.59	113.80
1	A	236	ASP	CA-CB-CG	5.14	117.74	112.60
1	A	132	PHE	N-CA-C	5.13	118.57	112.72
1	A	327	PHE	CA-CB-CG	-5.11	108.69	113.80
1	A	358	LEU	N-CA-C	5.07	117.70	111.82
1	A	349	ILE	N-CA-C	5.07	115.79	110.62
1	B	275	ARG	CG-CD-NE	5.07	123.15	112.00
1	B	65	PHE	N-CA-C	5.06	116.48	111.07
1	A	226	VAL	N-CA-C	5.05	115.76	108.48
1	A	172	THR	N-CA-CB	5.03	120.45	111.69
1	B	306	PHE	N-CA-CB	-5.03	103.11	110.86

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	2508	0	2528	31	0
1	B	2513	0	2533	38	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
3	A	16	0	19	0	0
3	B	16	0	19	0	0
4	A	3	0	0	1	0
4	B	3	0	0	1	0
5	A	204	0	0	3	0
5	B	216	0	0	5	0
All	All	5483	0	5099	69	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 7.

All (69) 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:B:237:LEU:HD21	1:B:290:GLN:HE22	1.47	0.79
1:B:132:PHE:HZ	1:B:201:HIS:CE1	2.04	0.75
1:A:262:LEU:HD21	1:A:316:VAL:HG13	1.70	0.73
1:B:344:GLU:HG3	5:B:1014:HOH:O	1.93	0.68
1:B:84:VAL:O	1:B:88:ARG:HG3	1.96	0.65
1:A:176:ALA:N	1:A:211:GLN:OE1	2.30	0.65
1:B:353:ASN:HB2	1:B:354:PRO:HD3	1.80	0.64
1:A:261:GLY:H	1:A:263:GLU:CD	2.07	0.63
1:A:262:LEU:HD21	1:A:316:VAL:CG1	2.29	0.62
1:A:294:LYS:O	1:A:356:ARG:NH2	2.33	0.61
1:A:333:ILE:HB	1:A:334:PRO:HD3	1.81	0.60
1:B:261:GLY:H	1:B:263:GLU:CD	2.10	0.60
1:B:259:ALA:O	1:B:262:LEU:HB2	2.03	0.58
1:B:131:TRP:CG	1:B:132:PHE:H	2.21	0.58
1:B:35:ASP:N	5:B:1021:HOH:O	2.36	0.57
1:B:264:ASP:N	1:B:264:ASP:OD1	2.36	0.57
1:A:242:ALA:HB3	5:A:1057:HOH:O	2.04	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:177:THR:HB	1:B:178:PRO:HD2	1.88	0.56
1:A:131:TRP:CG	1:A:132:PHE:H	2.25	0.53
1:B:110:VAL:HG22	1:B:163:ILE:HD13	1.91	0.52
1:B:333:ILE:HG23	1:B:346:LEU:HD13	1.93	0.51
1:B:329:PRO:HA	1:B:333:ILE:HD13	1.93	0.51
1:A:177:THR:HB	1:A:178:PRO:HD2	1.94	0.50
1:B:106:ILE:HG22	1:B:106:ILE:O	2.11	0.50
1:B:145:GLU:O	1:B:148:GLN:HB2	2.11	0.49
1:A:202:THR:HB	1:A:208:ASP:HB2	1.95	0.48
1:B:262:LEU:HD21	1:B:319:ARG:NH2	2.28	0.48
1:B:302:TRP:CH2	1:B:321:ASN:HB3	2.48	0.48
1:A:201:HIS:CD2	1:A:201:HIS:C	2.91	0.48
1:A:106:ILE:HG22	1:A:106:ILE:O	2.13	0.47
1:A:84:VAL:O	1:A:88:ARG:HG3	2.14	0.47
1:A:236:ASP:OD1	1:A:238:SER:OG	2.26	0.47
1:A:339:LYS:HD3	1:A:339:LYS:HA	1.61	0.47
1:B:255:ILE:HB	1:B:256:PRO:HD3	1.98	0.46
1:B:173:THR:O	1:B:173:THR:HG23	2.16	0.45
1:A:302:TRP:CH2	1:A:321:ASN:HB3	2.51	0.45
1:B:132:PHE:HZ	1:B:201:HIS:NE2	2.15	0.44
1:B:202:THR:HB	1:B:208:ASP:HB2	1.98	0.44
1:B:330:LEU:O	1:B:334:PRO:HG2	2.18	0.44
1:A:262:LEU:HD12	1:A:319:ARG:NH2	2.33	0.44
1:A:110:VAL:HG22	1:A:163:ILE:HD13	1.98	0.44
1:A:139:ARG:HG2	5:A:1087:HOH:O	2.18	0.43
1:B:353:ASN:N	1:B:354:PRO:HD2	2.33	0.43
1:B:96:ARG:HD3	5:B:989:HOH:O	2.17	0.43
1:A:353:ASN:HB2	1:A:354:PRO:HD3	2.00	0.43
1:A:51:PHE:C	1:A:51:PHE:HD1	2.26	0.43
1:A:133:ASP:N	1:A:134:PRO:CD	2.81	0.43
1:A:46:ILE:H	1:A:46:ILE:HG12	1.56	0.43
1:A:51:PHE:C	1:A:51:PHE:CD1	2.96	0.43
1:B:333:ILE:N	1:B:334:PRO:CD	2.81	0.43
1:B:201:HIS:CD2	1:B:201:HIS:C	2.96	0.42
1:B:201:HIS:HB2	4:B:902:FMT:O2	2.20	0.42
1:A:230:HIS:O	1:A:233:ASP:HB2	2.20	0.42
1:B:333:ILE:N	1:B:334:PRO:HD2	2.35	0.42
1:A:110:VAL:HG22	1:A:163:ILE:CD1	2.50	0.41
1:B:309:TYR:HD2	1:B:313:ILE:HG12	1.85	0.41
1:A:35:ASP:N	5:A:1025:HOH:O	2.52	0.41
1:A:321:ASN:HA	1:A:322:PRO:HD2	1.86	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:52:THR:HA	1:B:97:THR:O	2.21	0.41
1:B:131:TRP:CG	1:B:132:PHE:N	2.86	0.41
1:B:132:PHE:CE1	1:B:171:ALA:HB1	2.56	0.41
1:A:286:ALA:O	1:A:290:GLN:HG2	2.21	0.41
1:B:262:LEU:C	1:B:264:ASP:H	2.29	0.41
1:A:201:HIS:HB2	4:A:901:FMT:O1	2.20	0.41
1:B:177:THR:O	1:B:181:GLU:HG3	2.21	0.41
1:B:249:LEU:HD21	5:B:999:HOH:O	2.20	0.41
1:B:88:ARG:NH2	5:B:1065:HOH:O	2.48	0.40
1:B:262:LEU:C	1:B:264:ASP:N	2.79	0.40
1:A:57:HIS:O	1:A:303:LEU:HA	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	327/365 (90%)	317 (97%)	10 (3%)	0	100	100
1	B	328/365 (90%)	320 (98%)	7 (2%)	1 (0%)	36	35
All	All	655/730 (90%)	637 (97%)	17 (3%)	1 (0%)	43	42

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	263	GLU

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	263/286 (92%)	247 (94%)	16 (6%)	17	14
1	B	263/286 (92%)	245 (93%)	18 (7%)	14	11
All	All	526/572 (92%)	492 (94%)	34 (6%)	15	12

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	51	PHE
1	A	77	LYS
1	A	201	HIS
1	A	211	GLN
1	A	249	LEU
1	A	262	LEU
1	A	263	GLU
1	A	264	ASP
1	A	267	SER
1	A	271	LEU
1	A	299	SER
1	A	303	LEU
1	A	314	MET
1	A	337	ARG
1	A	339	LYS
1	A	362	LEU
1	B	36	ARG
1	B	51	PHE
1	B	77	LYS
1	B	96	ARG
1	B	118	ARG
1	B	132	PHE
1	B	148	GLN
1	B	260	ILE
1	B	264	ASP
1	B	274	ILE
1	B	290	GLN
1	B	293	MET
1	B	299	SER
1	B	303	LEU
1	B	314	MET
1	B	333	ILE
1	B	337	ARG

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Mol	Chain	Res	Type
1	B	362	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	290	GLN
1	A	295	GLN
1	B	290	GLN
1	B	312	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 8 ligands modelled in this entry, 4 are 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
4	FMT	B	902	1,2	2,2,2	0.51	0	1,1,1	0.30	0
3	EBP	A	900	-	16,16,16	1.38	2 (12%)	21,21,21	0.87	0
4	FMT	A	901	1,2	2,2,2	0.27	0	1,1,1	0.14	0
3	EBP	B	901	-	16,16,16	1.42	2 (12%)	21,21,21	1.32	2 (9%)

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	EBP	A	900	-	-	0/13/13/13	0/1/1/1
3	EBP	B	901	-	-	0/13/13/13	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	901	EBP	C3-C2	3.34	1.44	1.38
3	A	900	EBP	C6-C5	3.22	1.44	1.38
3	B	901	EBP	C6-C5	3.05	1.43	1.38
3	A	900	EBP	C3-C2	3.00	1.43	1.38

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	901	EBP	O1-P-C7	2.71	111.15	104.15
3	B	901	EBP	C6-C5-C4	-2.70	118.26	121.37

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	902	FMT	1	0
4	A	901	FMT	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](#)

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

6.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.