



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 12:41 PM UTC

PDB ID : 4BO8 / pdb_00004bo8
Title : Crystal structure of 3-oxoacyl-(acyl-carrier-protein) reductase (FabG) from *Pseudomonas aeruginosa* in complex with 1-(2-amino-4-phenylimidazol-1-yl)-3-(2-fluorophenyl)urea at 2.7Å resolution
Authors : Cukier, C.D.; Schnell, R.; Lindqvist, Y.; Schneider, G.
Deposited on : 2013-05-18
Resolution : 2.70 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

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)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

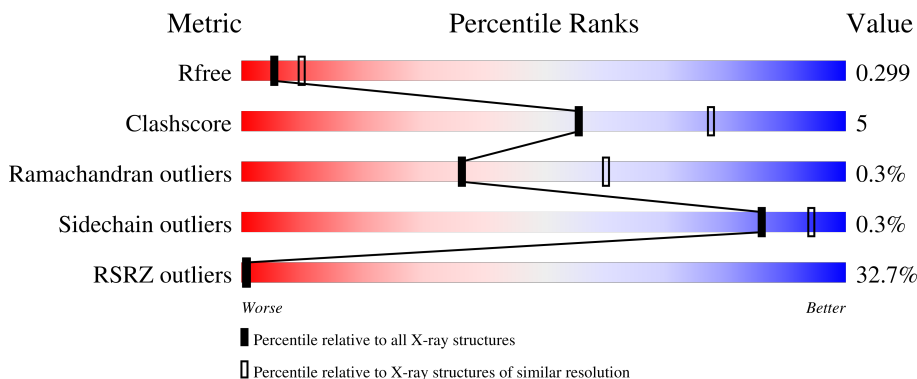
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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}	180053	3538 (2.70-2.70)
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (2.70-2.70)

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 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	269	28% 80% 8% 12%
1	B	269	25% 81% . 14%
1	C	269	32% 81% 8% 11%
1	D	269	31% 83% 7% . 9%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 7063 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 3-OXOACYL-[ACYL-CARRIER-PROTEIN] REDUCTASE FABG.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	236	Total	C	N	O	S	0	2	0
			1712	1066	307	333	6			
1	B	231	Total	C	N	O	S	0	3	0
			1691	1060	299	327	5			
1	C	240	Total	C	N	O	S	0	0	0
			1749	1092	314	338	5			
1	D	245	Total	C	N	O	S	0	4	0
			1808	1132	320	349	7			

There are 88 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-21	MET	-	expression tag	UNP O54438
A	-20	HIS	-	expression tag	UNP O54438
A	-19	HIS	-	expression tag	UNP O54438
A	-18	HIS	-	expression tag	UNP O54438
A	-17	HIS	-	expression tag	UNP O54438
A	-16	HIS	-	expression tag	UNP O54438
A	-15	HIS	-	expression tag	UNP O54438
A	-14	SER	-	expression tag	UNP O54438
A	-13	SER	-	expression tag	UNP O54438
A	-12	GLY	-	expression tag	UNP O54438
A	-11	VAL	-	expression tag	UNP O54438
A	-10	ASP	-	expression tag	UNP O54438
A	-9	LEU	-	expression tag	UNP O54438
A	-8	GLY	-	expression tag	UNP O54438
A	-7	THR	-	expression tag	UNP O54438
A	-6	GLU	-	expression tag	UNP O54438
A	-5	ASN	-	expression tag	UNP O54438
A	-4	LEU	-	expression tag	UNP O54438
A	-3	TYR	-	expression tag	UNP O54438
A	-2	PHE	-	expression tag	UNP O54438

Continued on next page...

Continued from previous page...

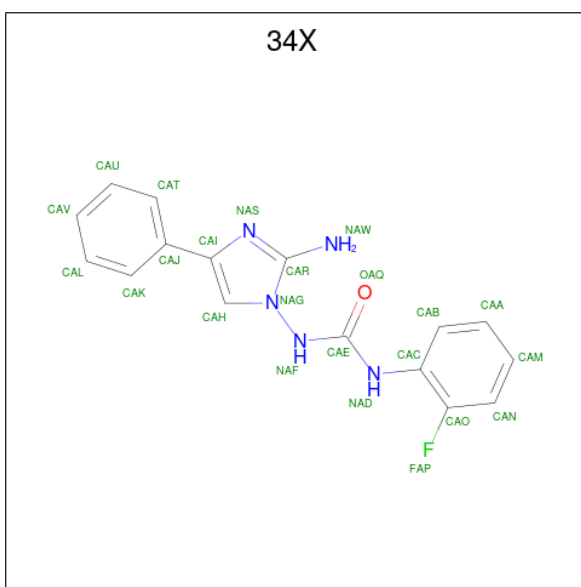
Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLN	-	expression tag	UNP O54438
A	0	SER	-	expression tag	UNP O54438
B	-21	MET	-	expression tag	UNP O54438
B	-20	HIS	-	expression tag	UNP O54438
B	-19	HIS	-	expression tag	UNP O54438
B	-18	HIS	-	expression tag	UNP O54438
B	-17	HIS	-	expression tag	UNP O54438
B	-16	HIS	-	expression tag	UNP O54438
B	-15	HIS	-	expression tag	UNP O54438
B	-14	SER	-	expression tag	UNP O54438
B	-13	SER	-	expression tag	UNP O54438
B	-12	GLY	-	expression tag	UNP O54438
B	-11	VAL	-	expression tag	UNP O54438
B	-10	ASP	-	expression tag	UNP O54438
B	-9	LEU	-	expression tag	UNP O54438
B	-8	GLY	-	expression tag	UNP O54438
B	-7	THR	-	expression tag	UNP O54438
B	-6	GLU	-	expression tag	UNP O54438
B	-5	ASN	-	expression tag	UNP O54438
B	-4	LEU	-	expression tag	UNP O54438
B	-3	TYR	-	expression tag	UNP O54438
B	-2	PHE	-	expression tag	UNP O54438
B	-1	GLN	-	expression tag	UNP O54438
B	0	SER	-	expression tag	UNP O54438
C	-21	MET	-	expression tag	UNP O54438
C	-20	HIS	-	expression tag	UNP O54438
C	-19	HIS	-	expression tag	UNP O54438
C	-18	HIS	-	expression tag	UNP O54438
C	-17	HIS	-	expression tag	UNP O54438
C	-16	HIS	-	expression tag	UNP O54438
C	-15	HIS	-	expression tag	UNP O54438
C	-14	SER	-	expression tag	UNP O54438
C	-13	SER	-	expression tag	UNP O54438
C	-12	GLY	-	expression tag	UNP O54438
C	-11	VAL	-	expression tag	UNP O54438
C	-10	ASP	-	expression tag	UNP O54438
C	-9	LEU	-	expression tag	UNP O54438
C	-8	GLY	-	expression tag	UNP O54438
C	-7	THR	-	expression tag	UNP O54438
C	-6	GLU	-	expression tag	UNP O54438
C	-5	ASN	-	expression tag	UNP O54438
C	-4	LEU	-	expression tag	UNP O54438

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
C	-3	TYR	-	expression tag	UNP O54438
C	-2	PHE	-	expression tag	UNP O54438
C	-1	GLN	-	expression tag	UNP O54438
C	0	SER	-	expression tag	UNP O54438
D	-21	MET	-	expression tag	UNP O54438
D	-20	HIS	-	expression tag	UNP O54438
D	-19	HIS	-	expression tag	UNP O54438
D	-18	HIS	-	expression tag	UNP O54438
D	-17	HIS	-	expression tag	UNP O54438
D	-16	HIS	-	expression tag	UNP O54438
D	-15	HIS	-	expression tag	UNP O54438
D	-14	SER	-	expression tag	UNP O54438
D	-13	SER	-	expression tag	UNP O54438
D	-12	GLY	-	expression tag	UNP O54438
D	-11	VAL	-	expression tag	UNP O54438
D	-10	ASP	-	expression tag	UNP O54438
D	-9	LEU	-	expression tag	UNP O54438
D	-8	GLY	-	expression tag	UNP O54438
D	-7	THR	-	expression tag	UNP O54438
D	-6	GLU	-	expression tag	UNP O54438
D	-5	ASN	-	expression tag	UNP O54438
D	-4	LEU	-	expression tag	UNP O54438
D	-3	TYR	-	expression tag	UNP O54438
D	-2	PHE	-	expression tag	UNP O54438
D	-1	GLN	-	expression tag	UNP O54438
D	0	SER	-	expression tag	UNP O54438

- Molecule 2 is 1-(2-AMINO-4-PHENYLMIDAZOL-1-YL)-3-(2-FLUOROPHENYL)UREA (CCD ID: 34X) (formula: C₁₆H₁₄FN₅O).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	B	1	Total	C	F	N	O	0	0
			23	16	1	5	1		
2	C	1	Total	C	F	N	O	0	0
			23	16	1	5	1		

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	C	1	Total	O	S	0	0
			5	4	1		

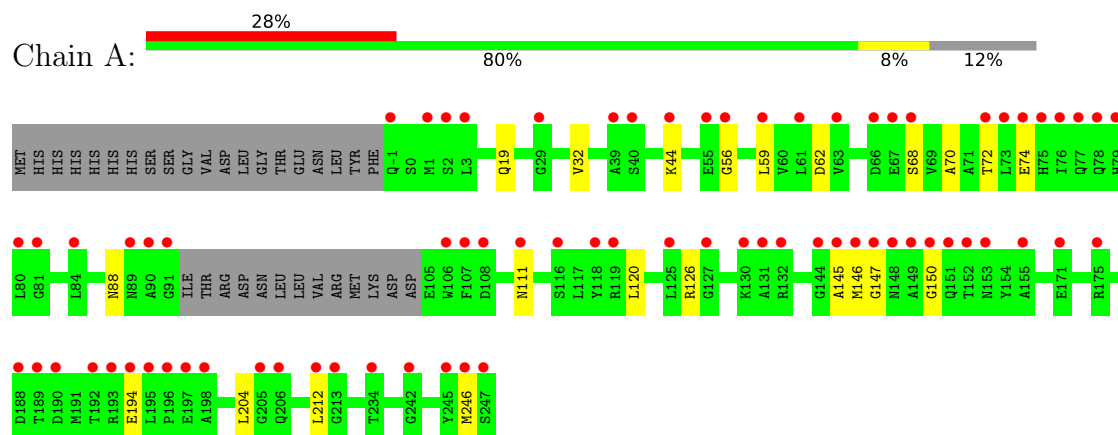
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	22	Total 22	O 22	0	0
4	B	7	Total 7	O 7	0	0
4	C	13	Total 13	O 13	0	0
4	D	10	Total 10	O 10	0	0

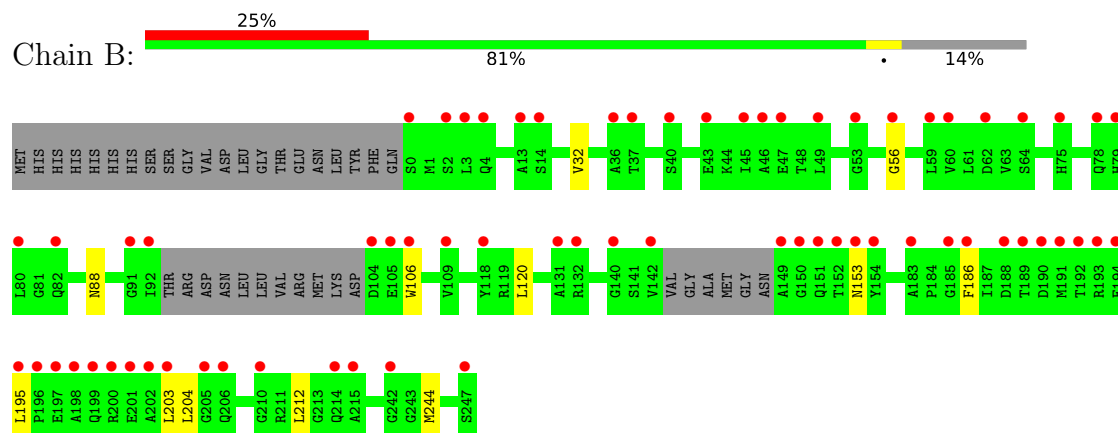
3 Residue-property plots

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 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.

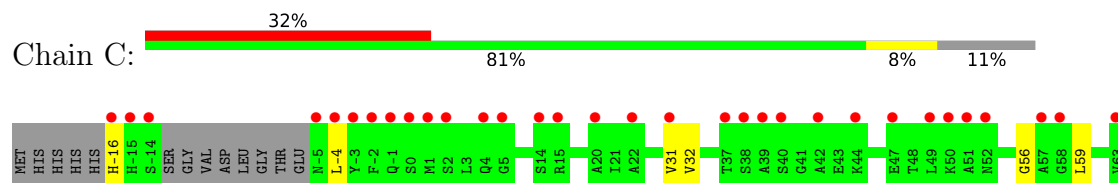
• Molecule 1: 3-OXOACYL-[ACYL-CARRIER-PROTEIN] REDUCTASE FABG

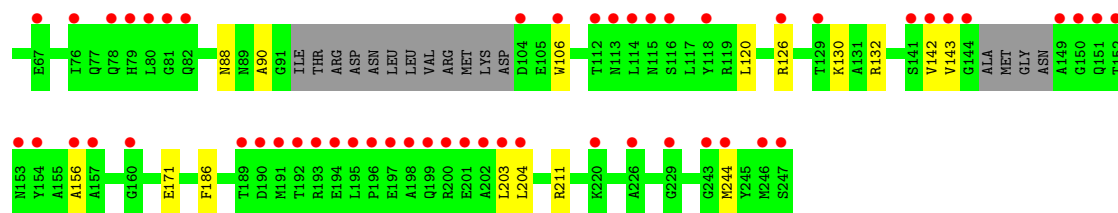


• Molecule 1: 3-OXOACYL-[ACYL-CARRIER-PROTEIN] REDUCTASE FABG

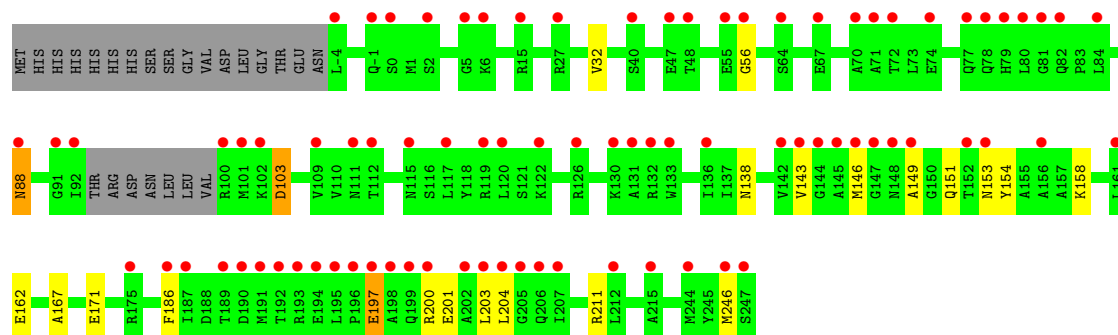
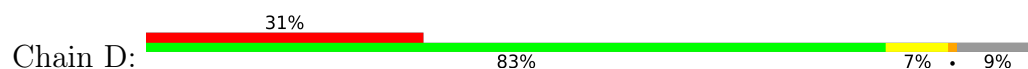


• Molecule 1: 3-OXOACYL-[ACYL-CARRIER-PROTEIN] REDUCTASE FABG





● Molecule 1: 3-OXOACYL-[ACYL-CARRIER-PROTEIN] REDUCTASE FABG



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	54.06Å 108.57Å 147.78Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	37.11 – 2.70 37.11 – 2.70	Depositor EDS
% Data completeness (in resolution range)	96.0 (37.11-2.70) 96.1 (37.11-2.70)	Depositor EDS
R_{merge}	0.18	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.73 (at 2.68Å)	Xtriage
Refinement program	REFMAC 5.7.0029	Depositor
R, R_{free}	0.252 , 0.301 0.253 , 0.299	Depositor DCC
R_{free} test set	1186 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	31.0	Xtriage
Anisotropy	0.374	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 37.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.81	EDS
Total number of atoms	7063	wwPDB-VP
Average B, all atoms (Å ²)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.80% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 34X, 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	0.74	0/1735	0.89	0/2347
1	B	0.74	0/1717	0.89	1/2322 (0.0%)
1	C	0.75	0/1768	0.91	2/2390 (0.1%)
1	D	0.71	0/1840	0.94	1/2487 (0.0%)
All	All	0.73	0/7060	0.91	4/9546 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	197	GLU	N-CA-C	8.38	121.54	111.82
1	B	195	LEU	N-CA-C	7.08	118.71	109.93
1	C	90	ALA	N-CA-C	5.63	117.39	108.67
1	C	132	ARG	CB-CG-CD	5.41	123.75	111.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1712	0	1748	16	0
1	B	1691	0	1733	13	0
1	C	1749	0	1772	14	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	1808	0	1844	18	0
2	B	23	0	13	6	0
2	C	23	0	14	4	0
3	C	5	0	0	0	0
4	A	22	0	0	1	0
4	B	7	0	0	0	0
4	C	13	0	0	1	0
4	D	10	0	0	0	0
All	All	7063	0	7124	67	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 5.

All (67) 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:C:1248:34X:CAH	2:C:1248:34X:HAB	1.78	1.14
2:C:1248:34X:HAB	2:C:1248:34X:HAH	1.21	1.13
2:C:1248:34X:HAH	2:C:1248:34X:CAB	1.97	0.94
1:A:145:ALA:HB1	1:A:150:GLY:HA3	1.51	0.90
1:B:88:ASN:OD1	1:B:120:LEU:HD23	1.85	0.77
1:A:88:ASN:OD1	1:A:120:LEU:HD23	1.85	0.75
1:C:88:ASN:OD1	1:C:120:LEU:HD23	1.87	0.73
1:C:186:PHE:HE1	1:C:244:MET:HE2	1.54	0.72
1:C:186:PHE:CE2	1:C:203:LEU:HD11	2.25	0.71
1:C:186:PHE:CE1	1:C:244:MET:HE2	2.27	0.69
1:C:-16:HIS:ND1	1:C:59:LEU:HD22	2.08	0.68
1:A:59:LEU:HD13	1:A:72:THR:HG23	1.77	0.67
1:A:145:ALA:HB1	1:A:150:GLY:CA	2.23	0.67
2:B:1248:34X:HAH	2:B:1248:34X:HAB	1.76	0.67
2:B:1248:34X:HAB	2:B:1248:34X:NAF	2.11	0.66
1:C:171:GLU:HG3	1:D:103:ASP:O	1.96	0.65
1:D:158:LYS:NZ	1:D:162:GLU:OE2	2.30	0.65
1:B:186[B]:PHE:CE2	1:B:203:LEU:HD23	2.33	0.64
1:B:186[B]:PHE:CD2	1:B:212:LEU:HG	2.38	0.59
1:D:88[A]:ASN:OD1	1:D:138:ASN:OD1	2.22	0.57
1:D:197:GLU:OE1	1:D:201:GLU:HG3	2.05	0.56
1:D:149:ALA:O	1:D:153:ASN:ND2	2.39	0.55
1:B:186[A]:PHE:CE2	1:B:244:MET:SD	3.01	0.54
1:D:197:GLU:HA	1:D:200:ARG:HB3	1.88	0.54
1:A:19:GLN:OE1	1:A:44:LYS:NZ	2.41	0.54

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:1248:34X:HAB	2:B:1248:34X:CAH	2.39	0.53
1:B:204:LEU:HD21	1:B:212:LEU:HD12	1.91	0.53
1:D:146:MET:HG3	1:D:203:LEU:HD21	1.90	0.52
1:B:204:LEU:HD21	1:B:212:LEU:CD1	2.40	0.52
1:B:186[B]:PHE:CE2	1:B:212:LEU:HG	2.45	0.52
1:D:143:VAL:HG11	1:D:186[A]:PHE:CZ	2.45	0.51
1:B:186[A]:PHE:CD2	1:B:244:MET:SD	3.04	0.51
1:A:145:ALA:O	1:A:147:GLY:N	2.43	0.51
1:C:106:TRP:CD1	1:D:171[A]:GLU:HG3	2.46	0.51
1:A:145:ALA:CB	1:A:150:GLY:HA3	2.35	0.50
1:D:200:ARG:O	1:D:203:LEU:HB2	2.12	0.50
1:A:246:MET:HG2	4:A:2021:HOH:O	2.11	0.50
1:C:31:VAL:HG23	4:C:2002:HOH:O	2.13	0.49
1:D:197:GLU:O	1:D:201:GLU:N	2.26	0.49
1:D:146:MET:HG2	1:D:146:MET:O	2.14	0.48
1:A:70:ALA:O	1:A:74:GLU:HG2	2.13	0.48
1:C:186:PHE:CZ	1:C:203:LEU:HD11	2.48	0.47
1:A:204:LEU:HD21	1:A:212:LEU:CD1	2.44	0.47
1:A:204:LEU:HD21	1:A:212:LEU:HD12	1.97	0.47
2:B:1248:34X:NAF	2:B:1248:34X:CAB	2.68	0.47
1:B:186[A]:PHE:CD1	1:B:203:LEU:HD21	2.49	0.47
2:C:1248:34X:HAK	2:C:1248:34X:HAA	1.95	0.47
1:A:62:ASP:O	1:A:68:SER:OG	2.30	0.46
1:A:111:ASN:OD1	2:B:1248:34X:NAW	2.48	0.46
1:D:151:GLN:HG3	1:D:246:MET:SD	2.55	0.46
1:C:156:ALA:HB2	1:D:167:ALA:HB2	1.98	0.45
2:B:1248:34X:HAH	2:B:1248:34X:HAK	1.62	0.44
1:C:126:ARG:CZ	1:C:130:LYS:HE3	2.47	0.44
1:D:154:TYR:CD2	1:D:246:MET:HE3	2.53	0.44
1:A:126:ARG:HA	1:A:126:ARG:HD2	1.83	0.44
1:C:32:VAL:O	1:C:56:GLY:HA3	2.18	0.43
1:B:186[B]:PHE:CZ	1:B:203:LEU:HD23	2.53	0.43
1:C:143:VAL:HG11	1:C:186:PHE:CZ	2.52	0.43
1:B:32:VAL:O	1:B:56:GLY:HA3	2.18	0.43
1:D:204:LEU:HD22	1:D:211:ARG:HA	2.00	0.42
1:A:32:VAL:O	1:A:56:GLY:HA3	2.19	0.42
1:B:106:TRP:HB3	1:B:153:ASN:ND2	2.35	0.41
1:C:204:LEU:HD22	1:C:211:ARG:HA	2.03	0.41
1:D:32:VAL:O	1:D:56:GLY:HA3	2.20	0.41
1:D:186[B]:PHE:CZ	1:D:203:LEU:HD22	2.55	0.41
1:A:194:GLU:O	1:A:194:GLU:HG2	2.21	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:186[A]:PHE:HE2	1:B:244:MET:SD	2.43	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	234/269 (87%)	229 (98%)	4 (2%)	1 (0%)	30	54
1	B	228/269 (85%)	225 (99%)	3 (1%)	0	100	100
1	C	232/269 (86%)	228 (98%)	3 (1%)	1 (0%)	30	54
1	D	245/269 (91%)	237 (97%)	7 (3%)	1 (0%)	30	54
All	All	939/1076 (87%)	919 (98%)	17 (2%)	3 (0%)	36	60

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	146	MET
1	C	142	VAL
1	D	103	ASP

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	172/201 (86%)	172 (100%)	0	100	100
1	B	171/201 (85%)	171 (100%)	0	100	100
1	C	176/201 (88%)	175 (99%)	1 (1%)	78	91
1	D	183/201 (91%)	181 (99%)	2 (1%)	65	85
All	All	702/804 (87%)	699 (100%)	3 (0%)	86	93

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	-4	LEU
1	D	88[A]	ASN
1	D	88[B]	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	115	ASN
1	A	151	GLN
1	A	153	ASN
1	A	214	GLN
1	B	113	ASN
1	B	115	ASN
1	B	153	ASN
1	B	206	GLN
1	B	214	GLN
1	C	151	GLN
1	C	214	GLN
1	D	19	GLN
1	D	82	GLN
1	D	115	ASN
1	D	138	ASN
1	D	151	GLN

5.3.3 RNA ⓘ

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](#)

3 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	$\# Z > 2$
2	34X	C	1248	-	23,25,25	2.59	6 (26%)	29,34,34	2.85	12 (41%)
2	34X	B	1248	-	23,25,25	3.02	5 (21%)	29,34,34	2.77	10 (34%)
3	SO4	C	1249	-	4,4,4	0.51	0	6,6,6	0.43	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
2	34X	C	1248	-	-	4/12/12/12	0/3/3/3
2	34X	B	1248	-	-	5/12/12/12	0/3/3/3

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1248	34X	CAJ-CAI	-10.31	1.32	1.47
2	C	1248	34X	CAJ-CAI	-9.33	1.33	1.47
2	B	1248	34X	FAP-CAO	-7.62	1.15	1.35
2	C	1248	34X	CAI-NAS	-4.28	1.31	1.39
2	B	1248	34X	CAH-CAI	-4.28	1.30	1.37

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	1248	34X	CAC-NAD	-4.23	1.33	1.41
2	B	1248	34X	CAR-NAG	-3.02	1.34	1.38
2	C	1248	34X	CAH-CAI	-2.98	1.32	1.37
2	B	1248	34X	CAI-NAS	-2.75	1.34	1.39
2	C	1248	34X	FAP-CAO	2.51	1.42	1.35
2	C	1248	34X	CAR-NAG	-2.26	1.35	1.38

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1248	34X	CAJ-CAI-CAH	-8.59	116.52	129.65
2	B	1248	34X	CAJ-CAI-NAS	8.59	133.09	119.95
2	C	1248	34X	OAQ-CAE-NAD	-7.50	110.32	123.64
2	C	1248	34X	OAQ-CAE-NAF	-6.12	112.80	122.82
2	C	1248	34X	CAI-CAH-NAG	5.08	110.66	105.90
2	C	1248	34X	CAJ-CAI-NAS	4.56	126.93	119.95
2	C	1248	34X	CAJ-CAI-CAH	-4.19	123.24	129.65
2	B	1248	34X	CAB-CAC-NAD	4.05	131.19	121.82
2	C	1248	34X	CAC-NAD-CAE	3.78	134.16	125.34
2	C	1248	34X	FAP-CAO-CAC	3.74	122.24	117.59
2	B	1248	34X	CAI-CAH-NAG	3.56	109.24	105.90
2	C	1248	34X	CAI-NAS-CAR	-2.85	103.91	105.46
2	C	1248	34X	CAO-CAC-NAD	-2.79	113.32	118.51
2	C	1248	34X	CAN-CAO-CAC	-2.78	120.07	123.18
2	B	1248	34X	CAK-CAJ-CAI	-2.51	118.06	120.87
2	B	1248	34X	CAB-CAC-CAO	-2.49	114.50	117.23
2	C	1248	34X	CAB-CAC-NAD	2.46	127.52	121.82
2	B	1248	34X	CAO-CAC-NAD	-2.34	114.16	118.51
2	C	1248	34X	NAW-CAR-NAG	2.19	124.83	121.85
2	B	1248	34X	CAT-CAJ-CAK	2.16	121.31	118.57
2	B	1248	34X	CAU-CAT-CAJ	-2.15	118.25	120.36
2	B	1248	34X	CAI-NAS-CAR	-2.00	104.37	105.46

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	1248	34X	NAF-CAE-NAD-CAC
2	B	1248	34X	CAE-NAF-NAG-CAR
2	C	1248	34X	NAF-CAE-NAD-CAC
2	C	1248	34X	CAE-NAF-NAG-CAR
2	B	1248	34X	OAQ-CAE-NAD-CAC

Continued on next page...

Continued from previous page...

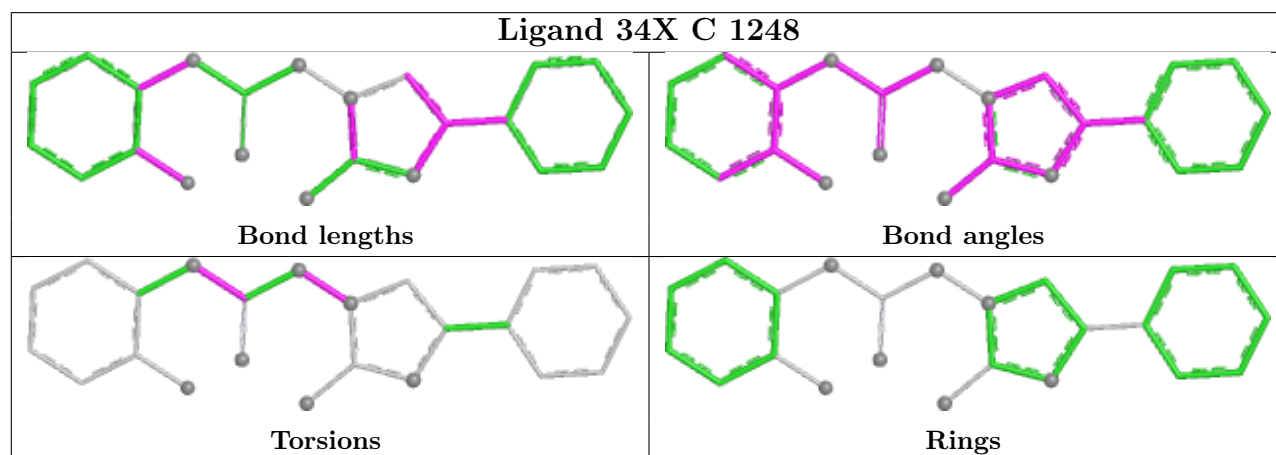
Mol	Chain	Res	Type	Atoms
2	C	1248	34X	OAQ-CAE-NAD-CAC
2	B	1248	34X	CAE-NAF-NAG-CAH
2	C	1248	34X	CAE-NAF-NAG-CAH
2	B	1248	34X	NAD-CAE-NAF-NAG

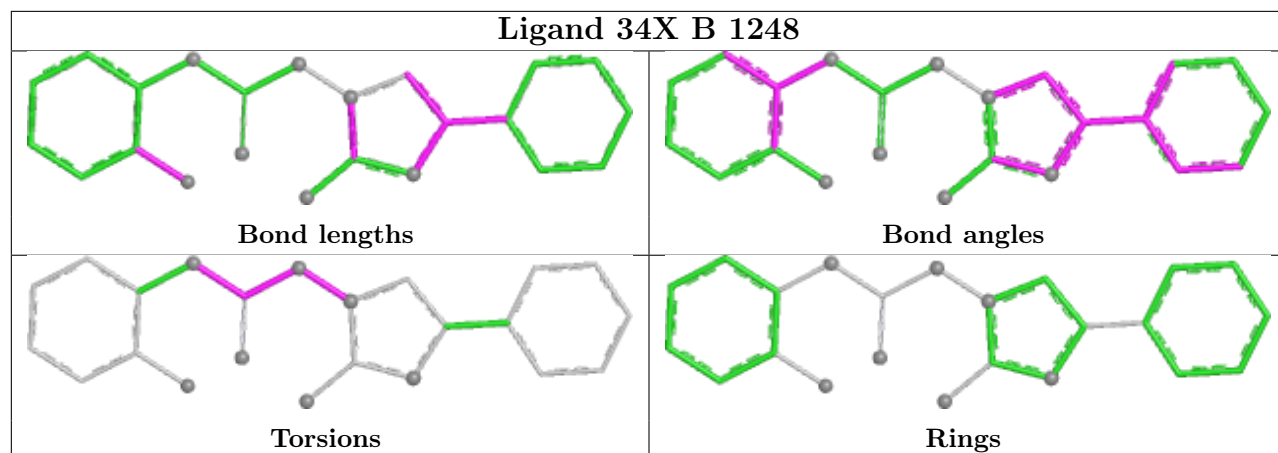
There are no ring outliers.

2 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	1248	34X	4	0
2	B	1248	34X	6	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	236/269 (87%)	1.70	74 (31%)  	8, 25, 55, 74	2 (0%)
1	B	231/269 (85%)	1.60	68 (29%)  	9, 24, 63, 83	3 (1%)
1	C	240/269 (89%)	1.77	85 (35%)  	9, 24, 62, 92	0
1	D	245/269 (91%)	1.82	84 (34%)  	11, 26, 62, 98	4 (1%)
All	All	952/1076 (88%)	1.72	311 (32%)  	8, 25, 62, 98	9 (0%)

All (311) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	92	ILE	7.2
1	C	-16	HIS	7.1
1	D	196	PRO	6.2
1	B	198	ALA	6.2
1	D	195	LEU	6.1
1	C	5	GLY	6.1
1	D	146	MET	5.8
1	D	197	GLU	5.7
1	B	197	GLU	5.5
1	B	104	ASP	5.5
1	B	152	THR	5.4
1	A	246	MET	5.2
1	D	56	GLY	5.1
1	C	142	VAL	5.1
1	C	190	ASP	5.1
1	B	149	ALA	5.0
1	A	90	ALA	5.0
1	D	81	GLY	5.0
1	B	247	SER	4.9
1	A	146	MET	4.9
1	A	247	SER	4.8

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	C	150	GLY	4.8
1	D	198	ALA	4.7
1	A	145	ALA	4.6
1	B	91	GLY	4.6
1	D	92	ILE	4.6
1	C	144	GLY	4.5
1	D	101	MET	4.5
1	A	149	ALA	4.5
1	C	39	ALA	4.5
1	C	193	ARG	4.5
1	A	39	ALA	4.4
1	A	245	TYR	4.4
1	D	80	LEU	4.4
1	C	149	ALA	4.4
1	C	191	MET	4.3
1	C	-15	HIS	4.3
1	C	152	THR	4.3
1	B	186[A]	PHE	4.2
1	D	79	HIS	4.2
1	C	200	ARG	4.2
1	D	100	ARG	4.2
1	D	145	ALA	4.2
1	A	40	SER	4.2
1	D	203	LEU	4.2
1	C	-5	ASN	4.1
1	C	157	ALA	4.1
1	B	202	ALA	4.1
1	C	78	GLN	4.0
1	D	147	GLY	4.0
1	A	147	GLY	4.0
1	C	51	ALA	4.0
1	B	151	GLN	3.9
1	C	4	GLN	3.9
1	A	132	ARG	3.9
1	C	143	VAL	3.9
1	D	205	GLY	3.9
1	C	189	THR	3.9
1	D	199	GLN	3.9
1	C	153	ASN	3.8
1	C	14	SER	3.8
1	D	77	GLN	3.8
1	C	-14	SER	3.8

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	63	VAL	3.8
1	D	247	SER	3.7
1	D	200	ARG	3.7
1	C	-1	GLN	3.7
1	D	-4	LEU	3.7
1	A	127	GLY	3.7
1	D	144	GLY	3.7
1	A	155	ALA	3.7
1	D	71	ALA	3.7
1	A	74	GLU	3.7
1	C	156	ALA	3.6
1	C	151	GLN	3.6
1	A	80	LEU	3.6
1	A	152	THR	3.6
1	B	201	GLU	3.5
1	C	197	GLU	3.5
1	D	190	ASP	3.5
1	C	47	GLU	3.5
1	A	78	GLN	3.4
1	A	197	GLU	3.4
1	B	82	GLN	3.4
1	D	246	MET	3.4
1	C	154	TYR	3.4
1	A	194	GLU	3.4
1	A	192	THR	3.3
1	D	102	LYS	3.3
1	C	-3	TYR	3.3
1	B	195	LEU	3.3
1	C	195	LEU	3.3
1	D	191	MET	3.3
1	A	153	ASN	3.3
1	B	13	ALA	3.2
1	C	198	ALA	3.2
1	A	79	HIS	3.2
1	B	199	GLN	3.2
1	A	81	GLY	3.2
1	D	215	ALA	3.2
1	D	186[A]	PHE	3.2
1	A	-1	GLN	3.2
1	D	78	GLN	3.2
1	D	206	GLN	3.2
1	D	40	SER	3.2

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	B	142	VAL	3.2
1	D	192	THR	3.2
1	B	0	SER	3.2
1	D	202	ALA	3.2
1	D	47	GLU	3.1
1	B	140	GLY	3.1
1	D	149	ALA	3.1
1	A	144	GLY	3.1
1	D	15	ARG	3.1
1	D	148	ASN	3.1
1	A	77	GLN	3.1
1	D	132	ARG	3.1
1	D	117	LEU	3.0
1	B	80	LEU	3.0
1	C	115	ASN	3.0
1	C	50	LYS	3.0
1	B	191	MET	3.0
1	D	48	THR	3.0
1	B	36	ALA	3.0
1	C	38	SER	2.9
1	A	89	ASN	2.9
1	A	175	ARG	2.9
1	B	37	THR	2.9
1	B	131	ALA	2.9
1	B	2	SER	2.9
1	D	126	ARG	2.9
1	B	190	ASP	2.9
1	C	22	ALA	2.9
1	A	193	ARG	2.9
1	C	52	ASN	2.9
1	A	190	ASP	2.9
1	B	62	ASP	2.9
1	D	112	THR	2.9
1	B	200	ARG	2.9
1	B	53	GLY	2.9
1	C	80	LEU	2.9
1	B	196	PRO	2.8
1	C	244	MET	2.8
1	C	192	THR	2.8
1	B	79	HIS	2.8
1	A	108	ASP	2.8
1	A	196	PRO	2.8

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	C	247	SER	2.8
1	A	212	LEU	2.8
1	D	131	ALA	2.8
1	A	151	GLN	2.8
1	D	6	LYS	2.8
1	C	0	SER	2.8
1	C	113	ASN	2.8
1	B	185	GLY	2.8
1	D	193	ARG	2.8
1	C	199	GLN	2.7
1	C	160	GLY	2.7
1	B	47	GLU	2.7
1	D	27	ARG	2.7
1	A	76	ILE	2.7
1	B	203	LEU	2.7
1	B	40	SER	2.7
1	B	105	GLU	2.7
1	A	131	ALA	2.7
1	A	75	HIS	2.7
1	D	119	ARG	2.7
1	C	-2	PHE	2.7
1	B	154	TYR	2.7
1	C	81	GLY	2.7
1	B	106	TRP	2.7
1	D	72	THR	2.7
1	A	84	LEU	2.6
1	C	204	LEU	2.6
1	C	82	GLN	2.6
1	A	118	TYR	2.6
1	B	118	TYR	2.6
1	B	214	GLN	2.6
1	D	64	SER	2.6
1	D	189	THR	2.6
1	C	104	ASP	2.6
1	D	194	GLU	2.6
1	A	150	GLY	2.6
1	D	111	ASN	2.6
1	C	1	MET	2.5
1	D	244	MET	2.5
1	D	130	LYS	2.5
1	A	171	GLU	2.5
1	B	56	GLY	2.5

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	B	183	ALA	2.5
1	D	82	GLN	2.5
1	A	189	THR	2.5
1	D	88[A]	ASN	2.5
1	B	45	ILE	2.5
1	B	75	HIS	2.5
1	C	201	GLU	2.5
1	C	2	SER	2.5
1	C	106	TRP	2.5
1	A	130	LYS	2.5
1	B	43	GLU	2.5
1	B	109	VAL	2.5
1	A	195	LEU	2.4
1	D	204	LEU	2.4
1	B	210	GLY	2.4
1	C	58	GLY	2.4
1	C	44	LYS	2.4
1	B	193	ARG	2.4
1	A	59	LEU	2.4
1	B	206	GLN	2.4
1	D	109	VAL	2.4
1	B	192	THR	2.4
1	D	207	ILE	2.4
1	D	115	ASN	2.4
1	A	2	SER	2.4
1	A	116	SER	2.4
1	C	243	GLY	2.4
1	B	4	GLN	2.4
1	A	198	ALA	2.4
1	C	-4	LEU	2.4
1	B	153	ASN	2.4
1	C	196	PRO	2.4
1	D	91	GLY	2.4
1	B	78	GLN	2.4
1	D	142	VAL	2.4
1	B	46	ALA	2.4
1	C	42	ALA	2.4
1	A	1	MET	2.3
1	A	188	ASP	2.3
1	C	229	GLY	2.3
1	A	119	ARG	2.3
1	C	15	ARG	2.3

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	C	31	VAL	2.3
1	C	79	HIS	2.3
1	D	55	GLU	2.3
1	B	205	GLY	2.3
1	B	59	LEU	2.3
1	A	234	THR	2.3
1	C	116	SER	2.3
1	D	0	SER	2.3
1	A	106	TRP	2.3
1	A	91	GLY	2.3
1	D	212	LEU	2.3
1	C	129	THR	2.3
1	C	226	ALA	2.2
1	A	72	THR	2.2
1	B	194	GLU	2.2
1	B	64	SER	2.2
1	A	29	GLY	2.2
1	B	150	GLY	2.2
1	D	161	LEU	2.2
1	A	67	GLU	2.2
1	D	67	GLU	2.2
1	A	73	LEU	2.2
1	C	49	LEU	2.2
1	D	120	LEU	2.2
1	D	156	ALA	2.2
1	A	55	GLU	2.2
1	D	175	ARG	2.2
1	D	153	ASN	2.2
1	A	206	GLN	2.2
1	B	3	LEU	2.2
1	B	242	GLY	2.2
1	C	141	SER	2.2
1	C	63	VAL	2.2
1	D	74	GLU	2.2
1	B	132	ARG	2.2
1	A	111	ASN	2.2
1	C	203	LEU	2.2
1	A	107	PHE	2.2
1	B	215	ALA	2.1
1	D	84	LEU	2.1
1	A	213	GLY	2.1
1	D	5	GLY	2.1

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	D	136	ILE	2.1
1	C	57	ALA	2.1
1	C	37	THR	2.1
1	A	148	ASN	2.1
1	B	49	LEU	2.1
1	A	205	GLY	2.1
1	D	143	VAL	2.1
1	C	202	ALA	2.1
1	D	70	ALA	2.1
1	B	189	THR	2.1
1	A	44	LYS	2.1
1	C	220	LYS	2.1
1	D	-1	GLN	2.1
1	A	3	LEU	2.1
1	B	60	VAL	2.1
1	B	14	SER	2.1
1	C	67	GLU	2.1
1	C	126	ARG	2.1
1	D	133	TRP	2.1
1	D	122	LYS	2.1
1	C	114	LEU	2.1
1	C	118	TYR	2.1
1	A	66	ASP	2.0
1	C	20	ALA	2.0
1	C	194	GLU	2.0
1	D	2	SER	2.0
1	C	112	THR	2.0
1	C	246	MET	2.0
1	A	61	LEU	2.0
1	A	56	GLY	2.0
1	A	242	GLY	2.0
1	C	76	ILE	2.0
1	B	188	ASP	2.0
1	A	68	SER	2.0
1	C	40	SER	2.0
1	D	152	THR	2.0
1	A	125	LEU	2.0
1	D	187	ILE	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

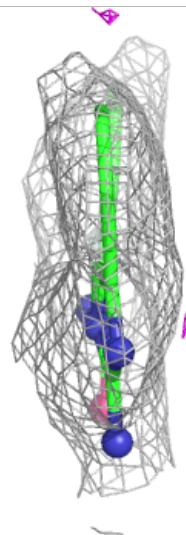
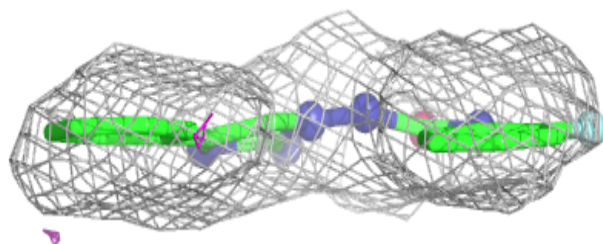
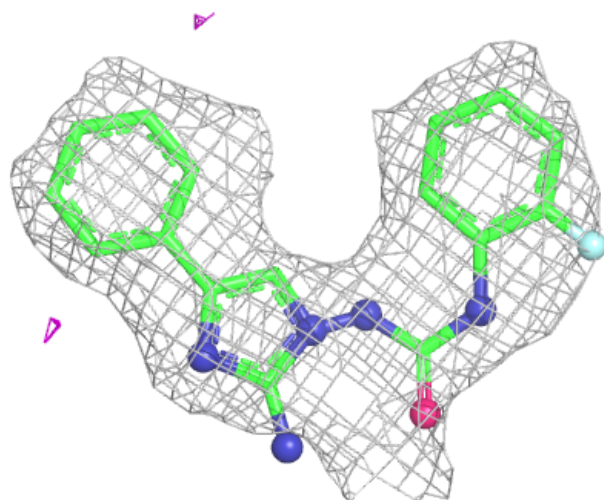
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	34X	B	1248	23/23	0.81	0.14	26,31,35,40	0
2	34X	C	1248	23/23	0.81	0.15	22,24,25,26	0
3	SO4	C	1249	5/5	0.83	0.14	45,46,48,50	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

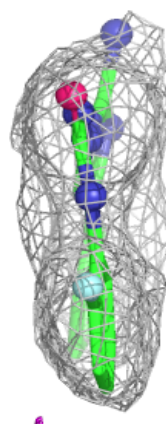
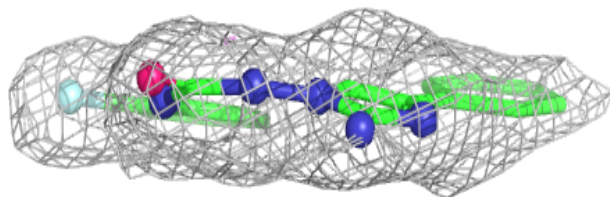
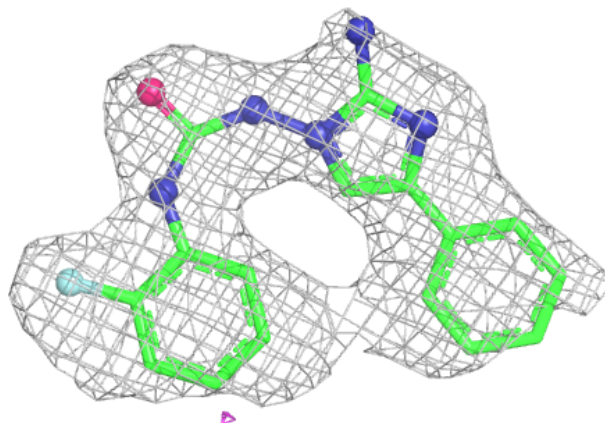
Electron density around 34X B 1248:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around 34X C 1248:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers [i](#)

There are no such residues in this entry.