



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 26, 2014 – 04:29 PM GMT

PDB ID : 2I1M
Title : cFMS tyrosine kinase (tie2 KID) in complex with an arylamide inhibitor
Authors : Schubert, C.; Schalk-Hihi, C.
Deposited on : 2006-08-14
Resolution : 1.80 Å(reported)

This is a full wwPDB validation report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

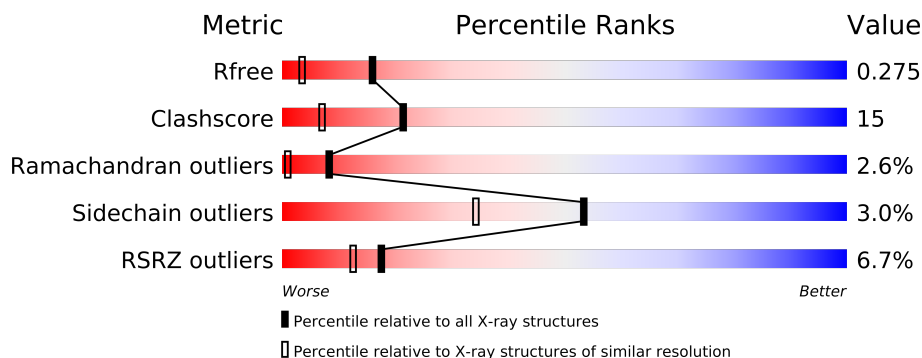
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

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))
R_{free}	66092	3513 (1.80-1.80)
Clashscore	79885	4461 (1.80-1.80)
Ramachandran outliers	78287	4404 (1.80-1.80)
Sidechain outliers	78261	4403 (1.80-1.80)
RSRZ outliers	66119	3515 (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 ≥ 3 , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	333	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 2670 atoms, of which 0 are hydrogen and 0 are deuterium.

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.

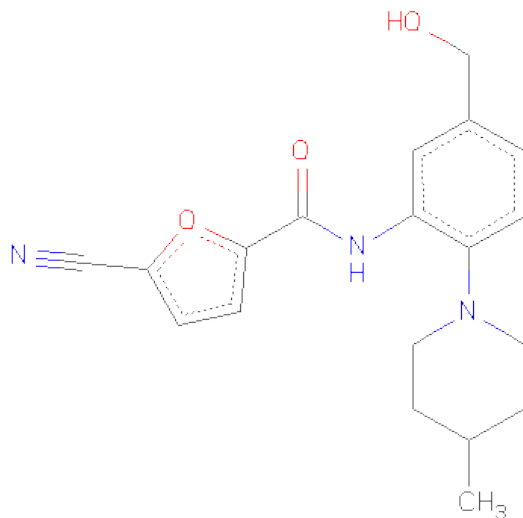
- Molecule 1 is a protein called Macrophage colony-stimulating factor 1 receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	311	Total	C	N	O	S	0	0	0
			2469	1580	425	449	15			

There are 22 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	535	GLY	-	EXPRESSION TAG	UNP P07333
A	536	VAL	-	EXPRESSION TAG	UNP P07333
A	537	ASP	-	EXPRESSION TAG	UNP P07333
A	679	SER	-	SEE REMARK 999	UNP P07333
A	680	ARG	-	SEE REMARK 999	UNP P07333
A	681	VAL	-	SEE REMARK 999	UNP P07333
A	682	LEU	-	SEE REMARK 999	UNP P07333
A	683	GLU	-	SEE REMARK 999	UNP P07333
A	684	THR	-	SEE REMARK 999	UNP P07333
A	685	ASP	-	SEE REMARK 999	UNP P07333
A	686	PRO	-	SEE REMARK 999	UNP P07333
A	687	ALA	-	SEE REMARK 999	UNP P07333
A	688	PHE	-	SEE REMARK 999	UNP P07333
A	689	ALA	-	SEE REMARK 999	UNP P07333
A	690	ILE	-	SEE REMARK 999	UNP P07333
A	691	ALA	-	SEE REMARK 999	UNP P07333
A	692	ASN	-	SEE REMARK 999	UNP P07333
A	693	SER	-	SEE REMARK 999	UNP P07333
A	694	THR	-	SEE REMARK 999	UNP P07333
A	697	ALA	-	SEE REMARK 999	UNP P07333
A	698	SER	-	SEE REMARK 999	UNP P07333
A	699	THR	-	SEE REMARK 999	UNP P07333

- Molecule 2 is 5-CYANO-FURAN-2-CARBOXYLICACID [5-HYDROXYMETHYL-2-(4-METHYL-PIPERIDIN-1-YL)-PHENYL]-AMIDE (three-letter code: 5CN) (formula: C₁₉H₂₁N₃O₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			25	19	3	3		

- Molecule 3 is water.

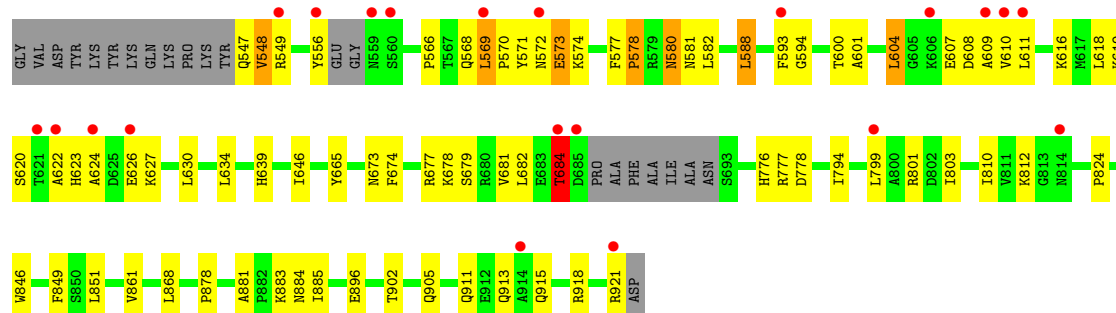
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	176	Total	O	0	0
			176	176		

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 errors 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: Macrophage colony-stimulating factor 1 receptor

Chain A: 



4 Data and refinement statistics

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α , β , γ	80.44Å 80.44Å 143.76Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	62.69 – 1.80 62.69 – 1.79	Depositor EDS
% Data completeness (in resolution range)	94.6 (62.69-1.80) 93.9 (62.69-1.79)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.05	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.29 (at 1.80Å)	Xtriage
Refinement program	CNX 2002	Depositor
R, R_{free}	0.237 , 0.282 0.232 , 0.275	Depositor DCC
R_{free} test set	1510 reflections (5.22%)	DCC
Wilson B-factor (Å ²)	21.8	Xtriage
Anisotropy	0.089	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 46.0	EDS
Estimated twinning fraction	0.031 for h,-h-k,-l	Xtriage
L-test for twinning	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 30512 reflections	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	2670	wwPDB-VP
Average B, all atoms (Å ²)	36.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.12% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 5CN

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	0.30	0/2525	0.58	0/3416

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2469	0	2450	76	0
2	A	25	0	21	0	0
3	A	176	0	0	8	0
All	All	2670	0	2471	76	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 15.

All (76) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:616:LYS:NZ	1:A:630:LEU:HD13	2.02	0.75

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:547:GLN:HG3	1:A:548:VAL:H	1.53	0.73
1:A:548:VAL:HG22	1:A:778:ASP:HB2	1.71	0.72
1:A:616:LYS:HZ2	1:A:630:LEU:HD13	1.55	0.71
1:A:846:TRP:CD1	1:A:878:PRO:HG3	2.27	0.69
1:A:616:LYS:HG2	1:A:799:LEU:HD12	1.75	0.68
1:A:918:ARG:O	1:A:921:ARG:HG3	1.94	0.67
1:A:623:HIS:H	1:A:626:GLU:CG	2.07	0.66
1:A:677:ARG:O	1:A:681:VAL:HG23	1.96	0.65
1:A:896:GLU:HB3	3:A:155:HOH:O	1.96	0.65
1:A:572:ASN:C	1:A:574:LYS:H	2.01	0.64
1:A:572:ASN:O	1:A:574:LYS:N	2.34	0.61
1:A:911:GLN:HG3	1:A:915:GLN:HE21	1.65	0.60
1:A:547:GLN:CG	1:A:548:VAL:H	2.15	0.59
1:A:623:HIS:H	1:A:626:GLU:HG2	1.67	0.58
1:A:616:LYS:HZ3	1:A:799:LEU:CG	2.16	0.58
1:A:547:GLN:HG3	1:A:548:VAL:N	2.19	0.57
1:A:600:THR:HG22	1:A:610:VAL:HG12	1.87	0.56
1:A:616:LYS:CG	1:A:799:LEU:HD12	2.35	0.56
1:A:868:LEU:HD23	3:A:106:HOH:O	2.05	0.56
1:A:883:LYS:HD3	1:A:883:LYS:O	2.06	0.56
1:A:601:ALA:CB	1:A:604:LEU:HD12	2.35	0.56
1:A:673:ASN:O	1:A:677:ARG:HG3	2.05	0.56
1:A:622:ALA:HA	1:A:626:GLU:HG3	1.87	0.55
1:A:618:LEU:HD11	1:A:627:LYS:HA	1.91	0.52
1:A:884:ASN:HD22	1:A:913:GLN:HE22	1.58	0.52
1:A:593:PHE:HB2	1:A:799:LEU:CD2	2.40	0.52
1:A:568:GLN:O	1:A:569:LEU:HB2	2.10	0.51
1:A:682:LEU:C	1:A:684:THR:H	2.14	0.51
1:A:616:LYS:HD3	3:A:26:HOH:O	2.10	0.51
1:A:572:ASN:C	1:A:574:LYS:N	2.64	0.51
1:A:573:GLU:OE2	3:A:179:HOH:O	2.18	0.50
1:A:607:GLU:C	1:A:609:ALA:H	2.14	0.49
1:A:824:PRO:HB2	3:A:55:HOH:O	2.13	0.49
1:A:902:THR:H	1:A:905:GLN:HE21	1.60	0.49
1:A:548:VAL:O	1:A:548:VAL:HG13	2.13	0.48
1:A:577:PHE:CD1	1:A:578:PRO:HD2	2.47	0.48
1:A:674:PHE:O	1:A:678:LYS:HG2	2.13	0.48
1:A:594:GLY:HA2	1:A:619:LYS:HG3	1.96	0.48
1:A:547:GLN:CG	1:A:548:VAL:N	2.77	0.48
1:A:639:HIS:HB2	3:A:31:HOH:O	2.14	0.47
1:A:812:LYS:HG2	1:A:812:LYS:O	2.14	0.47
1:A:616:LYS:HZ3	1:A:799:LEU:HG	1.78	0.47

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:574:LYS:HD2	1:A:574:LYS:N	2.30	0.47
1:A:679:SER:HB3	1:A:851:LEU:HB3	1.95	0.47
1:A:580:ASN:C	1:A:582:LEU:H	2.18	0.47
1:A:548:VAL:CG2	1:A:778:ASP:HB2	2.42	0.46
1:A:902:THR:H	1:A:905:GLN:NE2	2.13	0.46
1:A:549:ARG:HG2	3:A:141:HOH:O	2.15	0.46
1:A:616:LYS:HZ2	1:A:630:LEU:CD1	2.26	0.45
1:A:588:LEU:HD21	1:A:665:TYR:CE1	2.51	0.45
1:A:623:HIS:H	1:A:626:GLU:HG3	1.78	0.45
1:A:616:LYS:HZ3	1:A:799:LEU:CB	2.30	0.45
1:A:594:GLY:HA3	1:A:799:LEU:HD11	1.99	0.45
1:A:572:ASN:HB3	1:A:574:LYS:HD3	1.99	0.44
1:A:801:ARG:HG3	1:A:803:ILE:HG13	1.99	0.44
1:A:679:SER:O	1:A:682:LEU:HB2	2.17	0.44
1:A:607:GLU:O	1:A:609:ALA:N	2.49	0.43
1:A:616:LYS:HZ1	1:A:630:LEU:HD13	1.80	0.43
1:A:568:GLN:HB3	1:A:569:LEU:HD12	2.00	0.43
1:A:849:PHE:HB3	1:A:881:ALA:HB2	2.00	0.42
1:A:646:ILE:HD13	1:A:794:ILE:HG13	2.01	0.42
1:A:547:GLN:HE21	1:A:548:VAL:H	1.68	0.42
1:A:911:GLN:NE2	1:A:911:GLN:HA	2.35	0.42
1:A:623:HIS:ND1	1:A:624:ALA:N	2.66	0.42
1:A:776:HIS:O	1:A:777:ARG:HB2	2.20	0.42
1:A:799:LEU:O	1:A:799:LEU:HD13	2.20	0.41
1:A:566:PRO:HG3	1:A:639:HIS:CD2	2.55	0.41
1:A:849:PHE:CE2	1:A:885:ILE:HG21	2.56	0.41
1:A:549:ARG:HG2	1:A:549:ARG:HH11	1.85	0.41
1:A:600:THR:CG2	1:A:610:VAL:HG12	2.51	0.41
1:A:588:LEU:HD21	1:A:665:TYR:CD1	2.56	0.41
1:A:620:SER:HA	3:A:97:HOH:O	2.19	0.41
1:A:810:ILE:HG13	1:A:861:VAL:HG11	2.03	0.41
1:A:799:LEU:C	1:A:799:LEU:HD13	2.42	0.40
1:A:884:ASN:ND2	1:A:913:GLN:HE22	2.20	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone ⓘ

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	305/333 (92%)	285 (93%)	12 (4%)	8 (3%)	8 1

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	684	THR
1	A	573	GLU
1	A	608	ASP
1	A	570	PRO
1	A	581	ASN
1	A	548	VAL
1	A	569	LEU
1	A	578	PRO

5.3.2 Protein sidechains ⓘ

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	265/282 (94%)	257 (97%)	8 (3%)	53 34

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	556	TYR
1	A	571	TYR
1	A	580	ASN
1	A	588	LEU
1	A	604	LEU
1	A	611	LEU
1	A	634	LEU
1	A	684	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	547	GLN
1	A	808	ASN
1	A	874	GLN
1	A	905	GLN
1	A	911	GLN
1	A	913	GLN
1	A	915	GLN

5.3.3 RNA ⓘ

There are no RNA chains in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

1 ligand is 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	5CN	A	1000	-	27,27,27	1.49	5 (18%)	34,37,37	1.62	5 (14%)

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	5CN	A	1000	-	-	1/12/26/26	0/3/3/3

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1000	5CN	C6-C1	3.77	1.44	1.40
2	A	1000	5CN	C5-C6	2.88	1.44	1.39
2	A	1000	5CN	C2-C1	2.57	1.44	1.39
2	A	1000	5CN	C5-C4	2.55	1.44	1.39
2	A	1000	5CN	C8-N1	2.28	1.50	1.46

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1000	5CN	C9-N1-C8	5.39	122.74	111.67
2	A	1000	5CN	C17-C18-C19	5.04	131.14	125.50
2	A	1000	5CN	C16-C17-C18	-2.23	106.09	112.10
2	A	1000	5CN	C6-N2-C14	2.21	133.10	126.83
2	A	1000	5CN	C2-C1-N1	-2.18	118.22	122.06

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1000	5CN	C16-C15-C14-N2

There are no ring outliers.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues

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	311/333 (93%)	0.29	21 (6%) 17 12	15, 31, 66, 87	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	556	TYR	5.1
1	A	569	LEU	4.2
1	A	684	THR	3.6
1	A	593	PHE	3.4
1	A	621	THR	3.4
1	A	606	LYS	3.2
1	A	914	ALA	3.1
1	A	572	ASN	3.1
1	A	624	ALA	2.8
1	A	626	GLU	2.8
1	A	610	VAL	2.6
1	A	609	ALA	2.6
1	A	622	ALA	2.5
1	A	799	LEU	2.3
1	A	611	LEU	2.2
1	A	685	ASP	2.2
1	A	559	ASN	2.2
1	A	549	ARG	2.1
1	A	814	ASN	2.1
1	A	560	SER	2.1
1	A	921	ARG	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

There are no carbohydrates in this entry.

6.4 Ligands

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	RSR	LLDF	B-factors(Å ²)	Q<0.9
2	5CN	A	1000	25/25	0.12	-0.41	18,30,36,41	0

6.5 Other polymers

There are no such residues in this entry.