



# Full wwPDB X-ray Structure Validation Report

Feb 28, 2014 – 12:32 PM GMT

PDB ID : 3O23  
Title : Human unphosphorylated IGF1-R Kinase domain in complex with an hydan-  
toin inhibitor  
Authors : Maignan, S.; Guilloteau, J.P.; Dupuy, A.  
Deposited on : 2010-07-22  
Resolution : 2.10 Å(reported)

This is a full wwPDB 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 <http://wwpdb.org/ValidationPDFNotes.html>

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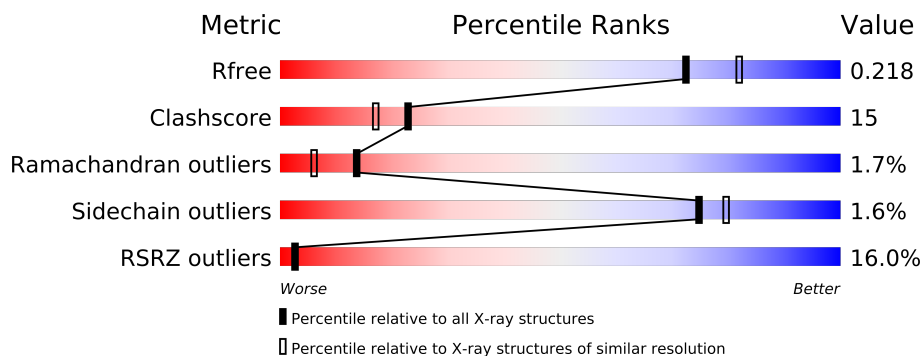
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 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 2.10 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	3012 (2.10-2.10)
Clashscore	79885	3649 (2.10-2.10)
Ramachandran outliers	78287	3610 (2.10-2.10)
Sidechain outliers	78261	3611 (2.10-2.10)
RSRZ outliers	66119	3013 (2.10-2.10)

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. 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	305	

## 2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 2459 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.

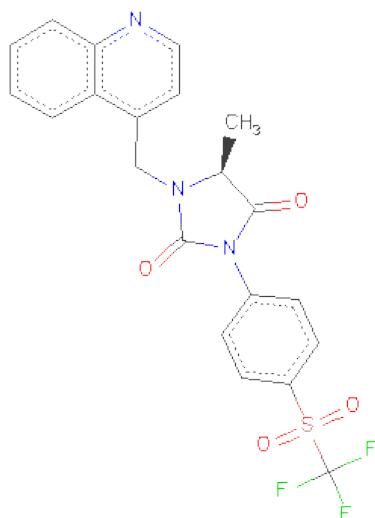
- Molecule 1 is a protein called Insulin-like growth factor 1 receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	293	2342	1488	392	439	23	7	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	987	PHE	TYR	ENGINEERED MUTATION	UNP P08069

- Molecule 2 is (5S)-5-METHYL-1-(QUINOLIN-4-YLMETHYL)-3-{4-[(TRIFLUOROMETHYL)SULFONYL]PHENYL}IMIDAZOLIDINE-2,4-DIONE (three-letter code: MQY) (formula: C<sub>21</sub>H<sub>16</sub>F<sub>3</sub>N<sub>3</sub>O<sub>4</sub>S).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
			Total	C	F	N	O	S		
2	A	1	32	21	3	3	4	1	0	0

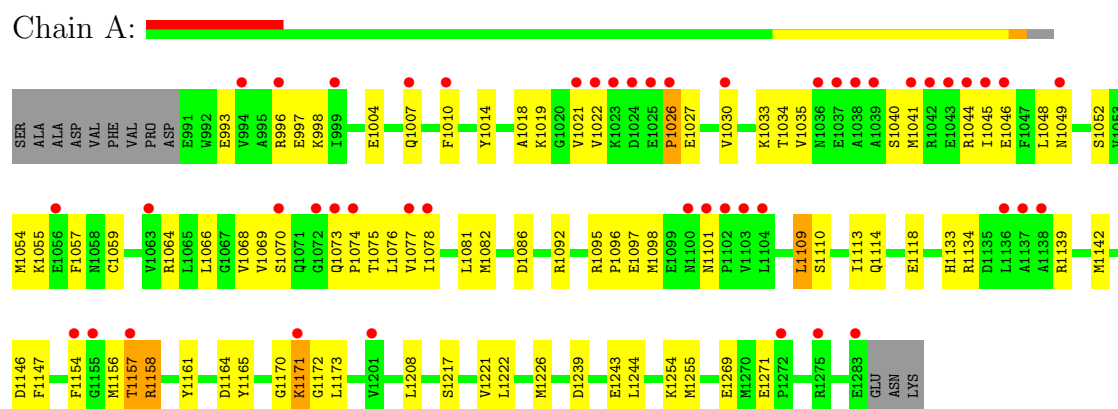
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	85	Total 85	O 85	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 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: Insulin-like growth factor 1 receptor



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	49.77Å 48.76Å 70.73Å 90.00° 98.74° 90.00°	Depositor
Resolution (Å)	30.00 – 2.10 29.79 – 2.08	Depositor EDS
% Data completeness (in resolution range)	(Not available) (30.00-2.10) 91.1 (29.79-2.08)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.07	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.21 (at 2.08Å)	Xtriage
Refinement program	CNX 2000	Depositor
R, $R_{free}$	0.238 , 0.278 0.227 , 0.218	Depositor DCC
$R_{free}$ test set	942 reflections (5.39%)	DCC
Wilson B-factor (Å <sup>2</sup> )	26.8	Xtriage
Anisotropy	0.731	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.39 , 61.0	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 18413 reflections	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	2459	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.56% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities 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: MQY

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	0.36	0/2392	0.56	0/3226

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	2342	0	2313	69	0
2	A	32	0	16	0	0
3	A	85	0	0	0	0
All	All	2459	0	2329	69	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 (69) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:1046:GLU:HA	1:A:1049:ASN:HD22	1.34	0.92

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:1157:THR:HG23	1:A:1158:ARG:H	1.48	0.77
1:A:1034:THR:HG22	1:A:1076:LEU:HD22	1.72	0.71
1:A:1098:MET:SD	1:A:1208:LEU:HD11	2.32	0.70
1:A:1004:GLU:HG2	1:A:1014:TYR:CD1	2.27	0.69
1:A:1139:ARG:HB2	1:A:1158:ARG:NH1	2.08	0.69
1:A:1239:ASP:O	1:A:1243:GLU:HG2	1.94	0.68
1:A:1066:LEU:O	1:A:1078:ILE:HB	1.95	0.66
1:A:1069:VAL:HB	1:A:1076:LEU:HB2	1.77	0.66
1:A:1048:LEU:HD11	1:A:1075:THR:HG21	1.77	0.66
1:A:1254:LYS:HD2	1:A:1254:LYS:H	1.62	0.64
1:A:1021:VAL:HG23	1:A:1022:VAL:HG23	1.79	0.64
1:A:1004:GLU:HG2	1:A:1014:TYR:CE1	2.34	0.63
1:A:1154:PHE:CE1	1:A:1156:MET:HB2	2.34	0.62
1:A:1086:ASP:CG	1:A:1158:ARG:HH21	2.04	0.61
1:A:1007:GLN:H	1:A:1157:THR:HG22	1.64	0.60
1:A:1041:MET:HG2	1:A:1044:ARG:HH21	1.66	0.60
1:A:1114:GLN:O	1:A:1118:GLU:HG3	2.00	0.60
1:A:1078:ILE:HD12	1:A:1078:ILE:N	2.17	0.60
1:A:1110:SER:O	1:A:1114:GLN:HG2	2.03	0.59
1:A:1146:ASP:O	1:A:1147:PHE:HB2	2.03	0.59
1:A:1040:SER:O	1:A:1044:ARG:HG3	2.03	0.58
1:A:1007:GLN:HB3	1:A:1157:THR:HB	1.85	0.57
1:A:1170:GLY:O	1:A:1172:GLY:N	2.37	0.57
1:A:1114:GLN:HE22	1:A:1271:GLU:H	1.53	0.56
1:A:1010:PHE:O	1:A:1035:VAL:HA	2.06	0.55
1:A:1171:LYS:HG2	1:A:1171:LYS:O	2.08	0.54
1:A:1052:SER:HA	1:A:1055:LYS:HG3	1.90	0.53
1:A:1139:ARG:HB2	1:A:1158:ARG:CZ	2.38	0.52
1:A:1133:HIS:O	1:A:1134:ARG:HB2	2.09	0.52
1:A:1068:VAL:HG23	1:A:1077:VAL:HG22	1.93	0.51
1:A:1034:THR:HG22	1:A:1076:LEU:CD2	2.40	0.51
1:A:1035:VAL:CG2	1:A:1075:THR:HB	2.41	0.50
1:A:1154:PHE:CE1	1:A:1158:ARG:HG3	2.47	0.49
1:A:1035:VAL:HG21	1:A:1075:THR:HB	1.93	0.49
1:A:1073:GLN:CB	1:A:1074:PRO:HD2	2.43	0.49
1:A:1114:GLN:NE2	1:A:1271:GLU:HG2	2.28	0.49
1:A:1109:LEU:O	1:A:1113:ILE:HG12	2.13	0.49
1:A:1154:PHE:CD1	1:A:1158:ARG:HD2	2.48	0.48
1:A:1086:ASP:CG	1:A:1158:ARG:NH2	2.66	0.48
1:A:1139:ARG:HB2	1:A:1158:ARG:HH12	1.78	0.48
1:A:1154:PHE:CD2	1:A:1158:ARG:CZ	2.96	0.48
1:A:1165:TYR:HB3	1:A:1173:LEU:HB3	1.95	0.47

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:1026:PRO:HG2	1:A:1027:GLU:H	1.79	0.47
1:A:1156:MET:O	1:A:1157:THR:C	2.54	0.46
1:A:1004:GLU:HG2	1:A:1014:TYR:HD1	1.78	0.46
1:A:1157:THR:HG23	1:A:1158:ARG:N	2.25	0.45
1:A:1030:VAL:HA	1:A:1081:LEU:HB2	1.98	0.45
1:A:1045:ILE:HG22	1:A:1049:ASN:HD21	1.80	0.45
1:A:1018:ALA:HB1	1:A:1021:VAL:HG11	1.98	0.45
1:A:1082:MET:HG3	1:A:1142:MET:CB	2.47	0.45
1:A:1052:SER:HA	1:A:1055:LYS:CD	2.47	0.44
1:A:996:ARG:HG3	1:A:997:GLU:OE2	2.18	0.44
1:A:993:GLU:HA	1:A:1068:VAL:O	2.18	0.44
1:A:996:ARG:HD2	1:A:1073:GLN:OE1	2.18	0.44
1:A:1222:LEU:HB3	1:A:1226:MET:CE	2.48	0.44
1:A:1073:GLN:HB3	1:A:1074:PRO:HD2	2.00	0.43
1:A:1217:SER:O	1:A:1221:VAL:HG23	2.19	0.43
1:A:1161:TYR:O	1:A:1164:ASP:HB2	2.19	0.43
1:A:998:LYS:HB3	1:A:1019:LYS:HB2	2.01	0.43
1:A:1097:GLU:O	1:A:1101:ASN:HB2	2.19	0.42
1:A:1269:GLU:OE2	1:A:1269:GLU:N	2.53	0.42
1:A:1054:MET:HA	1:A:1057:PHE:CD2	2.54	0.42
1:A:996:ARG:NH1	1:A:997:GLU:OE2	2.53	0.41
1:A:1158:ARG:HD3	1:A:1161:TYR:HD2	1.86	0.41
1:A:1074:PRO:O	1:A:1076:LEU:HG	2.21	0.40
1:A:1095:ARG:N	1:A:1096:PRO:HD2	2.36	0.40
1:A:1033:LYS:O	1:A:1076:LEU:HA	2.20	0.40
1:A:1059:CYS:N	1:A:1064:ARG:HH12	2.18	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	291/305 (95%)	264 (91%)	22 (8%)	5 (2%)	14   6

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1171	LYS
1	A	1070	SER
1	A	1157	THR
1	A	1158	ARG
1	A	1026	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	256/266 (96%)	252 (98%)	4 (2%)	75 79

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1092	ARG
1	A	1109	LEU
1	A	1244	LEU
1	A	1255	MET

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

Mol	Chain	Res	Type
1	A	1049	ASN
1	A	1071	GLN
1	A	1101	ASN
1	A	1114	GLN
1	A	1127	ASN
1	A	1214	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	MQY	A	1	-	35,35,35	1.70	10 (28%)	54,54,54	1.37	9 (16%)

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	MQY	A	1	-	-	0/23/43/43	0/2/4/4

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1	MQY	C2-N1	-3.61	1.38	1.44
2	A	1	MQY	C19-C16	3.48	1.43	1.37
2	A	1	MQY	C20-S17	-2.74	1.80	1.84
2	A	1	MQY	C32-C30	2.70	1.42	1.36
2	A	1	MQY	C31-C24	2.59	1.42	1.36
2	A	1	MQY	C18-C23	2.51	1.46	1.42
2	A	1	MQY	C12-C15	2.27	1.42	1.38
2	A	1	MQY	C25-N29	2.06	1.36	1.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1	MQY	C4-N1	-2.04	1.36	1.39
2	A	1	MQY	C6-C2	2.00	1.43	1.39

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1	MQY	C18-C23-N29	-4.11	118.61	122.91
2	A	1	MQY	N7-C3-N1	3.82	109.09	107.14
2	A	1	MQY	C25-N29-C23	3.35	121.66	116.94
2	A	1	MQY	O10-C4-N1	3.26	127.87	124.29
2	A	1	MQY	C16-C13-N7	2.65	116.76	113.19
2	A	1	MQY	C30-C23-N29	2.20	121.99	118.59
2	A	1	MQY	O22-S17-C20	2.17	107.43	104.56
2	A	1	MQY	O21-S17-C20	2.12	107.36	104.56
2	A	1	MQY	F26-C20-S17	-2.05	107.68	110.45

There are no chirality outliers.

There are no torsion outliers.

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, 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	293/305 (96%)	0.93	47 (16%) <b>3</b> <b>3</b>	19, 40, 84, 93	2 (0%)

All (47) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1038	ALA	7.8
1	A	1021	VAL	7.6
1	A	1072	GLY	6.4
1	A	1045	ILE	5.4
1	A	1024	ASP	5.3
1	A	1039	ALA	5.3
1	A	1023	LYS	4.9
1	A	1037	GLU	4.8
1	A	1073	GLN	4.6
1	A	1044	ARG	4.6
1	A	1026	PRO	4.4
1	A	1007	GLN	4.4
1	A	1022	VAL	4.3
1	A	996	ARG	4.1
1	A	1157	THR	4.1
1	A	1102	PRO	4.0
1	A	1042	ARG	3.7
1	A	1049	ASN	3.5
1	A	1025	GLU	3.4
1	A	1074	PRO	3.1
1	A	1043	GLU	3.0
1	A	1154	PHE	2.9
1	A	1046	GLU	2.9
1	A	1010	PHE	2.9
1	A	1056	GLU	2.9
1	A	1283	GLU	2.9
1	A	994	VAL	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	1171	LYS	2.8
1	A	1036	ASN	2.7
1	A	1070	SER	2.7
1	A	1272	PRO	2.7
1	A	1103	VAL	2.5
1	A	999	ILE	2.5
1	A	1275	ARG	2.5
1	A	1201	VAL	2.4
1	A	1101	ASN	2.4
1	A	1077	VAL	2.3
1	A	1137	ALA	2.3
1	A	1030	VAL	2.2
1	A	1041	MET	2.2
1	A	1136	LEU	2.2
1	A	1100	ASN	2.2
1	A	1063	VAL	2.2
1	A	1104	LEU	2.1
1	A	1155	GLY	2.1
1	A	1078	ILE	2.1
1	A	1138	ALA	2.1

## 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, 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	RSR	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
2	MQY	A	1	32/32	0.15	-0.66	43,46,48,48	0

## 6.5 Other polymers ⓘ

There are no such residues in this entry.