



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 11:28 PM GMT

PDB ID : 1X9Q
Title : 4m5.3 anti-fluorescein single chain antibody fragment (scFv)
Authors : Midelfort, K.S.; Hernandez, H.H.; Lippow, S.M.; Tidor, B.; Drennan, C.L.; Wittrop, K.D.
Deposited on : 2004-08-24
Resolution : 1.50 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
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

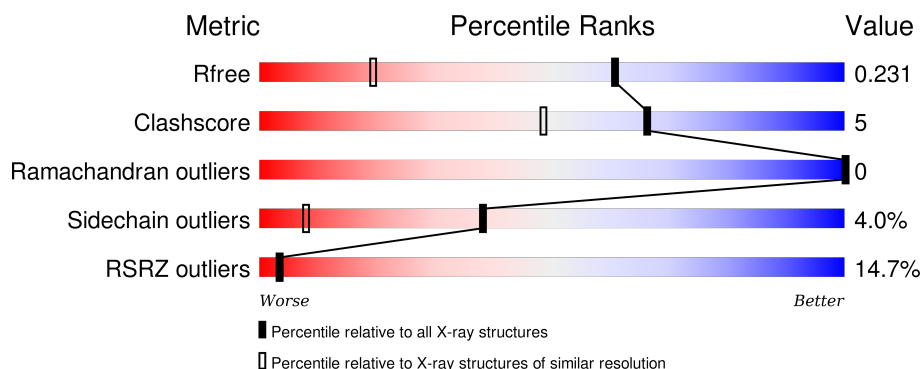
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.50 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}	91344	2072 (1.50-1.50)
Clashscore	102246	2274 (1.50-1.50)
Ramachandran outliers	100387	2218 (1.50-1.50)
Sidechain outliers	100360	2216 (1.50-1.50)
RSRZ outliers	91569	2075 (1.50-1.50)

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. 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	268	<div> <div>13%</div> <div>75%</div> <div>9%</div> <div>14%</div> </div>

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 2120 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 4m5.3 anti-fluorescein single chain antibody fragment.

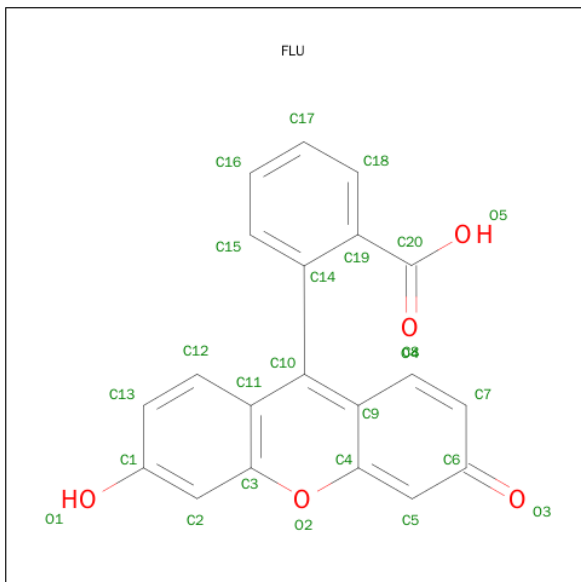
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	231	1843	1159	305	366	13	3	23	0

- Molecule 2 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).



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

- Molecule 3 is 2-(6-HYDROXY-3-OXO-3H-XANTHEN-9-YL)-BENZOIC ACID (three-letter code: FLU) (formula: C₂₀H₁₂O₅).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			25	20	5		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	233	Total	O	0	0
			233	233		

- Molecule 1: 4m5.3 anti-fluorescein single chain antibody fragment



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	55.78Å 57.45Å 79.22Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	28.75 – 1.50 28.73 – 1.50	Depositor EDS
% Data completeness (in resolution range)	98.8 (28.75-1.50) 98.7 (28.73-1.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.03	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.41 (at 1.50Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.165 , 0.193 0.232 , 0.231	Depositor DCC
R_{free} test set	4040 reflections (11.12%)	DCC
Wilson B-factor (Å ²)	20.4	Xtriage
Anisotropy	0.414	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 45.1	EDS
Estimated twinning fraction	0.028 for k,h,-l	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Outliers	0 of 40620 reflections	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	2120	wwPDB-VP
Average B, all atoms (Å ²)	17.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.96% 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, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

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: FLU, ACT

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	0.51	2/1983 (0.1%)	0.78	3/2684 (0.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	24[A]	SER	CA-CB	5.71	1.61	1.52
1	A	24[B]	SER	CA-CB	5.71	1.61	1.52

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	226	ASP	CB-CG-OD2	5.65	123.38	118.30
1	A	15	ASP	CB-CG-OD2	5.26	123.03	118.30
1	A	243	ASP	CB-CG-OD2	5.13	122.91	118.30

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	1843	0	1749	18	1
2	A	19	0	15	1	0
3	A	25	0	10	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	233	0	0	5	3
All	All	2120	0	1774	18	3

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 (18) 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:A:256[A]:MET:HE2	1:A:257:GLU:H	1.08	1.13
1:A:75:SER:O	4:A:1629:HOH:O	1.94	0.85
1:A:256[A]:MET:HE2	1:A:257:GLU:N	1.91	0.84
1:A:256[A]:MET:CE	1:A:257:GLU:H	1.90	0.84
1:A:21:THR:HG23	4:A:1488:HOH:O	1.93	0.69
1:A:29:LEU:O	4:A:1695:HOH:O	2.15	0.64
1:A:32[A]:GLN:HG3	4:A:1674:HOH:O	2.02	0.58
1:A:236[A]:MET:HE2	1:A:239:LEU:HD21	1.84	0.57
1:A:261:GLN:O	1:A:261:GLN:HG3	2.05	0.56
1:A:20:GLN:HE21	1:A:118:GLY:HA3	1.70	0.56
1:A:23[B]:LEU:HG	4:A:1615:HOH:O	2.10	0.51
1:A:188[A]:VAL:CG1	1:A:248:TYR:HB2	2.42	0.50
1:A:32[B]:GLN:HE21	1:A:95[B]:ASN:ND2	2.14	0.45
1:A:205:LYS:HB3	1:A:206:PRO:HD3	1.98	0.44
1:A:20:GLN:HE22	1:A:106:PHE:HA	1.82	0.44
1:A:188[A]:VAL:HG12	1:A:248:TYR:HB2	1.99	0.43
1:A:226:ASP:OD2	1:A:229:LYS:HE2	2.18	0.43
1:A:58:LYS:HZ1	2:A:1476:ACT:H1	1.83	0.43

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:1709:HOH:O	4:A:1711:HOH:O[3_646]	1.76	0.44
4:A:1578:HOH:O	4:A:1610:HOH:O[1_455]	1.99	0.21
1:A:261:GLN:CD	4:A:1688:HOH:O[3_656]	2.19	0.01

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	249/268 (93%)	244 (98%)	5 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	220/227 (97%)	205 (93%)	15 (7%)	20	2

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	24[A]	SER
1	A	24[B]	SER
1	A	28[A]	SER
1	A	28[B]	SER
1	A	32[A]	GLN
1	A	32[B]	GLN
1	A	95[A]	ASN
1	A	95[B]	ASN
1	A	191[A]	SER
1	A	191[B]	SER
1	A	199[A]	VAL
1	A	199[B]	VAL
1	A	249[A]	CYS

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Mol	Chain	Res	Type
1	A	249[B]	CYS
1	A	250	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	20	GLN
1	A	61	GLN

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](#)

6 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	$\# Z > 2$
3	FLU	A	1341	-	24,28,28	2.68	6 (25%)	26,41,41	1.53	4 (15%)
2	ACT	A	1474	-	2,2,3	0.86	0	0,1,3	0.00	-
2	ACT	A	1475	-	1,3,3	0.79	0	0,3,3	0.00	-
2	ACT	A	1476	-	1,3,3	0.72	0	0,3,3	0.00	-

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	ACT	A	1477	-	1,3,3	1.13	0	0,3,3	0.00	-
2	ACT	A	1478	-	1,3,3	1.11	0	0,3,3	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
3	FLU	A	1341	-	-	0/4/12/12	0/4/4/4
2	ACT	A	1474	-	-	0/0/0/0	0/0/0/0
2	ACT	A	1475	-	-	0/0/0/0	0/0/0/0
2	ACT	A	1476	-	-	0/0/0/0	0/0/0/0
2	ACT	A	1477	-	-	0/0/0/0	0/0/0/0
2	ACT	A	1478	-	-	0/0/0/0	0/0/0/0

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1341	FLU	O2-C4	-6.60	1.26	1.35
3	A	1341	FLU	O2-C3	-6.04	1.26	1.37
3	A	1341	FLU	C14-C10	-2.03	1.47	1.50
3	A	1341	FLU	C19-C14	3.69	1.47	1.41
3	A	1341	FLU	C9-C10	5.29	1.46	1.38
3	A	1341	FLU	C11-C3	5.32	1.48	1.41

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1341	FLU	C9-C10-C11	-4.99	115.87	119.57
3	A	1341	FLU	C10-C11-C3	-2.17	117.06	119.17
3	A	1341	FLU	C4-O2-C3	2.55	125.66	122.37
3	A	1341	FLU	O2-C3-C2	3.29	120.37	116.18

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1476	ACT	1	0

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	231/268 (86%)	0.80	34 (14%) 3 3	9, 14, 21, 30	7 (3%)

All (34) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	29	LEU	5.9
1	A	188[A]	VAL	5.3
1	A	219	GLY	3.9
1	A	228	SER	3.4
1	A	28[A]	SER	3.4
1	A	259	LEU	3.3
1	A	248	TYR	3.3
1	A	14	SER	3.1
1	A	196	LEU	3.1
1	A	150	ASP	3.1
1	A	99	ALA	2.9
1	A	229	LYS	2.8
1	A	152	GLY	2.8
1	A	31	ASP	2.6
1	A	67[A]	ILE	2.6
1	A	208	ASN	2.5
1	A	75	SER	2.5
1	A	27	VAL	2.4
1	A	46	SER	2.4
1	A	108[A]	SER	2.4
1	A	32[A]	GLN	2.4
1	A	261	GLN	2.4
1	A	96	ARG	2.3
1	A	117[A]	PHE	2.3
1	A	95[A]	ASN	2.3
1	A	258	TYR	2.2
1	A	249[A]	CYS	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	250	THR	2.2
1	A	100	GLU	2.1
1	A	218	LYS	2.1
1	A	256[A]	MET	2.1
1	A	227	ASP	2.1
1	A	55	TYR	2.1
1	A	26	PRO	2.0

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

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

6.3 Carbohydrates [i](#)

There are no carbohydrates 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. 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	RSCC	RSR	LLDF	B-factors(Å ²)	Q<0.9
2	ACT	A	1476	4/4	0.72	0.20	1.63	53,53,53,53	0
2	ACT	A	1475	4/4	0.84	0.15	0.32	38,38,38,39	0
3	FLU	A	1341	25/25	0.91	0.09	-0.78	11,13,16,19	0
2	ACT	A	1474	3/4	0.69	0.18	-	26,26,26,27	0
2	ACT	A	1477	4/4	0.25	0.34	-	91,91,91,91	0
2	ACT	A	1478	4/4	0.77	0.18	-	64,64,64,64	0

6.5 Other polymers [i](#)

There are no such residues in this entry.