



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2018 – 06:17 pm GMT

PDB ID : 1A7O  
Title : FV FRAGMENT OF MOUSE MONOCLONAL ANTIBODY D1.3 (BALB/C, IGG1, K) R96L DELETION MUTANT ON VARIANT FOR CHAIN L GLU81->ASP AND CHAIN H LEU312->VAL  
Authors : Marks, C.; Henrick, K.; Winter, G.  
Deposited on : 1998-03-16  
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](mailto: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.

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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
Xtriage (Phenix)	:	1.13
EDS	:	trunk30967
Percentile statistics	:	20171227.v01 (using entries in the PDB archive December 27th 2017)
Refmac	:	5.8.0158
CCP4	:	7.0 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	trunk30967

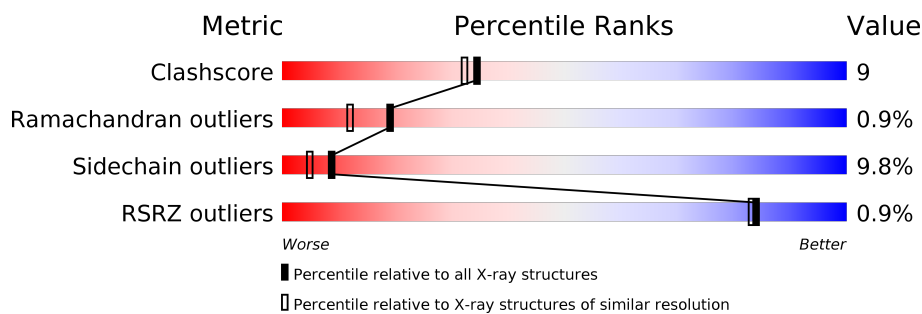
# 1 Overall quality at a glance

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	122126	8267 (2.00-2.00)
Ramachandran outliers	120053	8166 (2.00-2.00)
Sidechain outliers	120020	8165 (2.00-2.00)
RSRZ outliers	108989	7011 (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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	L	106	<div> <div>2%</div> <div>71%</div> <div>24%</div> <div>• •</div> </div>
2	H	116	<div> <div>56%</div> <div>30%</div> <div>13%</div> <div>•</div> </div>

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 1826 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 IGG1-KAPPA D1.3 FV (LIGHT CHAIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	L	106	Total	C	N	O	S	0	0	0
			802	511	131	158	2			

There are 7 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
L	3	VAL	GLU	CONFLICT	UNP P01635
L	50	TYR	LYS	CONFLICT	UNP P01635
L	51	THR	ALA	CONFLICT	UNP P01635
L	52	THR	GLN	CONFLICT	UNP P01635
L	81	ASP	GLU	VARIANT	UNP P01635
L	?	-	PRO	DELETION	UNP P01635
L	?	-	TRP	DELETION	UNP P01635

- Molecule 2 is a protein called IGG1-KAPPA D1.3 FV (HEAVY CHAIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	116	Total	C	N	O	S	0	0	0
			892	560	156	172	4			

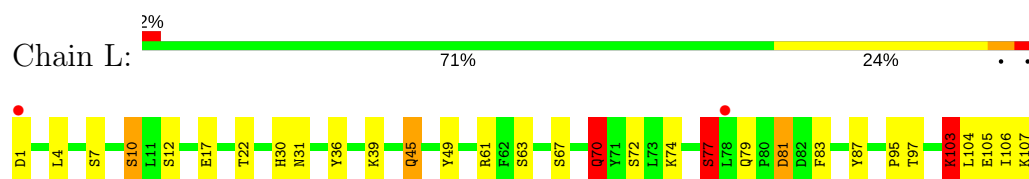
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	L	73	Total	O	0	0
			73	73		
3	H	59	Total	O	0	0
			59	59		

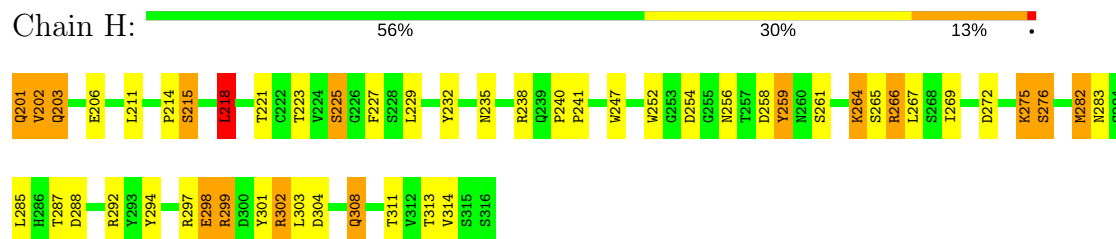
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: IGG1-KAPPA D1.3 FV (LIGHT CHAIN)



- Molecule 2: IGG1-KAPPA D1.3 FV (HEAVY CHAIN)



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	90.42Å 90.42Å 56.66Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	6.00 – 2.00 16.92 – 2.01	Depositor EDS
% Data completeness (in resolution range)	(Not available) (6.00-2.00) 95.0 (16.92-2.01)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.22 (at 2.00Å)	Xtriage
Refinement program	CCP4	Depositor
R, $R_{free}$	0.167 , (Not available) 0.172 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	27.1	Xtriage
Anisotropy	0.024	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 99.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	1826	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.13% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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

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	L	0.97	0/823	1.93	23/1120 (2.1%)
2	H	0.95	0/912	2.36	41/1238 (3.3%)
All	All	0.96	0/1735	2.16	64/2358 (2.7%)

There are no bond length outliers.

All (64) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	302	ARG	NE-CZ-NH1	28.01	134.31	120.30
2	H	302	ARG	NE-CZ-NH2	-19.36	110.62	120.30
2	H	201	GLN	CA-CB-CG	-13.86	82.90	113.40
1	L	61	ARG	NE-CZ-NH2	10.93	125.76	120.30
1	L	87	TYR	CB-CG-CD1	-10.90	114.46	121.00
1	L	81	ASP	CB-CG-OD1	10.51	127.76	118.30
2	H	297	ARG	NE-CZ-NH2	-9.61	115.50	120.30
2	H	302	ARG	CG-CD-NE	9.04	130.78	111.80
2	H	298	GLU	OE1-CD-OE2	9.03	134.13	123.30
2	H	238	ARG	NE-CZ-NH2	-8.95	115.82	120.30
2	H	266	ARG	NE-CZ-NH1	8.72	124.66	120.30
1	L	36	TYR	CB-CG-CD2	8.59	126.15	121.00
1	L	10	SER	N-CA-CB	8.20	122.81	110.50
1	L	97	THR	N-CA-CB	8.04	125.57	110.30
2	H	266	ARG	NE-CZ-NH2	-8.00	116.30	120.30
2	H	298	GLU	CG-CD-OE1	-7.86	102.58	118.30
2	H	304	ASP	CB-CG-OD1	7.67	125.20	118.30
2	H	232	TYR	CB-CG-CD2	-7.63	116.42	121.00
2	H	299	ARG	CA-CB-CG	7.62	130.16	113.40
1	L	36	TYR	CB-CG-CD1	-7.34	116.60	121.00
2	H	288	ASP	CB-CG-OD2	-7.33	111.71	118.30
1	L	87	TYR	CB-CG-CD2	7.26	125.36	121.00
2	H	218	LEU	CA-CB-CG	7.20	131.85	115.30
2	H	304	ASP	CB-CG-OD2	-7.08	111.92	118.30
2	H	206	GLU	OE1-CD-OE2	-6.96	114.95	123.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	L	45	GLN	OE1-CD-NE2	-6.58	106.77	121.90
2	H	203	GLN	CB-CA-C	6.51	123.43	110.40
1	L	45	GLN	CB-CG-CD	6.51	128.52	111.60
2	H	297	ARG	NE-CZ-NH1	6.50	123.55	120.30
2	H	238	ARG	NE-CZ-NH1	6.27	123.43	120.30
2	H	215	SER	O-C-N	6.20	132.62	122.70
2	H	292	ARG	NE-CZ-NH2	-6.16	117.22	120.30
2	H	298	GLU	CA-CB-CG	-6.16	99.85	113.40
1	L	70	GLN	CA-CB-CG	6.06	126.72	113.40
1	L	103	LYS	CB-CA-C	-5.93	98.54	110.40
1	L	7	SER	N-CA-CB	5.90	119.36	110.50
2	H	288	ASP	CB-CA-C	5.90	122.20	110.40
1	L	39	LYS	CA-CB-CG	-5.88	100.45	113.40
1	L	63	SER	N-CA-CB	5.87	119.31	110.50
2	H	314	VAL	O-C-N	5.85	132.06	122.70
1	L	17	GLU	CA-CB-CG	5.78	126.11	113.40
2	H	201	GLN	CA-C-N	-5.77	104.50	117.20
2	H	259	TYR	CB-CG-CD2	5.76	124.46	121.00
2	H	202	VAL	CB-CA-C	5.75	122.32	111.40
2	H	258	ASP	CB-CA-C	5.73	121.85	110.40
2	H	282	MET	CA-CB-CG	5.61	122.84	113.30
2	H	294	TYR	CA-CB-CG	5.60	124.05	113.40
1	L	77	SER	CA-C-O	5.57	131.79	120.10
1	L	45	GLN	CG-CD-NE2	5.52	129.96	116.70
2	H	202	VAL	N-CA-CB	-5.51	99.38	111.50
2	H	232	TYR	CB-CG-CD1	5.45	124.27	121.00
1	L	70	GLN	N-CA-CB	-5.44	100.81	110.60
2	H	285	LEU	O-C-N	5.41	131.35	122.70
2	H	311	THR	CA-CB-OG1	-5.38	97.71	109.00
1	L	97	THR	CA-CB-CG2	5.33	119.86	112.40
2	H	238	ARG	CD-NE-CZ	5.32	131.05	123.60
1	L	67	SER	N-CA-CB	5.26	118.39	110.50
2	H	308	GLN	CG-CD-OE1	5.26	132.11	121.60
2	H	225	SER	CB-CA-C	-5.23	100.16	110.10
2	H	201	GLN	CB-CA-C	-5.18	100.03	110.40
1	L	79	GLN	CB-CA-C	5.14	120.69	110.40
2	H	223	THR	O-C-N	5.12	130.90	122.70
2	H	201	GLN	CG-CD-NE2	-5.12	104.42	116.70
1	L	4	LEU	O-C-N	5.09	130.85	122.70

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	L	802	0	768	10	0
2	H	892	0	856	21	0
3	H	59	0	0	4	0
3	L	73	0	0	1	0
All	All	1826	0	1624	30	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 9.

All (30) 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:L:49:TYR:OH	3:L:581:HOH:O	1.99	0.80
2:H:203:GLN:HG2	2:H:225:SER:HB2	1.64	0.79
1:L:1:ASP:CB	3:H:600:HOH:O	2.38	0.71
1:L:103:LYS:NZ	1:L:103:LYS:HB2	2.12	0.63
1:L:103:LYS:HG2	1:L:105:GLU:HG3	1.86	0.58
2:H:267:LEU:HD23	2:H:282:MET:HG2	1.86	0.57
2:H:211:LEU:CD1	2:H:313:THR:HB	2.36	0.56
2:H:264:LYS:HE2	3:H:526:HOH:O	2.07	0.54
2:H:218:LEU:HD12	2:H:282:MET:HB2	1.90	0.54
2:H:211:LEU:HD12	2:H:313:THR:HB	1.91	0.53
1:L:83:PHE:CE2	1:L:106:ILE:HD12	2.44	0.52
2:H:214:PRO:O	2:H:215:SER:HB2	2.10	0.51
2:H:272:ASP:CG	2:H:275:LYS:HG3	2.31	0.51
2:H:298:GLU:HG3	2:H:303:LEU:HD23	1.94	0.50
1:L:12:SER:HA	1:L:105:GLU:O	2.13	0.48
2:H:308:GLN:NE2	3:H:471:HOH:O	2.47	0.47
1:L:95:PRO:HG2	2:H:247:TRP:CE2	2.50	0.46
2:H:275:LYS:O	2:H:276:SER:HB2	2.16	0.45
2:H:235:ASN:ND2	2:H:298:GLU:HB2	2.32	0.44
2:H:301:TYR:O	2:H:302:ARG:HB3	2.18	0.44
2:H:240:PRO:HA	2:H:241:PRO:HD3	1.90	0.44
2:H:259:TYR:CE1	2:H:269:ILE:HD12	2.53	0.44
1:L:10:SER:HB3	1:L:103:LYS:HB3	2.01	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:229:LEU:HB2	3:H:477:HOH:O	2.19	0.43
1:L:30:HIS:O	1:L:31:ASN:HB2	2.19	0.42
2:H:266:ARG:HG2	2:H:283:ASN:O	2.19	0.42
2:H:202:VAL:HG13	2:H:227:PHE:CE1	2.55	0.42
1:L:22:THR:HG23	1:L:70:GLN:HE22	1.84	0.41
2:H:254:ASP:CG	2:H:256:ASN:HD22	2.24	0.41
2:H:201:GLN:HG2	2:H:201:GLN:O	2.19	0.41

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	L	104/106 (98%)	101 (97%)	2 (2%)	1 (1%)	17	10
2	H	114/116 (98%)	109 (96%)	4 (4%)	1 (1%)	19	12
All	All	218/222 (98%)	210 (96%)	6 (3%)	2 (1%)	19	12

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	L	77	SER
2	H	264	LYS

### 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	L	87/90 (97%)	78 (90%)	9 (10%)	8	4
2	H	96/100 (96%)	87 (91%)	9 (9%)	9	5
All	All	183/190 (96%)	165 (90%)	18 (10%)	9	5

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	L	45	GLN
1	L	70	GLN
1	L	72	SER
1	L	74	LYS
1	L	77	SER
1	L	81	ASP
1	L	103	LYS
1	L	104	LEU
1	L	107	LYS
2	H	218	LEU
2	H	221	THR
2	H	252	TRP
2	H	261	SER
2	H	265	SER
2	H	275	LYS
2	H	276	SER
2	H	287	THR
2	H	299	ARG

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

Mol	Chain	Res	Type
1	L	45	GLN
1	L	70	GLN
1	L	89	GLN
2	H	216	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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 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](#)

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	L	106/106 (100%)	-0.36	2 (1%) 66 65	14, 24, 37, 44	7 (6%)
2	H	116/116 (100%)	-0.45	0 100 100	15, 26, 42, 48	3 (2%)
All	All	222/222 (100%)	-0.41	2 (0%) 84 83	14, 24, 38, 48	10 (4%)

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	L	78	LEU	3.1
1	L	1	ASP	2.3

### 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](#)

There are no ligands in this entry.

### 6.5 Other polymers [i](#)

There are no such residues in this entry.