



Full wwPDB EM Validation Report ⓘ

Jul 16, 2025 – 11:59 AM JST

PDB ID : 8WXE / pdb_00008wxe
EMDB ID : EMD-37904
Title : Vgamma5Vdelta1 EH TCR-CD3 complex
Authors : Xin, W.; Huang, B.; Chi, X.; Xu, M.; Zhang, Y.; Li, X.; Su, Q.; Zhou, Q.
Deposited on : 2023-10-28
Resolution : 4.00 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp>

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:

EMDB validation analysis : **FAILED**
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0rc1
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

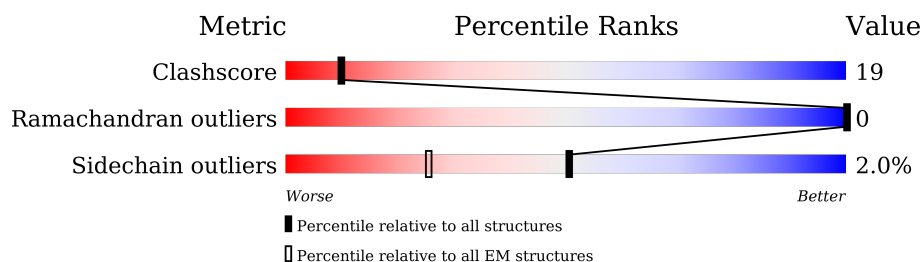
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 4.00 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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	a	195	7% 6% . 86%
1	b	195	11% . 86%
2	d	171	40% 21% . 39%
3	e	207	34% 17% 49%
3	f	207	38% 14% 49%
4	g	182	37% 19% . 43%
5	m	307	7% . 89%
6	n	331	8% . 89%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 4388 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 T-cell surface glycoprotein CD3 zeta chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	a	28	Total	C	N	O	S	0	0
			226	157	33	35	1		
1	b	28	Total	C	N	O	S	0	0
			226	157	33	35	1		

There are 62 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
a	165	ALA	-	expression tag	UNP P20963
a	166	ALA	-	expression tag	UNP P20963
a	167	ALA	-	expression tag	UNP P20963
a	168	TRP	-	expression tag	UNP P20963
a	169	SER	-	expression tag	UNP P20963
a	170	HIS	-	expression tag	UNP P20963
a	171	PRO	-	expression tag	UNP P20963
a	172	GLN	-	expression tag	UNP P20963
a	173	PHE	-	expression tag	UNP P20963
a	174	GLU	-	expression tag	UNP P20963
a	175	LYS	-	expression tag	UNP P20963
a	176	GLY	-	expression tag	UNP P20963
a	177	GLY	-	expression tag	UNP P20963
a	178	GLY	-	expression tag	UNP P20963
a	179	SER	-	expression tag	UNP P20963
a	180	GLY	-	expression tag	UNP P20963
a	181	GLY	-	expression tag	UNP P20963
a	182	GLY	-	expression tag	UNP P20963
a	183	SER	-	expression tag	UNP P20963
a	184	GLY	-	expression tag	UNP P20963
a	185	GLY	-	expression tag	UNP P20963
a	186	SER	-	expression tag	UNP P20963
a	187	ALA	-	expression tag	UNP P20963
a	188	TRP	-	expression tag	UNP P20963
a	189	SER	-	expression tag	UNP P20963
a	190	HIS	-	expression tag	UNP P20963

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Chain	Residue	Modelled	Actual	Comment	Reference
a	191	PRO	-	expression tag	UNP P20963
a	192	GLN	-	expression tag	UNP P20963
a	193	PHE	-	expression tag	UNP P20963
a	194	GLU	-	expression tag	UNP P20963
a	195	LYS	-	expression tag	UNP P20963
b	165	ALA	-	expression tag	UNP P20963
b	166	ALA	-	expression tag	UNP P20963
b	167	ALA	-	expression tag	UNP P20963
b	168	TRP	-	expression tag	UNP P20963
b	169	SER	-	expression tag	UNP P20963
b	170	HIS	-	expression tag	UNP P20963
b	171	PRO	-	expression tag	UNP P20963
b	172	GLN	-	expression tag	UNP P20963
b	173	PHE	-	expression tag	UNP P20963
b	174	GLU	-	expression tag	UNP P20963
b	175	LYS	-	expression tag	UNP P20963
b	176	GLY	-	expression tag	UNP P20963
b	177	GLY	-	expression tag	UNP P20963
b	178	GLY	-	expression tag	UNP P20963
b	179	SER	-	expression tag	UNP P20963
b	180	GLY	-	expression tag	UNP P20963
b	181	GLY	-	expression tag	UNP P20963
b	182	GLY	-	expression tag	UNP P20963
b	183	SER	-	expression tag	UNP P20963
b	184	GLY	-	expression tag	UNP P20963
b	185	GLY	-	expression tag	UNP P20963
b	186	SER	-	expression tag	UNP P20963
b	187	ALA	-	expression tag	UNP P20963
b	188	TRP	-	expression tag	UNP P20963
b	189	SER	-	expression tag	UNP P20963
b	190	HIS	-	expression tag	UNP P20963
b	191	PRO	-	expression tag	UNP P20963
b	192	GLN	-	expression tag	UNP P20963
b	193	PHE	-	expression tag	UNP P20963
b	194	GLU	-	expression tag	UNP P20963
b	195	LYS	-	expression tag	UNP P20963

- Molecule 2 is a protein called T-cell surface glycoprotein CD3 delta chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	d	105	Total	C	N	O	S	0	0
			817	521	135	155	6		

- Molecule 3 is a protein called T-cell surface glycoprotein CD3 epsilon chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	e	106	Total	C	N	O	S	0	0
			853	550	133	162	8		
3	f	106	Total	C	N	O	S	0	0
			847	540	135	164	8		

- Molecule 4 is a protein called T-cell surface glycoprotein CD3 gamma chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	g	104	Total	C	N	O	S	0	0
			821	530	135	149	7		

- Molecule 5 is a protein called Signal peptide,flag tag,T cell receptor delta variable 1,T cell receptor delta constant.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	m	34	Total	C	N	O	S	0	0
			268	180	42	43	3		

There are 23 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
m	115	ASP	-	linker	UNP A0A1B0GX56
m	116	PRO	-	linker	UNP A0A1B0GX56
m	117	GLY	-	linker	UNP A0A1B0GX56
m	118	GLY	-	linker	UNP A0A1B0GX56
m	119	LEU	-	linker	UNP A0A1B0GX56
m	120	ASN	-	linker	UNP A0A1B0GX56
m	121	THR	-	linker	UNP A0A1B0GX56
m	122	ASP	-	linker	UNP A0A1B0GX56
m	123	LYS	-	linker	UNP A0A1B0GX56
m	124	LEU	-	linker	UNP A0A1B0GX56
m	125	ILE	-	linker	UNP A0A1B0GX56
m	126	PHE	-	linker	UNP A0A1B0GX56
m	127	GLY	-	linker	UNP A0A1B0GX56
m	128	LYS	-	linker	UNP A0A1B0GX56
m	129	GLY	-	linker	UNP A0A1B0GX56
m	130	THR	-	linker	UNP A0A1B0GX56
m	131	ARG	-	linker	UNP A0A1B0GX56
m	132	VAL	-	linker	UNP A0A1B0GX56
m	133	THR	-	linker	UNP A0A1B0GX56
m	134	VAL	-	linker	UNP A0A1B0GX56

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Chain	Residue	Modelled	Actual	Comment	Reference
m	135	GLU	-	linker	UNP A0A1B0GX56
m	136	PRO	-	linker	UNP A0A1B0GX56
m	137	ARG	-	linker	UNP A0A1B0GX56

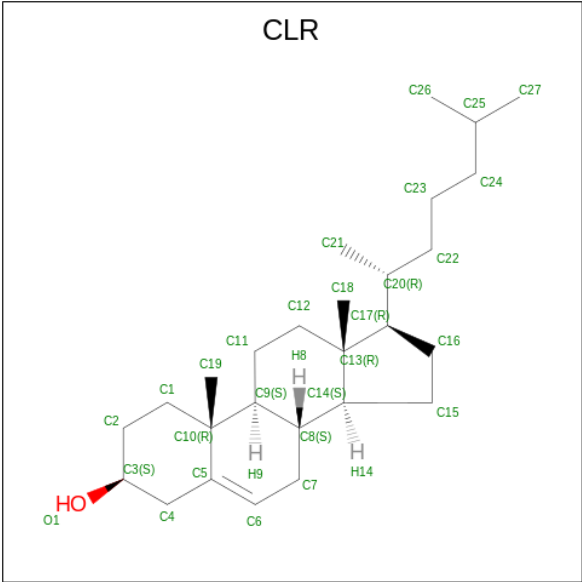
- Molecule 6 is a protein called Signal peptide,flag tag,T cell receptor gamma variable 5,T cell receptor gamma constant 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	n	37	Total	C	N	O	S	0	0
			302	203	46	50	3		

There are 23 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
n	72	GLU	TYR	engineered mutation	UNP A0A0B4J1U4
n	86	HIS	ARG	engineered mutation	UNP A0A0B4J1U4
n	104	GLY	-	linker	UNP A0A0B4J1U4
n	105	ASN	-	linker	UNP A0A0B4J1U4
n	106	PRO	-	linker	UNP A0A0B4J1U4
n	107	LYS	-	linker	UNP A0A0B4J1U4
n	108	THR	-	linker	UNP A0A0B4J1U4
n	109	HIS	-	linker	UNP A0A0B4J1U4
n	110	TYR	-	linker	UNP A0A0B4J1U4
n	111	TYR	-	linker	UNP A0A0B4J1U4
n	112	LYS	-	linker	UNP A0A0B4J1U4
n	113	LYS	-	linker	UNP A0A0B4J1U4
n	114	LEU	-	linker	UNP A0A0B4J1U4
n	115	PHE	-	linker	UNP A0A0B4J1U4
n	116	GLY	-	linker	UNP A0A0B4J1U4
n	117	SER	-	linker	UNP A0A0B4J1U4
n	118	GLY	-	linker	UNP A0A0B4J1U4
n	119	THR	-	linker	UNP A0A0B4J1U4
n	120	THR	-	linker	UNP A0A0B4J1U4
n	121	LEU	-	linker	UNP A0A0B4J1U4
n	122	VAL	-	linker	UNP A0A0B4J1U4
n	123	VAL	-	linker	UNP A0A0B4J1U4
n	124	THR	-	linker	UNP A0A0B4J1U4

- Molecule 7 is CHOLESTEROL (CCD ID: CLR) (formula: C₂₇H₄₆O) (labeled as "Ligand of Interest" by depositor).



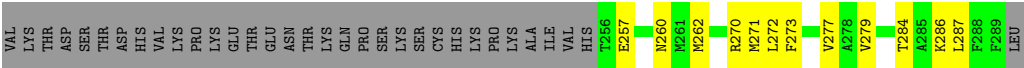
Mol	Chain	Residues	Atoms			AltConf
7	g	1	Total	C	O	0
			28	27	1	

ALA	GLY	GLN	ARG	GLY	GLN	ASN	LYS	GLU	ARG	GLY	VAL	PRO	PRO	GLU	GLU	THR	ASP	ASP	PRO	PRO	GLY	GLN	ASN	GLN	GLY	LYS	ARG	ASP	THR	THR	ILE															
L82	S83	F87	S88	E89	Q92	S93	Y96	Y97	C98	P100	R101	GLY	SER	LYS	PRO	GLU	ASP	ASP	ASP	GLY	F109	F110	Y111	R117	E120	M123	E124	V127	M128	T132	I133	V134	D137	T141	L145	K153	ASN	ARG	LYS	ALA	LYS	ALA	LYS	PRO	THR	ARG
GLN	GLY	THR	HIS	TRP	ARG	VAL	GLY	LEU	CYS	LEU	SER	VAL	GLY	VAL	THR	GLY	GLN	ASP	GLY	ASN	GLY	F110	Y111	R117	E120	M123	E124	V127	M128	T132	I133	V134	D137	T141	L145	K153	ASN	ARG	LYS	ALA	LYS	ALA	LYS	PRO	THR	ARG
MET	GLN	GLY	THR	HIS	TRP	ARG	VAL	LEU	CYS	LEU	SER	VAL	GLY	VAL	THR	GLY	GLN	ASP	GLY	ASN	GLY	F110	Y111	R117	E120	M123	E124	V127	M128	T132	I133	V134	D137	T141	L145	K153	ASN	ARG	LYS	ALA	LYS	ALA	LYS	PRO	THR	ARG
Q33	V38	I46	L47	E56	I57	L58	W59	Q60	K64	N65	I66	GLY	ASP	GLU	ASP	ASP	LYS	ASN	I75	D78																										

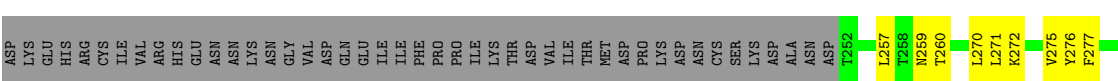
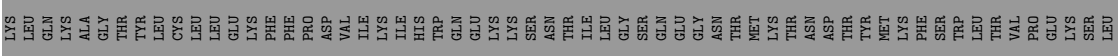
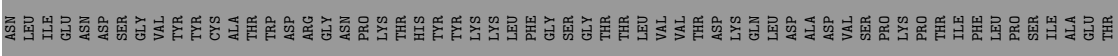
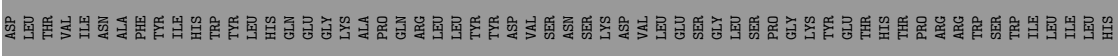
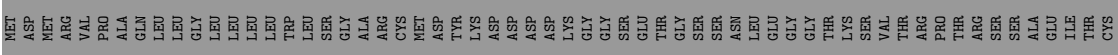
[illegible]

ASP	ASP	ASP	ASP	GLN	TYR	SER	HIS	LEU	GLN	GLY	ASN	GLN	LEU	ARG	ARG	ASN	Q91	N92	K93	S94	K95	P96	L97	Q99	Y101	R102	M103	C104	Q105	Y108	E109	L110	N111	A112	I115	L119	S125	L129	G132	V133	Y134	F135	I136	D140	GLY	VAL	ARG	GLN	SER	ARG	ALA	SER	ASP	LYS	GLN	THR	LEU	LEU	PRO	ASN	ASP	GLN	LEU	TYR	GLN	PRO	LYS	MET	GLU	GLN	GLY	LYS	GLY	LEU	ALA	VAL	LEU	ILE	LEU	ALA	ILE	ILE	LEU	GLN	THR	ALA	SER	ILE	K26	H29	L30	D35	D47	ALA	GLU	ALA	LYS	ASN	ILE	T54	W55	D58	M61	I62	L65	THR	GLU	ASP	LYS	LYS	K71	M84	Y85	Q86	C87
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PRO	LYS	ASP	GLU	LEU	MET
LYS	ASP	SER	GLU	TYR	ASP
ILE	ALA	THR	THR	THR	MET
ILE	LYS	SER	SER	TRP	ARG
ASN	PHE	TRP	TRP	ALA	PRO
LEU	CYS	SER	SER	GLN	ALA
VAL	ALA	TYR	TYR	LEU	GLN
SER	LEU	LEU	TYR	LEU	LEU
SER	GLY	ILE	ILE	GLY	GLY
LYS	ASP	PHE	PHE	LEU	LEU
LYS	PRO	TRP	TRP	LEU	LEU
ILE	GLY	TYR	TYR	LEU	LEU
THR	GLY	LYS	LYS	TRP	LEU
GLU	LEU	GLN	GLN	TRP	TRP
PHE	LEU	ASN	LEU	SER	LEU
ASP	THR	THR	PRO	SER	SER
PRO	ASP	ASP	SER	GLY	GLY
ALA	ALA	LYS	SER	ALA	ALA
ILE	LEU	GLU	MET	ARG	ARG
VAL	VAL	ILE	GLY	CYS	MET
ILE	PHE	ILE	ILE	MET	ILE
SER	GLY	PHE	PHE	ASP	ASP
PRO	LYS	LEU	LEU	TYR	TYR
GLY	GLY	ILE	ILE	LYS	LYS
SER	THR	ARG	GLN	ASP	ASP
TYR	VAL	VAL	GLY	ASP	ASP
ASN	THR	THR	SER	ASP	ASP
ALA	VAL	VAL	ASP	LYS	LYS
VAL	GLU	GLU	GLU	GLY	GLY
LYS	PRO	THR	ASN	GLY	GLY
LEU	ARG	ARG	GLN	SER	SER
GLY	SER	SER	ALA	GLU	GLU
LYS	GLN	LYS	LYS	THR	THR
TYR	PRO	PRO	LYS	SER	GLY
GLU	HIS	GLY	ARG	ALA	ALA
ASP	THR	THR	THR	GLN	GLN
SER	LYS	LYS	TYR	LYS	LYS
ASN	PRO	SER	SER	VAL	VAL
SER	SER	SER	VAL	THR	THR
VAL	VAL	VAL	PHE	ASN	ASN
CYS	VAL	VAL	VAL	GLN	GLN
SER	SER	MET	LYS	SER	SER
VAL	VAL	LYS	ALA	SER	SER
GLN	ASN	ASN	ALA	VAL	VAL
HIS	GLY	GLY	LYS	SER	SER
ASP	THR	THR	SER	MET	MET
ASN	ASN	ASN	VAL	PRO	PRO
LYS	VAL	VAL	ALA	VAL	VAL
THR	ALA	LEU	THR	ARG	ARG
VAL	CYS	THR	THR	LYS	LYS
HIS	LEU	ILE	THR	THR	THR
SER	VAL	SER	ILE	ALA	ALA
THR	LYS	GLY	LEU	THR	THR
ASP	GLU	LEU	LEU	LEU	LEU
PHE	PHE	THR	GLN	ASN	ASN
THR	THR	LEU	THR	THR	THR



● Molecule 6: Signal peptide,flag tag,T cell receptor gamma variable 5,T cell receptor gamma constant 1



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	342095	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor

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: CLR

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	0.25	0/230	0.53	0/311
1	b	0.18	0/230	0.38	0/311
2	d	0.14	0/829	0.39	0/1127
3	e	0.17	0/871	0.45	0/1182
3	f	0.16	0/863	0.48	0/1169
4	g	0.18	0/837	0.58	1/1124 (0.1%)
5	m	0.16	0/271	0.43	0/363
6	n	0.15	0/306	0.36	0/416
All	All	0.17	0/4437	0.47	1/6003 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	g	96	PRO	CA-N-CD	-9.79	98.30	112.00

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	226	0	250	31	0
1	b	226	0	250	10	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	d	817	0	828	50	0
3	e	853	0	831	28	0
3	f	847	0	819	21	0
4	g	821	0	806	38	0
5	m	268	0	296	37	0
6	n	302	0	332	12	0
7	g	28	0	46	5	0
All	All	4388	0	4458	169	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 19.

All (169) 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)
4:g:136:ILE:HD11	5:m:284:THR:HG23	1.20	1.15
2:d:125:PHE:CD1	5:m:286:LYS:HG3	1.87	1.09
2:d:118:LEU:HD13	5:m:279:VAL:HG23	1.36	1.06
2:d:125:PHE:HE1	5:m:286:LYS:CB	1.75	0.98
2:d:118:LEU:HD13	5:m:279:VAL:CG2	1.92	0.96
2:d:125:PHE:CE1	5:m:286:LYS:HB2	2.01	0.95
4:g:136:ILE:HD11	5:m:284:THR:CG2	1.98	0.94
1:a:37:GLY:O	1:a:41:ILE:HG23	1.65	0.94
2:d:125:PHE:CE1	5:m:286:LYS:CB	2.51	0.94
2:d:125:PHE:HE1	5:m:286:LYS:CA	1.86	0.88
2:d:120:LEU:HD23	2:d:121:GLY:N	1.87	0.87
1:a:38:ILE:O	1:a:41:ILE:HG13	1.76	0.86
2:d:118:LEU:CD1	5:m:279:VAL:CG2	2.57	0.82
1:a:41:ILE:O	1:a:44:VAL:HG12	1.80	0.80
2:d:125:PHE:CD1	5:m:286:LYS:CG	2.65	0.80
2:d:119:ALA:O	2:d:122:VAL:HG12	1.81	0.79
1:a:46:LEU:CD2	1:b:46:LEU:HD23	2.13	0.79
1:a:44:VAL:O	1:a:47:THR:HG22	1.84	0.78
2:d:118:LEU:CD1	5:m:279:VAL:HG22	2.13	0.78
2:d:125:PHE:CE1	5:m:286:LYS:HG3	2.21	0.76
4:g:109:GLU:HB2	6:n:257:LEU:HD11	1.67	0.74
4:g:129:LEU:HD22	6:n:272:LYS:HE2	1.69	0.74
2:d:125:PHE:HE1	5:m:286:LYS:HB2	1.43	0.73
4:g:136:ILE:CD1	5:m:284:THR:HG23	2.12	0.73
2:d:118:LEU:HD12	5:m:279:VAL:HG22	1.70	0.73
1:a:46:LEU:HD22	1:b:46:LEU:HD23	1.72	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:a:41:ILE:HD12	1:a:42:TYR:N	2.05	0.71
3:f:117:ARG:HE	4:g:103:MET:HE1	1.53	0.71
1:a:41:ILE:HD12	1:a:41:ILE:C	2.16	0.71
2:d:125:PHE:HD1	5:m:286:LYS:HG3	1.54	0.71
4:g:86:GLN:HE22	4:g:94:SER:HB3	1.54	0.70
4:g:132:GLY:O	4:g:136:ILE:HG12	1.93	0.69
1:a:35:LEU:O	1:a:38:ILE:HG22	1.93	0.68
2:d:117:LEU:HD11	6:n:277:PHE:CZ	2.28	0.68
2:d:120:LEU:HD23	2:d:120:LEU:C	2.18	0.68
2:d:125:PHE:CE1	5:m:286:LYS:CG	2.77	0.68
2:d:125:PHE:HE1	5:m:286:LYS:HA	1.59	0.66
3:f:104:LYS:NZ	3:f:106:GLU:OE1	2.20	0.65
3:e:124:GLU:OE2	3:e:124:GLU:N	2.27	0.65
2:d:125:PHE:CE1	5:m:286:LYS:HA	2.33	0.64
3:f:136:VAL:O	3:f:140:ILE:HG12	1.97	0.64
2:d:125:PHE:CD1	5:m:286:LYS:HB2	2.33	0.63
1:a:41:ILE:O	1:a:45:ILE:HG22	2.00	0.62
1:a:47:THR:HG23	1:a:48:ALA:N	2.15	0.61
3:f:41:SER:O	3:f:44:THR:OG1	2.18	0.61
2:d:125:PHE:CE1	5:m:286:LYS:CA	2.76	0.61
4:g:125:SER:OG	6:n:272:LYS:NZ	2.32	0.61
1:a:46:LEU:HD23	1:b:46:LEU:HD23	1.80	0.60
2:d:117:LEU:HD11	6:n:277:PHE:HZ	1.66	0.60
3:e:128:MET:O	3:e:132:THR:HG23	2.03	0.59
2:d:52:LEU:HD21	2:d:54:ASP:HB3	1.85	0.59
3:e:92:GLN:O	3:e:96:TYR:OH	2.22	0.58
3:e:56:GLU:HG2	3:e:101:ARG:HH22	1.68	0.58
4:g:30:LEU:H	4:g:30:LEU:HD12	1.68	0.58
1:a:39:LEU:HD21	1:b:39:LEU:HB3	1.86	0.57
3:f:59:TRP:O	3:f:60:GLN:NE2	2.38	0.57
2:d:22:PHE:HB3	2:d:84:SER:HB2	1.88	0.56
4:g:91:GLN:NE2	4:g:92:ASN:OD1	2.35	0.56
4:g:61:MET:HE2	4:g:61:MET:HA	1.87	0.56
1:a:42:TYR:CD2	1:a:43:GLY:N	2.74	0.56
3:e:137:ASP:OD2	5:m:271:MET:HE2	2.06	0.56
2:d:24:ILE:HD11	2:d:84:SER:HB3	1.88	0.55
2:d:38:ASN:HB2	2:d:76:THR:HG22	1.88	0.55
4:g:86:GLN:NE2	4:g:87:CYS:O	2.39	0.55
3:e:60:GLN:HG3	3:e:99:TYR:CE1	2.41	0.55
2:d:29:LEU:HD12	2:d:32:ARG:HB2	1.88	0.55
1:a:42:TYR:CD2	1:a:42:TYR:C	2.86	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:f:58:LEU:HD21	3:f:101:ARG:HE	1.72	0.54
5:m:273:PHE:HA	6:n:270:LEU:HD21	1.89	0.54
3:f:127:VAL:HG23	3:f:127:VAL:O	2.09	0.54
3:f:125:MET:HE1	4:g:108:ILE:HD11	1.89	0.53
2:d:125:PHE:HD1	5:m:286:LYS:CG	2.16	0.53
3:f:107:ASP:OD1	3:f:107:ASP:N	2.40	0.53
1:a:38:ILE:HG23	1:a:39:LEU:N	2.23	0.53
1:a:35:LEU:HD22	5:m:270:ARG:HG2	1.90	0.52
7:g:201:CLR:H212	5:m:284:THR:HG21	1.90	0.52
4:g:129:LEU:HG	6:n:276:TYR:CD2	2.45	0.52
1:a:47:THR:CG2	1:a:48:ALA:N	2.72	0.52
2:d:125:PHE:CD1	5:m:286:LYS:CB	2.88	0.52
1:a:42:TYR:HD2	1:a:43:GLY:N	2.06	0.51
4:g:84:MET:HE2	4:g:96:PRO:HB3	1.93	0.51
3:e:89:GLU:N	3:e:89:GLU:OE1	2.42	0.51
3:f:40:ILE:HD13	4:g:102:ARG:NH1	2.25	0.51
3:e:59:TRP:CH2	3:e:98:CYS:HB3	2.45	0.51
5:m:262:MET:HE2	5:m:262:MET:HA	1.93	0.51
4:g:134:TYR:C	4:g:134:TYR:CD1	2.86	0.51
3:f:91:GLU:HG3	3:f:92:GLN:HG3	1.92	0.51
4:g:84:MET:HE3	4:g:85:TYR:H	1.76	0.51
3:e:120:GLU:OE1	3:e:120:GLU:N	2.43	0.50
1:a:39:LEU:CD2	1:b:39:LEU:HB3	2.41	0.50
3:e:117:ARG:NH1	5:m:257:GLU:OE1	2.44	0.50
4:g:55:TRP:HE1	4:g:65:LEU:HB2	1.76	0.50
4:g:86:GLN:OE1	4:g:96:PRO:HD3	2.11	0.50
1:a:44:VAL:HG13	1:a:45:ILE:N	2.26	0.49
4:g:103:MET:HA	4:g:103:MET:HE2	1.94	0.49
3:f:59:TRP:CG	3:f:82:LEU:HD22	2.48	0.49
4:g:108:ILE:HG22	6:n:260:THR:HG23	1.95	0.49
2:d:120:LEU:HD23	2:d:121:GLY:CA	2.42	0.48
2:d:96:CYS:HA	3:e:124:GLU:HA	1.95	0.48
3:f:61:HIS:ND1	3:f:95:TYR:O	2.45	0.48
2:d:37:CYS:HB2	2:d:41:ILE:HD11	1.95	0.48
2:d:46:GLY:HA3	2:d:69:GLY:HA2	1.94	0.48
3:e:59:TRP:HB3	3:e:66:ILE:HD11	1.93	0.48
2:d:72:ARG:HG2	2:d:83:GLU:OE2	2.13	0.48
4:g:35:ASP:OD1	4:g:35:ASP:N	2.42	0.48
4:g:94:SER:OG	4:g:95:LYS:N	2.46	0.48
3:e:47:LEU:HD12	3:e:82:LEU:HD13	1.96	0.48
2:d:97:VAL:HG22	5:m:260:ASN:HB3	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:f:111:TYR:HB2	4:g:97:LEU:HB2	1.96	0.47
4:g:104:CYS:SG	4:g:105:GLN:N	2.88	0.47
1:a:30:LYS:C	1:a:30:LYS:HD2	2.40	0.47
2:d:41:ILE:HB	2:d:58:LEU:HD11	1.96	0.47
3:e:123:MET:SD	3:e:123:MET:N	2.87	0.47
6:n:272:LYS:O	6:n:275:VAL:HG12	2.14	0.47
4:g:112:ALA:HA	4:g:115:ILE:HG22	1.95	0.47
1:b:40:PHE:CE2	5:m:277:VAL:HG11	2.48	0.47
1:a:41:ILE:CD1	1:a:42:TYR:N	2.76	0.47
2:d:110:THR:HA	2:d:113:ILE:HG22	1.97	0.47
3:e:46:ILE:HD12	3:e:82:LEU:O	2.15	0.46
4:g:61:MET:C	4:g:62:ILE:HD12	2.40	0.46
4:g:58:ASP:HA	4:g:84:MET:HB2	1.97	0.46
2:d:117:LEU:CD2	5:m:279:VAL:HG11	2.46	0.46
2:d:39:THR:OG1	2:d:40:SER:N	2.48	0.46
3:e:57:ILE:HG21	3:e:98:CYS:HB2	1.97	0.46
1:a:44:VAL:CG1	1:a:45:ILE:N	2.79	0.45
3:e:78:ASP:OD1	3:e:83:SER:N	2.49	0.45
3:f:115:ARG:HD2	4:g:101:TYR:HE1	1.82	0.45
5:m:287:LEU:HD23	6:n:284:LEU:HG	1.97	0.45
1:a:38:ILE:CG2	1:a:39:LEU:N	2.79	0.44
3:e:46:ILE:O	3:e:47:LEU:HD23	2.16	0.44
3:f:111:TYR:HE2	4:g:29:HIS:CG	2.35	0.44
2:d:62:LYS:HB3	2:d:65:LEU:HG	2.00	0.44
1:a:34:LEU:HD12	3:e:134:VAL:HG11	2.01	0.43
3:e:58:LEU:HB2	3:e:99:TYR:CZ	2.53	0.43
7:g:201:CLR:H272	7:g:201:CLR:H211	2.01	0.43
1:b:48:ALA:HB1	7:g:201:CLR:H72	2.01	0.43
4:g:109:GLU:CD	4:g:111:ASN:HD22	2.26	0.43
3:f:40:ILE:HD13	4:g:102:ARG:HH12	1.82	0.43
3:e:87:PHE:HD1	3:e:88:SER:H	1.67	0.43
1:a:46:LEU:HD23	1:b:46:LEU:CD2	2.45	0.43
3:e:59:TRP:CD1	3:e:82:LEU:HG	2.54	0.43
3:e:93:SER:O	3:e:93:SER:OG	2.37	0.43
2:d:110:THR:HG23	5:m:272:LEU:HD11	2.01	0.42
3:e:58:LEU:H	3:e:58:LEU:HD12	1.83	0.42
3:f:110:PHE:HE2	4:g:98:GLN:HB3	1.84	0.42
2:d:96:CYS:O	5:m:260:ASN:ND2	2.52	0.42
2:d:43:TRP:CD2	2:d:48:VAL:HB	2.54	0.42
2:d:122:VAL:HG13	2:d:123:PHE:N	2.34	0.42
3:e:64:LYS:HD3	3:e:64:LYS:C	2.45	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:g:201:CLR:H221	7:g:201:CLR:H162	1.53	0.42
1:a:51:LEU:HD12	1:a:51:LEU:HA	1.95	0.42
2:d:120:LEU:CD2	2:d:121:GLY:N	2.73	0.42
7:g:201:CLR:H263	5:m:277:VAL:HG13	2.00	0.42
1:a:41:ILE:C	1:a:41:ILE:CD1	2.86	0.41
1:b:41:ILE:O	1:b:45:ILE:HG22	2.19	0.41
3:e:110:PHE:C	3:e:111:TYR:HD1	2.28	0.41
4:g:119:LEU:HD12	4:g:119:LEU:HA	1.91	0.41
4:g:102:ARG:O	4:g:102:ARG:HG3	2.20	0.41
6:n:271:LEU:O	6:n:271:LEU:HD13	2.20	0.41
2:d:120:LEU:C	2:d:120:LEU:CD2	2.88	0.41
6:n:270:LEU:HD23	6:n:270:LEU:HA	1.81	0.41
3:f:138:ILE:HD13	3:f:138:ILE:HA	1.83	0.41
2:d:123:PHE:CD2	2:d:123:PHE:C	2.99	0.40
1:a:30:LYS:HG3	3:e:127:VAL:HG13	2.03	0.40
3:e:141:THR:O	3:e:145:LEU:HD23	2.21	0.40
1:a:47:THR:HA	1:b:46:LEU:HD21	2.04	0.40
2:d:26:ILE:HD13	2:d:26:ILE:HA	1.82	0.40
3:f:35:PRO:HA	3:f:110:PHE:HZ	1.86	0.40
3:f:149:TYR:HD2	4:g:133:VAL:HG22	1.87	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 PDB entries followed by that with respect to all EM entries.

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	26/195 (13%)	26 (100%)	0	0	100	100
1	b	26/195 (13%)	26 (100%)	0	0	100	100
2	d	103/171 (60%)	97 (94%)	6 (6%)	0	100	100
3	e	100/207 (48%)	96 (96%)	4 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	f	100/207 (48%)	92 (92%)	8 (8%)	0	100	100
4	g	98/182 (54%)	86 (88%)	12 (12%)	0	100	100
5	m	32/307 (10%)	32 (100%)	0	0	100	100
6	n	35/331 (11%)	34 (97%)	1 (3%)	0	100	100
All	All	520/1795 (29%)	489 (94%)	31 (6%)	0	100	100

There are no Ramachandran outliers to report.

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 PDB entries followed by that with respect to all EM entries.

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	25/154 (16%)	22 (88%)	3 (12%)	4	19
1	b	25/154 (16%)	25 (100%)	0	100	100
2	d	93/147 (63%)	90 (97%)	3 (3%)	34	55
3	e	98/177 (55%)	97 (99%)	1 (1%)	73	81
3	f	97/177 (55%)	95 (98%)	2 (2%)	48	66
4	g	88/155 (57%)	88 (100%)	0	100	100
5	m	30/272 (11%)	30 (100%)	0	100	100
6	n	35/299 (12%)	34 (97%)	1 (3%)	37	58
All	All	491/1535 (32%)	481 (98%)	10 (2%)	50	68

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	a	38	ILE
1	a	41	ILE
1	a	42	TYR
2	d	116	LEU
2	d	120	LEU
2	d	124	CYS

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Mol	Chain	Res	Type
3	e	38	VAL
3	f	43	THR
3	f	119	CYS
6	n	259	ASN

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

Mol	Chain	Res	Type
3	f	33	GLN
3	f	60	GLN
4	g	73	ASN
4	g	86	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

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	$\# Z > 2$
7	CLR	g	201	-	31,31,31	0.28	0	48,48,48	0.48	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
7	CLR	g	201	-	-	7/10/68/68	0/4/4/4

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (7) torsion outliers are listed below:

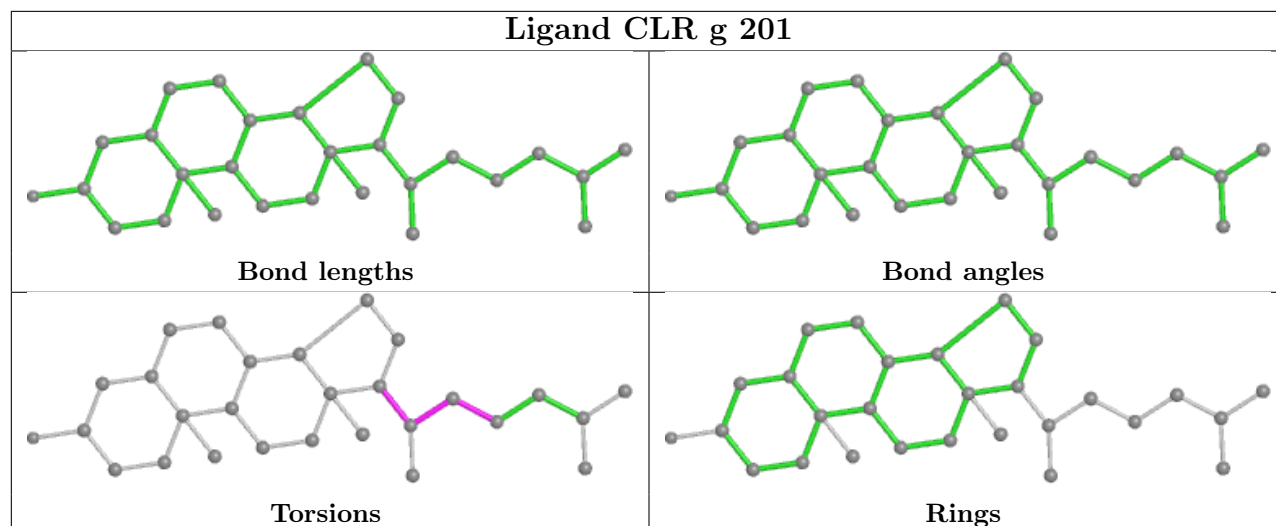
Mol	Chain	Res	Type	Atoms
7	g	201	CLR	C13-C17-C20-C21
7	g	201	CLR	C13-C17-C20-C22
7	g	201	CLR	C16-C17-C20-C22
7	g	201	CLR	C16-C17-C20-C21
7	g	201	CLR	C17-C20-C22-C23
7	g	201	CLR	C21-C20-C22-C23
7	g	201	CLR	C20-C22-C23-C24

There are no ring outliers.

1 monomer is involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	g	201	CLR	5	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.