



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 1, 2016 – 05:51 AM GMT

PDB ID : 2V12  
Title : CRYSTAL STRUCTURE OF RENIN WITH INHIBITOR 8  
Authors : Rahuel, J.; Rasetti, V.; Maibaum, J.; Rueger, H.; Goschke, R.; Cohen, N.C.;  
Stutz, S.; Cumin, F.; Fuhrer, W.; Wood, J.M.; Grutter, M.G.  
Deposited on : 2007-05-21  
Resolution : 3.20 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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/validation/2016/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  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

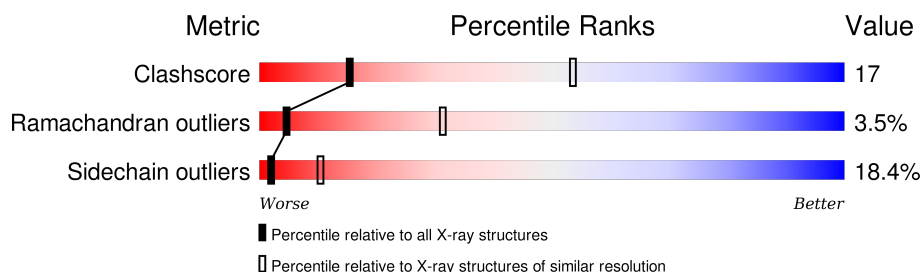
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.20 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	102246	1024 (3.22-3.18)
Ramachandran outliers	100387	1004 (3.22-3.18)
Sidechain outliers	100360	1003 (3.22-3.18)

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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	C	340	
1	O	340	

## 2 Entry composition [i](#)

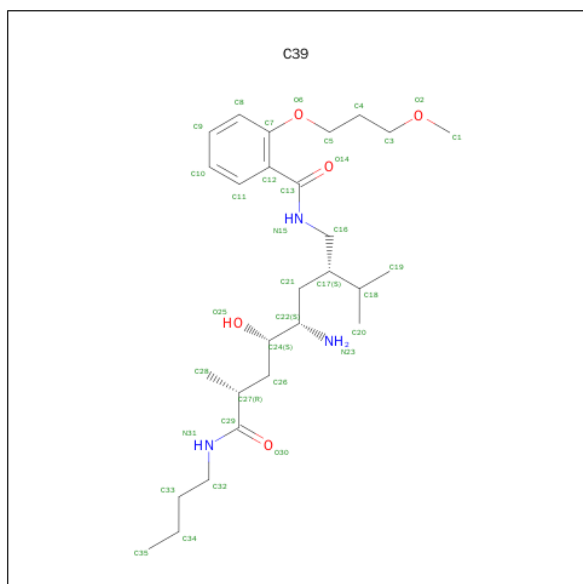
There are 2 unique types of molecules in this entry. The entry contains 5194 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 RENIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	C	334	Total	C	N	O	S	0	0	1
			2567	1639	416	498	14			
1	O	332	Total	C	N	O	S	0	0	1
			2557	1634	414	495	14			

- Molecule 2 is N-[(2S,4S,5S,7R)-4-AMINO-8-(BUTYLAMINO)-5-HYDROXY-7-METHY L-2-(1-METHYLETHYL)-8-OXOOCTYL]-2-(3-METHOXYPROPOXY)BENZAMIDE (three-letter code: C39) (formula: C<sub>27</sub>H<sub>47</sub>N<sub>3</sub>O<sub>5</sub>).





Note EDS was not executed.

- Chain C: 52% 33% 11%

Amino Acid	Count
L338	1
A339	1
R340	1
G262	1
P263	1
T264	1
L265	1
P266	1
D267	1
I268	1
H271	1
L272	1
G273	1
G274	1
K275	1
E276	1
Y277	1
T280	1
S281	1
A282	1
D283	1
Y284	1
Q287	1
E288	1
S289	1
S292	1
K293	1
K294	1
L295	1
C296	1
T297	1
L298	1
H301	1
A302	1
M303	1
P306	1
P307	1
P308	1
T309	1
W313	1
T318	1
R321	1
Y324	1
D328	1
R329	1
R330	1
R331	1
R332	1
I334	1
G335	1
P115	1
A116	1
L117	1
P118	1
L121	1
L122	1
E123	1
V128	1
G129	1
M130	1
G131	1
F132	1
I133	1
E134	1
Q135	1
A136	1
I137	1
G138	1
R139	1
V140	1
T141	1
P142	1
L143	1
F144	1
D145	1
N146	1
I147	1
I148	1
S149	1
Q150	1
G151	1
V152	1
L153	1
V157	1
F158	1
S159	1
F160	1
Y161	1
R164	1
S165	1
E167	1
ASN	1
SER	1
GLN	1
S171	1
L172	1
Q175	1
L176	1
V177	1
V256	1
C259	1
H184	1
N186	1
F187	1
L181	1
G90	1
S93	1
Q94	1
V99	1
I102	1
T103	1
M107	1
E110	1
V111	1
T112	1
V113	1
L114	1
L115	1
L116	1
L117	1
L118	1
L119	1
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L193	1
L194	1
L195	1
L196	1
L197	1
L198	1
L199	1
L200	1
L201	1
L202	1
L203	1
L204	1
L205	

- Chain O:  48% 35% 13%

Category	Category	Category	Category	Category	Category	Category	Category	Category	Category
W313	E240	A317	Y324	D328	R329	R330	R331	R332	R340
I239	E240	K241	L242	W243	L246	G247	R248	K249	K250
K251	L252	F253	D254	Y255	Y256	V257	K259	C259	W260
E261	G262	P263	T264	L265	L268	L272	G273	E276	Y277
A282	V285	T286	Q287	F288	S289	Y290	S291	S292	K293
K294	L298	H301	L305	P306	P307	P308	T309	G310	P311
P312	F160	R164	D165	S166	GLU	ASN	SER	GLN	S171
L172	L173	G174	Q175	I176	V177	S181	D182	P183	Q184
H185	Y186	L195	I196	K197	T198	G199	V200	W201	Q202
I203	K206	S209	S213	T214	T215	L216	C217	E218	D219
G220	C221	L222	A223	L224	G228	A229	S230	I231	G232
S233	S237	S238	L31	R82	Y83	T87	V88	S89	G90
F91	L92	S93	Q94	D95	I96	I97	T98	Q106	M107
F108	G109	E110	V111	T112	E113	M114	P115	A116	L117
P118	F119	M120	L121	V127	V128	G129	M130	G131	F132
L133	E134	Q135	A136	I137	G138	R139	M146	I147	I148
S149	K50	C51	S52	R53	Y55	T56	A57	C58	Y60
H61	K62	L63	F64	S70	S71	Y72	K73	H74	N75
G76	T77	E78	L79	T80					

## 4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section will therefore be incomplete.

Property	Value	Source
Space group	P 21 3	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	142.90 Å   142.90 Å   142.90 Å 90.00°   90.00°   90.00°	Depositor
Resolution (Å)	10.00 – 3.20	Depositor
% Data completeness (in resolution range)	92.0 (10.00-3.20)	Depositor
$R_{merge}$	0.13	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, $R_{free}$	0.236 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	5194	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	15.0	wwPDB-VP

## 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: C39

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	C	1.13	2/2626 (0.1%)	1.86	62/3560 (1.7%)
1	O	1.12	4/2616 (0.2%)	1.92	64/3547 (1.8%)
All	All	1.13	6/5242 (0.1%)	1.89	126/7107 (1.8%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	1
1	O	0	4
All	All	0	5

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	O	171	SER	CA-CB	6.08	1.62	1.52
1	C	244	GLU	CG-CD	5.39	1.60	1.51
1	O	8	SER	CA-CB	-5.25	1.45	1.52
1	C	78	GLU	CG-CD	5.17	1.59	1.51
1	O	78	GLU	CG-CD	5.16	1.59	1.51

The worst 5 of 126 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	O	53	ARG	NE-CZ-NH1	14.64	127.62	120.30
1	O	324	TYR	CB-CG-CD2	-12.55	113.47	121.00
1	C	139	ARG	NE-CZ-NH1	10.42	125.51	120.30
1	C	251	ARG	NE-CZ-NH1	9.46	125.03	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	139	ARG	NE-CZ-NH2	-9.28	115.66	120.30

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	307	PRO	Peptide
1	O	182	ASP	Peptide
1	O	277	TYR	Sidechain
1	O	306	PRO	Peptide
1	O	307	PRO	Peptide

## 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	C	2567	0	2498	88	0
1	O	2557	0	2490	90	0
2	C	35	0	47	6	0
2	O	35	0	47	5	0
All	All	5194	0	5082	178	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 17.

The worst 5 of 178 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:O:5:ASN:HA	1:O:154:LYS:HD3	1.28	1.07
1:O:148:ILE:HD11	1:O:156:ASP:HB3	1.56	0.87
1:C:293:LYS:HG3	1:C:294:LYS:HG2	1.58	0.85
1:O:285:VAL:HG22	1:O:298:LEU:HD22	1.64	0.79
1:C:260:ASN:OD1	1:C:292:SER:HA	1.87	0.74

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	C	330/340 (97%)	296 (90%)	23 (7%)	11 (3%)	5	32
1	O	328/340 (96%)	281 (86%)	35 (11%)	12 (4%)	4	29
All	All	658/680 (97%)	577 (88%)	58 (9%)	23 (4%)	4	31

5 of 23 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	166	SER
1	C	251	ARG
1	O	50	LYS
1	O	116	ALA
1	C	140	VAL

### 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	C	283/290 (98%)	228 (81%)	55 (19%)	2	9
1	O	282/290 (97%)	233 (83%)	49 (17%)	2	12
All	All	565/580 (97%)	461 (82%)	104 (18%)	2	10

5 of 104 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	307	PRO

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Mol	Chain	Res	Type
1	O	36	VAL
1	O	260	ASN
1	C	318	THR
1	C	333	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	332	ASN
1	O	31	GLN
1	O	194	ASN
1	C	301	HIS
1	O	175	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](#)

2 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
2	C39	C	350	-	35,35,35	1.33	2 (5%)	36,44,44	1.88	8 (22%)
2	C39	O	350	-	35,35,35	1.23	2 (5%)	36,44,44	2.07	8 (22%)

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	C39	C	350	-	-	0/40/40/40	0/1/1/1
2	C39	O	350	-	-	0/40/40/40	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	350	C39	C12-C13	-5.65	1.38	1.50
2	O	350	C39	C12-C13	-5.20	1.39	1.50
2	C	350	C39	C11-C12	-2.04	1.36	1.39
2	O	350	C39	O6-C7	2.15	1.41	1.37

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	350	C39	O6-C7-C8	-5.18	113.17	124.01
2	O	350	C39	O6-C7-C8	-4.52	114.55	124.01
2	O	350	C39	C7-C12-C13	-4.13	119.35	126.18
2	C	350	C39	C7-C12-C13	-3.79	119.92	126.18
2	O	350	C39	O25-C24-C22	-3.77	103.90	109.49

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	350	C39	6	0
2	O	350	C39	5	0

## 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

### 6.1 Protein, DNA and RNA chains

EDS was not executed - this section will therefore be empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section will therefore be empty.

### 6.3 Carbohydrates

EDS was not executed - this section will therefore be empty.

### 6.4 Ligands

EDS was not executed - this section will therefore be empty.

### 6.5 Other polymers

EDS was not executed - this section will therefore be empty.