Full wwPDB X-ray Structure Validation Report (i)

Oct 29, 2025 – 02:08 AM JST

PDB ID	:	9V8F / pdb_00009v8f
Title	:	PPARgamma ligand-binding domain in complex with PG14
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Deposited on	:	2025-05-29
Resolution	:	1.75 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
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) 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 (1)) were used in the production of this report:

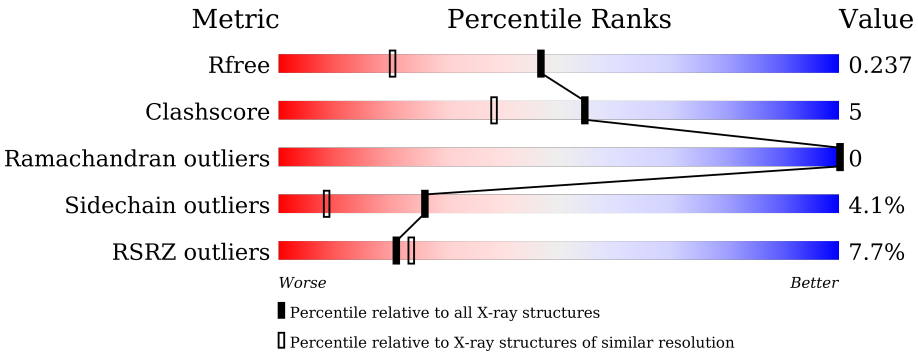
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.75 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}	164625	2888 (1.76-1.76)
Clashscore	180529	3097 (1.76-1.76)
Ramachandran outliers	177936	3072 (1.76-1.76)
Sidechain outliers	177891	3072 (1.76-1.76)
RSRZ outliers	164620	2887 (1.76-1.76)

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 of the lower 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 <=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	273	8% 83% 10% • 5%
2	B	19	89% 5% 5%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 2379 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.

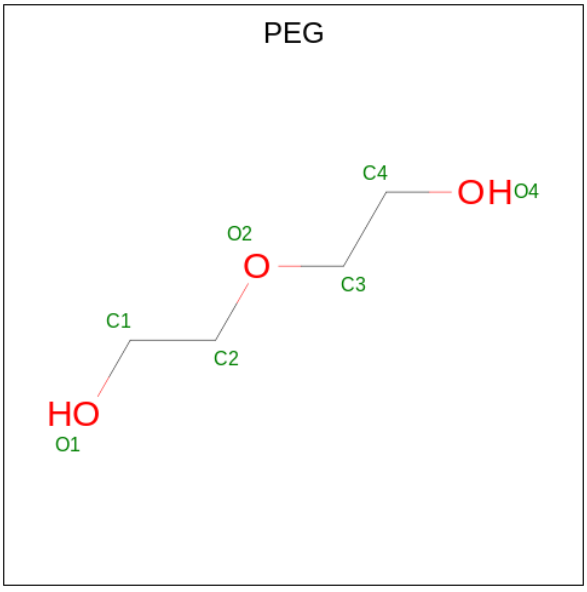
- Molecule 1 is a protein called Peroxisome proliferator-activated receptor gamma.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	259	Total	C	N	O	S	0	0	0
			2066	1335	334	387	10			

- Molecule 2 is a protein called PG14.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	19	Total	C	N	O	S	0	0	1
			154	98	30	25	1			

- Molecule 3 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			7	4	3		
3	A	1	Total	C	O	0	0
			7	4	3		

- Molecule 4 is water.

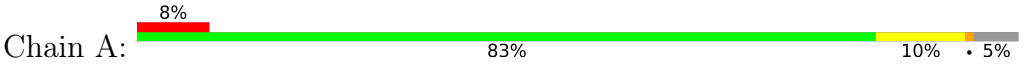
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	131	Total O 131 131	0	0
4	B	14	Total O 14 14	0	0

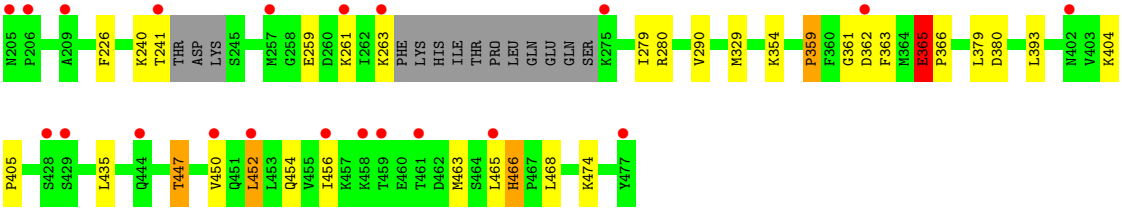
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide 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: Peroxisome proliferator-activated receptor gamma

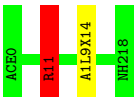
Chain A:





• Molecule 2: PG14

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 2 21 21	Depositor
Cell constants a, b, c, α, β, γ	32.51Å 85.14Å 99.67Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.05 – 1.75 43.05 – 1.75	Depositor EDS
% Data completeness (in resolution range)	99.9 (43.05-1.75) 99.9 (43.05-1.75)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.96 (at 1.75Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, R_{free}	0.192 , 0.230 0.206 , 0.237	Depositor DCC
R_{free} test set	1629 reflections (5.66%)	wwPDB-VP
Wilson B-factor (Å^2)	28.1	Xtriage
Anisotropy	0.263	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 39.7	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	2379	wwPDB-VP
Average B, all atoms (Å^2)	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.35% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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

Bond lengths and bond angles in the following residue types are not validated in this section: NH2, PEG, ACE, A1L9X, DTY

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	0.62	0/2100	1.07	6/2829 (0.2%)
2	B	0.56	0/120	0.93	0/158
All	All	0.61	0/2220	1.06	6/2987 (0.2%)

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
2	B	0	1

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	447	THR	CA-CB-OG1	-6.78	99.44	109.60
1	A	380	ASP	CA-CB-CG	6.74	119.34	112.60
1	A	365	GLU	CB-CG-CD	5.99	122.78	112.60
1	A	363	PHE	CA-CB-CG	5.47	119.27	113.80
1	A	466	HIS	CB-CG-CD2	-5.41	124.17	131.20
1	A	359	PRO	N-CA-CB	-5.14	96.94	102.60

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	11	ARG	Sidechain

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	2066	0	2114	18	0
2	B	154	0	131	3	0
3	A	14	0	20	0	0
4	A	131	0	0	1	1
4	B	14	0	0	0	0
All	All	2379	0	2265	21	1

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 (21) 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)
2:B:11:ARG:HH11	2:B:11:ARG:HG3	1.41	0.85
2:B:11:ARG:HH11	2:B:11:ARG:CG	1.93	0.81
1:A:259:GLU:OE2	1:A:280:ARG:NH2	2.22	0.72
2:B:11:ARG:HG3	2:B:11:ARG:NH1	2.08	0.69
1:A:226:PHE:CG	1:A:329:MET:HE1	2.42	0.55
1:A:466:HIS:HD2	1:A:468:LEU:H	1.56	0.53
1:A:379:LEU:HD11	1:A:435:LEU:HD21	1.90	0.53
1:A:404:LYS:HD2	1:A:404:LYS:C	2.34	0.53
1:A:454:GLN:OE1	1:A:454:GLN:HA	2.09	0.53
1:A:452:LEU:O	1:A:456:ILE:HG13	2.10	0.52
1:A:279:ILE:HD12	1:A:279:ILE:N	2.26	0.51
1:A:466:HIS:HB2	4:A:682:HOH:O	2.10	0.50
1:A:290:VAL:HG21	1:A:466:HIS:CG	2.48	0.49
1:A:466:HIS:CD2	1:A:468:LEU:H	2.33	0.46
1:A:240:LYS:O	1:A:241:THR:HB	2.18	0.43
1:A:447:THR:O	1:A:450:VAL:HG22	2.19	0.42
1:A:354:LYS:HA	1:A:361:GLY:O	2.20	0.42
1:A:404:LYS:N	1:A:405:PRO:HD2	2.35	0.42
1:A:365:GLU:N	1:A:366:PRO:CD	2.83	0.41
1:A:456:ILE:CG2	1:A:463:MET:HE1	2.50	0.41
1:A:435:LEU:HD23	1:A:435:LEU:HA	1.90	0.40

All (1) 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:720:HOH:O	4:A:720:HOH:O[2_556]	1.74	0.46

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	253/273 (93%)	251 (99%)	2 (1%)	0	100	100
2	B	14/19 (74%)	14 (100%)	0	0	100	100
All	All	267/292 (91%)	265 (99%)	2 (1%)	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	230/246 (94%)	221 (96%)	9 (4%)	27	9
2	B	14/14 (100%)	13 (93%)	1 (7%)	12	2
All	All	244/260 (94%)	234 (96%)	10 (4%)	26	8

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

Mol	Chain	Res	Type
1	A	261	LYS
1	A	263	LYS
1	A	359	PRO
1	A	362	ASP
1	A	365	GLU
1	A	393	LEU
1	A	452	LEU
1	A	465	LEU
1	A	474	LYS
2	B	11	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	286	GLN
1	A	415	GLN
1	A	430	GLN
1	A	449	HIS
1	A	466	HIS

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

3 non-standard protein/DNA/RNA residues 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	A1L9X	B	10	2	5,9,10	0.86	0	7,12,14	1.01	0
2	A1L9X	B	14	2	5,9,10	0.73	0	7,12,14	2.34	3 (42%)

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	A1L9X	B	10	2	-	0/2/13/16	0/1/1/1
2	A1L9X	B	14	2	-	0/2/13/16	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	14	A1L9X	CE-CZ-CA	3.64	116.28	112.95
2	B	14	A1L9X	CB-CG-ND	3.08	117.39	110.89
2	B	14	A1L9X	CZ-CE-ND	2.82	116.84	110.89

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates (i)

There are no oligosaccharides 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	$\#\|Z\| > 2$
3	PEG	A	501	-	6,6,6	0.18	0	5,5,5	0.08	0
3	PEG	A	502	-	6,6,6	0.21	0	5,5,5	0.23	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
3	PEG	A	501	-	-	1/4/4/4	-
3	PEG	A	502	-	-	4/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	502	PEG	C1-C2-O2-C3
3	A	502	PEG	O1-C1-C2-O2
3	A	502	PEG	O2-C3-C4-O4
3	A	501	PEG	O1-C1-C2-O2
3	A	502	PEG	C4-C3-O2-C2

There are no ring outliers.

No monomer is involved in short contacts.

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

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^{th} 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	259/273 (94%)	0.45	21 (8%) 19 22	20, 36, 75, 95	0
2	B	14/19 (73%)	-0.17	0 100 100	26, 30, 38, 39	0
All	All	273/292 (93%)	0.42	21 (7%) 21 24	20, 35, 74, 95	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	241	THR	4.7
1	A	452	LEU	3.9
1	A	206	PRO	3.6
1	A	205	ASN	3.0
1	A	456	ILE	2.8
1	A	465	LEU	2.5
1	A	429	SER	2.5
1	A	263	LYS	2.5
1	A	477	TYR	2.5
1	A	402	ASN	2.5
1	A	275	LYS	2.4
1	A	257	MET	2.2
1	A	362	ASP	2.2
1	A	450	VAL	2.2
1	A	461	THR	2.1
1	A	261	LYS	2.1
1	A	458	LYS	2.1
1	A	459	THR	2.1
1	A	444	GLN	2.1
1	A	209	ALA	2.0
1	A	428	SER	2.0

6.2 Non-standard residues in protein, DNA, RNA chains (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. The B-factors column lists the minimum, median, 95^{th} 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	B-factors(Å^2)	Q<0.9
2	DTY	B	1	12/13	0.90	0.10	27,36,42,47	0
2	A1L9X	B	14	9/10	0.93	0.08	26,28,37,40	0
2	A1L9X	B	10	9/10	0.95	0.07	27,29,34,34	0

6.3 Carbohydrates (i)

There are no oligosaccharides 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. The B-factors column lists the minimum, median, 95^{th} 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	B-factors(Å^2)	Q<0.9
3	PEG	A	501	7/7	0.81	0.12	54,60,64,67	0
3	PEG	A	502	7/7	0.84	0.17	59,61,68,71	0

6.5 Other polymers (i)

There are no such residues in this entry.