



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 27, 2026 – 05:25 PM EDT

PDB ID : 1RH2 / pdb_00001rh2
Title : RECOMBINANT HUMAN INTERFERON-ALPHA 2B
Authors : Walter, M.R.
Deposited on : 1996-11-07
Resolution : 2.90 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 ⓘ 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:

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
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)	:	2.49

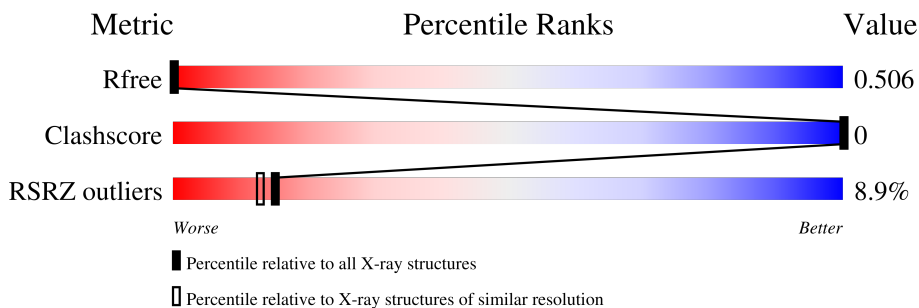
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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}	180053	2481 (2.90-2.90)
Clashscore	190562	2690 (2.90-2.90)
RSRZ outliers	180081	2481 (2.90-2.90)

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 $\leq 5\%$. 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	165	5% 88% 12%
1	B	165	3% 83% 17%
1	C	165	8% 74% 26%
1	D	165	11% 79% 21%
1	E	165	10% 80% 20%
1	F	165	5% 73% 27%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 791 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 INTERFERON-ALPHA 2B.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf	Trace
1	A	145	Total C 145 145	0	0	145
1	B	137	Total C 137 137	0	0	137
1	C	122	Total C 122 122	0	0	122
1	D	131	Total C 131 131	0	0	131
1	E	132	Total C 132 132	0	0	132
1	F	120	Total C 120 120	0	0	120

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	23	ARG	LYS	conflict	UNP P01563
A	112	ASN	LYS	conflict	UNP P01563
B	23	ARG	LYS	conflict	UNP P01563
B	112	ASN	LYS	conflict	UNP P01563
C	23	ARG	LYS	conflict	UNP P01563
C	112	ASN	LYS	conflict	UNP P01563
D	23	ARG	LYS	conflict	UNP P01563
D	112	ASN	LYS	conflict	UNP P01563
E	23	ARG	LYS	conflict	UNP P01563
E	112	ASN	LYS	conflict	UNP P01563
F	23	ARG	LYS	conflict	UNP P01563
F	112	ASN	LYS	conflict	UNP P01563

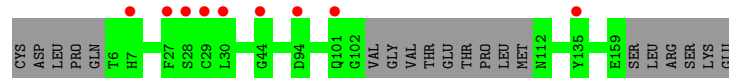
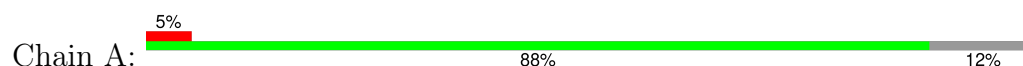
- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total 1	Zn 1	0	0
2	B	1	Total 1	Zn 1	0	0
2	C	1	Total 1	Zn 1	0	0
2	E	1	Total 1	Zn 1	0	0

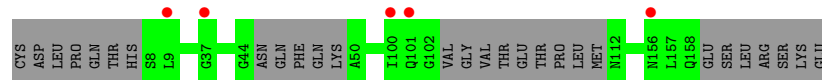
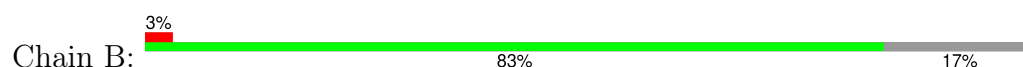
3 Residue-property plots [i](#)

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.

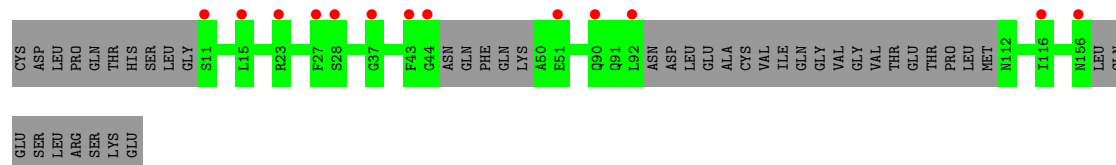
- Molecule 1: INTERFERON-ALPHA 2B



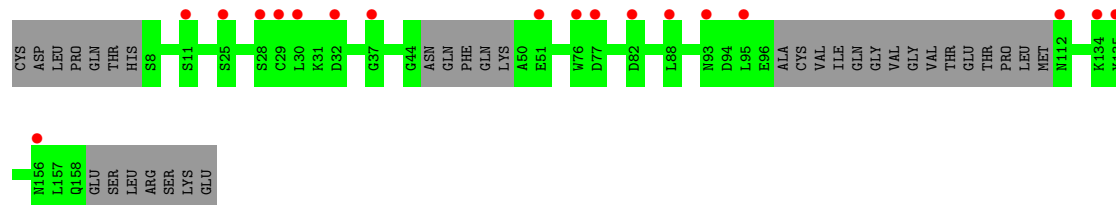
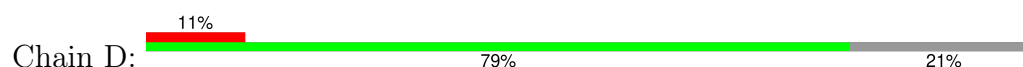
- Molecule 1: INTERFERON-ALPHA 2B



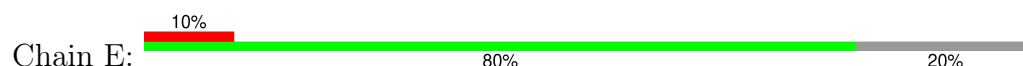
- Molecule 1: INTERFERON-ALPHA 2B

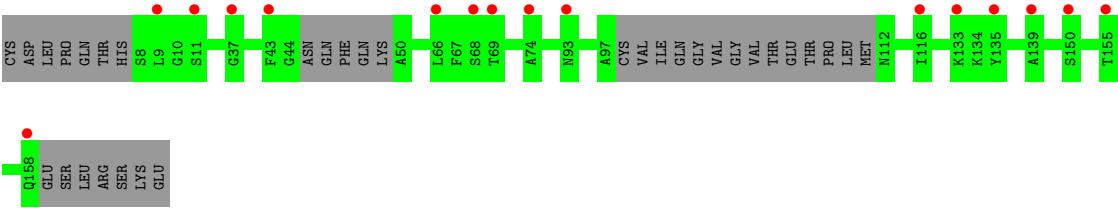


- Molecule 1: INTERFERON-ALPHA 2B

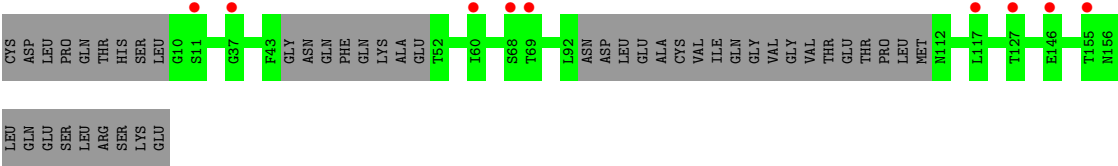


- Molecule 1: INTERFERON-ALPHA 2B





● Molecule 1: INTERFERON-ALPHA 2B



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	62.40Å 75.50Å 148.20Å 90.00° 90.80° 90.00°	Depositor
Resolution (Å)	6.00 – 2.90 6.00 – 2.90	Depositor EDS
% Data completeness (in resolution range)	99.2 (6.00-2.90) 87.6 (6.00-2.90)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.43 (at 2.56Å)	Xtriage
Refinement program	X-PLOR 3.1	Depositor
R, R_{free}	0.227 , 0.311 0.496 , 0.506	Depositor DCC
R_{free} test set	1891 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	42.3	Xtriage
Anisotropy	0.158	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.08 , 56.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.030 for h,-k,-l	Xtriage
F_o, F_c correlation	0.45	EDS
Total number of atoms	791	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.89% 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, 0.333 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: ZN

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).

There are no protein, RNA or DNA chains available to summarize Z scores of covalent bonds and angles.

There are no bond length outliers.

There are no bond angle outliers.

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	A	145	0	0	0	0
1	B	137	0	0	0	0
1	C	122	0	0	0	0
1	D	131	0	0	0	0
1	E	132	0	0	0	0
1	F	120	0	0	0	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	E	1	0	0	0	0
All	All	791	0	0	0	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 0.

There are no clashes within the asymmetric unit.

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

There are no protein backbone outliers to report in this entry.

5.3.2 Protein sidechains [i](#)

There are no protein residues with a non-rotameric sidechain to report in this entry.

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](#)

Of 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

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 ⓘ

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	145/165 (87%)	0.00	9 (6%) 26 21	5, 20, 56, 81	0
1	B	137/165 (83%)	-0.08	5 (3%) 46 38	5, 20, 51, 70	0
1	C	122/165 (73%)	0.20	13 (10%) 11 9	5, 28, 60, 71	0
1	D	131/165 (79%)	0.41	18 (13%) 6 5	5, 29, 61, 80	0
1	E	132/165 (80%)	0.36	16 (12%) 8 7	5, 34, 56, 76	0
1	F	120/165 (72%)	0.21	9 (7%) 20 16	14, 34, 60, 74	0
All	All	787/990 (79%)	0.18	70 (8%) 15 13	5, 28, 58, 81	0

All (70) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	32	ASP	13.7
1	C	44	GLY	8.3
1	A	7	HIS	7.3
1	F	146	GLU	7.2
1	E	9	LEU	7.1
1	B	37	GLY	6.0
1	C	37	GLY	5.6
1	F	155	THR	5.4
1	E	150	SER	5.3
1	A	29	CYS	5.3
1	B	100	ILE	5.0
1	E	158	GLN	4.7
1	D	28	SER	4.7
1	A	101	GLN	4.7
1	D	30	LEU	4.6
1	C	15	LEU	4.3
1	C	156	ASN	4.2
1	D	76	TRP	4.2
1	D	95	LEU	3.9

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Mol	Chain	Res	Type	RSRZ
1	B	156	ASN	3.9
1	E	69	THR	3.8
1	D	82	ASP	3.8
1	D	135	TYR	3.6
1	E	135	TYR	3.5
1	D	37	GLY	3.3
1	E	66	LEU	3.3
1	B	101	GLN	3.3
1	E	155	THR	3.2
1	F	127	THR	3.1
1	D	25	SER	3.0
1	E	116	ILE	3.0
1	E	68	SER	3.0
1	F	60	ILE	2.9
1	F	37	GLY	2.9
1	C	51	GLU	2.9
1	C	92	LEU	2.9
1	C	28	SER	2.8
1	E	37	GLY	2.8
1	C	11	SER	2.8
1	E	93	ASN	2.7
1	E	11	SER	2.7
1	D	134	LYS	2.6
1	A	28	SER	2.6
1	F	11	SER	2.6
1	A	94	ASP	2.6
1	C	23	ARG	2.5
1	A	44	GLY	2.5
1	A	135	TYR	2.5
1	C	116	ILE	2.5
1	C	90	GLN	2.5
1	D	93	ASN	2.4
1	D	77	ASP	2.4
1	F	68	SER	2.4
1	A	30	LEU	2.4
1	B	9	LEU	2.3
1	E	133	LYS	2.3
1	F	117	LEU	2.3
1	D	51	GLU	2.3
1	D	112	ASN	2.3
1	E	139	ALA	2.3
1	A	27	PHE	2.2

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Mol	Chain	Res	Type	RSRZ
1	D	88	LEU	2.2
1	D	11	SER	2.2
1	C	27	PHE	2.2
1	F	69	THR	2.1
1	D	156	ASN	2.1
1	D	29	CYS	2.1
1	C	43	PHE	2.1
1	E	74	ALA	2.1
1	E	43	PHE	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 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, 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	B-factors($\text{\AA}^2$)	Q<0.9
2	ZN	A	1204	1/1	0.77	0.10	29,29,29,29	0
2	ZN	E	1202	1/1	0.85	0.14	37,37,37,37	0
2	ZN	C	1203	1/1	0.89	0.15	29,29,29,29	0
2	ZN	B	1201	1/1	0.98	0.16	5,5,5,5	0

6.5 Other polymers [i](#)

There are no such residues in this entry.