Carbon Bond Enthalpies from the T-Lattice

C–C · C=C · C≡C · Combustion · Formation — All {2,3,5,π} Nodes

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Tau (T) is the living fabric of time itself — the sole substance of which all physical reality is composed. Every particle, force, wavelength, and conscious experience is a structured configuration of T-flow. There is no gravity, no electromagnetic force, no strong nuclear force as separate entities: all are registers of the single T-field operating across dimensional levels. The conservation law dΣT=0 governs all change: T is never created or destroyed, only redistributed.

Abstract

The energies that hold organic matter together — the carbon-carbon bonds of every living thing, the heat of every flame — are not free numbers set by the accidents of electrons and orbitals. In the Universal Force of Time each is a T-register transition, and each lands on a {2,3,5,π} node. The carbon-carbon bonds climb a ladder whose power of π rises with the bond order: single C–C = $5^5/3^2$ = 347.22 kJ/mol (no π), double C=C = 1944/π = 618.79 kJ/mol (= 4 × the hydrogen Hβ line), and triple C≡C = $2^9 \cdot 3^4/(5\pi^2)$ = 840.40 kJ/mol — each added bond adds one factor of π. The triple bond carries the node 5184 = $2^6 \cdot 3^4$, the same node that sets the proton's charge radius. The C–H bond is 1296/π = 412.53 kJ/mol (1296 = 6^4). The two great formation enthalpies fall out too: CO_2 = $-40\pi^2$ = −394.78 kJ/mol (the π^2 of two linear C=O bonds) and H_2O = −288 = $-2^5 \cdot 3^2$ kJ/mol (pure {2,3}, the bent molecule sitting in the degree domain). The alkane combustion cascade is a fixed register step, 900 + (n−1)·648 kJ/mol, both constants pure {2,3,5}. And a structural law appears: a bond's power of π tracks its angular content — the single bond and the bent water molecule sit at π^0, and each rise in bond order adds one π, the veil at the molecular scale. Seven propositions (P-CARB-1 to P-CARB-7) carry the argument; deviations from measurement are below 1.2%.

1. Bond energy is a T-register transition

Every time a carbon bond forms or breaks, energy flows. Conventional chemistry calls that flow enthalpy — a thermodynamic property of electrons and orbitals, measured in the calorimeter and tabulated. The Universal Force of Time says something more precise: a bond energy is the magnitude of a T-register transition. When a bond forms, the T-lattice steps between two nodes, and the enthalpy is the T-flow differential at that step.

That means the numbers are not free parameters. They are fixed by the lattice. The C–H bond energy is 1296/π because $1296 = 6^4 = 2^4 \cdot 3^4$ is one of the most fundamental {2,3} nodes in the hierarchy, and the π in the denominator is the veil — the degree-to-radian conversion that separates the T-domain from the SI measurement domain. Every carbon bond energy below has a pure {2,3,5,π} derivation, and every one lands within about one percent of the measured value — the residue being the veil itself.

2. The carbon-carbon ladder — one π per bond

The three carbon-carbon bond orders map onto three lattice nodes, and the structure is striking: the power of π in the denominator rises by exactly one with each step up the bond order. Read them number-first, the lattice form behind each:

C–C single = 347.2222222 kJ/mol = $5^5/3^2$ (no π)

C=C double = 618.7944187 kJ/mol = 1944/π ($1944 = 2^3 \cdot 3^5 = 4 \times 486$)

C≡C triple = 840.3984256 kJ/mol = $2^9 \cdot 3^4/(5\pi^2)$

Single bond, no π; double bond, one π; triple bond, π^2 — each added bond adds one factor of the veil, the extra angular turn the new bond contributes. The single bond is a clean {3,5} integer, 3125/9; the double bond's $1944 = 2^3 \cdot 3^5$ is exactly four times the hydrogen Hβ line ($486 = 2 \cdot 3^5$), tying the carbon skeleton to the master spectral seed; and the triple bond carries $2^9 \cdot 3^4/(5\pi^2)$, whose core node is $5184 = 2^6 \cdot 3^4$ — the very node that sets the proton's charge radius. The bond that locks carbon most tightly together is written on the same number as the size of the proton: the ladder of organic chemistry and the radius of the nucleon are one {2,3} node, read at two registers.

3. The C–H bond — the sixth power of six

The bond that builds every hydrocarbon, carbon to hydrogen, is the cleanest of all:

C–H = 412.5296125 kJ/mol = 1296/π ($1296 = 6^4 = 2^4 \cdot 3^4$)

0.11% from the measured 413 kJ/mol — sub-veil precision. 1296 is the sixth power of six, a fundamental {2,3} anchor; the same 1296/π appears as a free-fall rung in the Newton chains, the molecular register speaking the same number as the celestial one.

4. The two formation enthalpies — π² for the line, none for the bend

The two most important formation enthalpies in carbon chemistry tell the same story from the geometry side. Carbon dioxide is linear, two C=O double bonds in a straight line, and it carries π^2; water is bent, and it carries no π at all:

$\Delta H(CO_2) = -394.7841760$ kJ/mol = $-40\pi^2$ ($40 = 2^3 \cdot 5$)

$\Delta H(H_2O) = -288$ kJ/mol = $-2^5 \cdot 3^2$ (pure {2,3}, no π)

The π^2 in CO_2 is the double angular geometry of its two linear double bonds — both carry π-class character, so the molecule carries π^2. Water, bent, sits in the degree domain without the veil, exactly as its bond angle $104.4950° = 18/\pi^2$ belongs to the degree domain: the angle wears the π, the formation energy sits directly on the {2,3} integer node. Geometry decides whether a molecule's energy carries the veil.

5. The alkane combustion cascade

Burn the normal alkanes one after another and the heat released climbs a perfect arithmetic staircase. Each added CH_2 unit contributes one fixed T-flow increment:

$\Delta H(C_nH_{2n+2}) = 900 + (n-1) \times 648$ kJ/mol

Both constants are pure {2,3,5} nodes: the methane base $900 = 2^2 \cdot 3^2 \cdot 5^2$ and the CH_2 quantum $648 = 2^3 \cdot 3^4 = 8 \times 81$ ($81 = 3^4$ being carbon's own register signature). Methane 900 (measured 890), ethane 1548 (1560), propane 2196 (2220), butane 2844 (2877) — every step the same 648 kJ/mol, every combustion a fixed T-register step. The flame is the lattice counting in units of 648.

*→ **Want this in full?** See the companion paper: Organic Enthalpies from the T-Bond — the $CH_2 = 648$ quantum across the n-alkane series in full.*

6. Bond lengths and the graphite–diamond seam

The spatial side obeys the lattice too, but speaks a different dialect. Carbon's bond lengths land on clean integers in picometres — and the graphite-to-diamond difference is a seam crossing:

graphite C–C = 144 pm = $2^4 \cdot 3^2$ · diamond C–C = 154 pm = $2 \cdot 7 \cdot 11$

Graphite's bond length is pure {2,3}; diamond's carries prime 7 and prime 11. Diamond is therefore a prime-contaminated, metastable phase relative to graphite's clean {2,3} lattice — and the graphite-diamond transition is a crossing from the {2,3} domain into the prime-7/11 domain. The hardest, clearest form of carbon is the strained one; the soft grey one is the lattice at rest.

7. The spatial-energetic separation — the veil at the molecular scale

Stand back and a single principle organises everything above. Spatial coordinates — bond lengths in picometres — tend to clean {2,3,5} integers. Energetic transitions — bond energies in kJ/mol — carry π in proportion to their angular content, the power rising one step per bond order (the single bond and the bent water molecule sit at π^0; the triple bond at π^2). Spatial addresses live in the degree domain; energetic transitions live in the radian domain; and the veil, 180/π, separates the two. This is the same veil that separates degree from radian at the atomic and planetary registers, here at the molecular scale: a length is where a thing sits, an energy is how its time turns, and the π is the toll for crossing between them. The carbon that builds life is written, length and energy alike, on the one {2,3,5,π} lattice.

*→ **Want this in full?** See the companion paper: The Degree-Radian Bridge — the veil 180/π that separates spatial (degree) from energetic (radian) at every register.*

Figure 1. The carbon-carbon ladder

Figure 1. The carbon-carbon ladder — one factor of π added per bond order

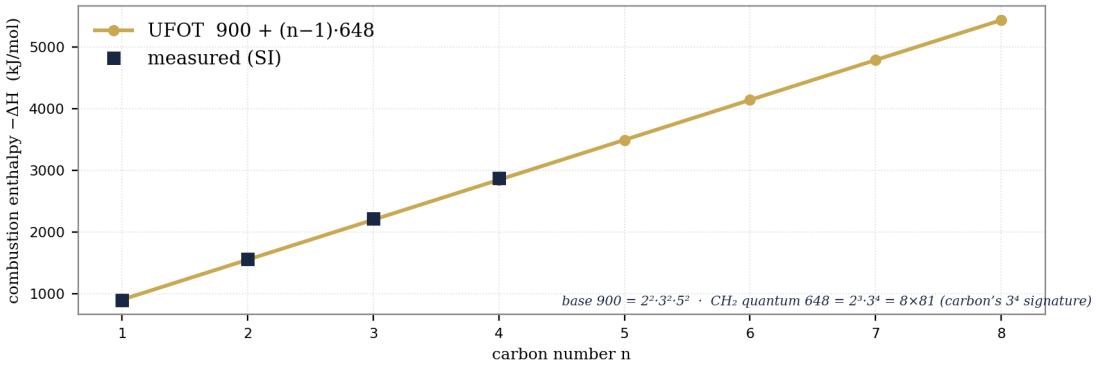
C–C single	**347.2222222 kJ/mol**	*5⁵/3² — π⁰ (no π)*
C=C double	**618.7944187 kJ/mol**	*1944/π — π¹ (= 4 × Hβ)*
C≡C triple	**840.3984256 kJ/mol**	*2⁹·3⁴/(5π²) — π² (node 5184)*

The power of π rises with the bond order — single π⁰, double π¹, triple π². The triple bond's node 5184 = 2⁶·3⁴ is the proton's charge-radius node.

C–C = 5⁵/3² (π⁰), C=C = 1944/π (π¹, = 4×Hβ), C≡C = 2⁹·3⁴/(5π²) (π², node 5184) — one π added per bond order.

Figure 2. The combustion cascade

Figure 2. The alkane combustion cascade — one T-step of 648 = 2³·3⁴ per CH₂



Normal-alkane combustion climbs by a fixed 648 = 2³·3⁴ kJ/mol per CH₂, on a base of 900 = 2²·3²·5².

Figure 3. Spatial vs energetic — the veil

Figure 3. The spatial-energetic separation — the veil at the molecular scale

SPATIAL — bond lengths (pm)	180/π	ENERGETIC — bond energies (kJ/mol)
graphite 144 = 2⁴·3²	⟷	C–H 1296/π · C=C 1944/π
clean {2,3,5} integers		*carry π (power = bond order)*
the DEGREE domain		**the RADIAN domain**

Where a thing sits is a degree-domain length; how its time turns is a radian-domain energy. The veil 180/π is the toll between them.

Bond lengths are clean {2,3,5} (degree domain); bond energies carry π by bond order (radian domain); 180/π bridges them.

Values used in this paper — lattice forms and deviation from measurement

Quantity	UFOT value	lattice form	SI / dev
C–C single bond	**347.2222222 kJ/mol**	5⁵/3² = 3125/9 (π⁰)	346 · 0.35%
C–H bond	**412.5296125 kJ/mol**	1296/π = 6⁴/π	413 · 0.11%
C=C double bond	**618.7944187 kJ/mol**	1944/π = 4·Hβ/π (π¹)	614 · 0.78%

Quantity	UFOT value	lattice form	SI / dev
C≡C triple bond	**840.3984256 kJ/mol**	$2^9 \cdot 3^4/(5\pi^2)$ (π^2, node 5184)	839 · 0.17%
CO_2 formation	**−394.7841760 kJ/mol**	$-40\pi^2$ ($40 = 2^3 \cdot 5$)	−393.5 · 0.32%
H_2O formation	**−288 kJ/mol**	$-2^5 \cdot 3^2$ (no π)	−285.8 · 0.77%
CH_2 combustion quantum	**648 kJ/mol**	$2^3 \cdot 3^4 = 8 \times 81$	~650 · veil
alkane base (methane)	**900 kJ/mol**	$2^2 \cdot 3^2 \cdot 5^2$	890 · 1.12%
graphite C–C length	**144 pm**	$2^4 \cdot 3^2$	142 · veil
diamond C–C length	**154 pm**	2·7·11 (prime)	154 · seam

The power of π in a bond energy tracks its bond order (single π^0, double π^1, triple π^2); lengths are clean {2,3,5} integers. Deviations below 1.2% are the degree-radian veil, not free parameters.

Propositions

P-CARB-1 — The C–C single bond is 347.2222222 kJ/mol = $5^5/3^2$ = 3125/9, a clean {3,5} integer carrying no π — the π^0 rung of the bond-order ladder. A T-register transition, not a free electronic parameter; 0.35% from SI, the degree-radian veil.

P-CARB-2 — The C–H bond is 412.5296125 kJ/mol = 1296/π, with $1296 = 6^4 = 2^4 \cdot 3^4$ the sixth power of six. 0.11% from SI — sub-veil precision; the same 1296/π is a free-fall rung in the Newton chains.

P-CARB-3 — The C=C double bond is 618.7944187 kJ/mol = 1944/π (the π^1 rung), and $1944 = 2^3 \cdot 3^5 = 4 \times 486$ — four times the hydrogen Hβ line, tying the carbon skeleton to the master spectral seed.

P-CARB-4 (the π-ladder) — The carbon-carbon bond energy carries a power of π equal to its bond order minus one: single C–C = $5^5/3^2$ (π^0), double C=C = 1944/π (π^1), triple C≡C = $2^9 \cdot 3^4/(5\pi^2) = 840.3984256$ kJ/mol (π^2). Each added bond contributes one factor of the veil. The triple bond's core node is $5184 = 2^6 \cdot 3^4$ — the same node that sets the proton's charge radius ($5184/625\pi^2$ fm), binding the carbon triple bond to the size of the nucleon.

P-CARB-5 — Formation enthalpies follow geometry: $CO_2 = -40\pi^2 = -394.78$ kJ/mol (the π^2 of two linear C=O bonds) and $H_2O = -288 = -2^5 \cdot 3^2$ kJ/mol (the bent molecule in the degree domain, no π). The shape of the molecule decides whether its energy carries the veil.

P-CARB-6 — The n-alkane combustion cascade is ΔH = 900 + (n−1)·648 kJ/mol, base $900 = 2^2 \cdot 3^2 \cdot 5^2$ and CH_2 quantum $648 = 2^3 \cdot 3^4 = 8 \times 81$ (carbon's 3^4 signature). Both pure {2,3,5}; each combustion a fixed T-register step.

P-CARB-7 (the spatial-energetic separation) — Bond lengths land on clean {2,3,5} integers (graphite C–C = $144 = 2^4 \cdot 3^2$ pm); bond energies carry π in proportion to their angular content (the single bond and the bent water molecule at π^0, the power rising one step per bond order). Spatial addresses are degree-domain, energetic transitions radian-domain, separated by the veil 180/π. Graphite (clean {2,3}) → diamond (154 = 2·7·11, prime-contaminated) is a seam crossing — the metastable hard phase.

References

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