

Thermal Curing and Carbonization Profile for Seshat's Bones

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Overview

Seshat's Bones are ultra-strong, carbon-rich hemp-based composites formulated from hemp carbon and hemp oil. The mechanical, thermal, and electrical performance of these materials is determined by the curing and post-curing temperatures applied during processing. The table below summarizes the recommended thermal treatment steps.

Thermal Treatment Protocol

Table 1: Recommended Thermal Stages for Seshat's Bones

Stage	Process	Temperature	Duration	Purpose
1. Pre-Cure	Drying of raw mix	80–120°C	1–2 hrs	Remove moisture or volatiles
2. Primary Cure	Thermoset bonding of hemp oil matrix	150–200°C	2–4 hrs	Cross-linking and structural solidification
3. Post-Cure	Strength and rigidity enhancement	220–260°C	2–6 hrs	Increase hardness and heat resistance
4. Carbonization	Pyrolysis in inert atmosphere (N ₂ , Ar)	600–900°C	3–12 hrs	Convert organic matrix to conductive carbon
5. Graphitization (Optional)	High-temp carbon lattice alignment	1200–2800°C	Varies	Maximize electrical conductivity and thermal stability

Best Practices

- **Structural composites:** Complete steps 1–3. Post-curing at 250°C optimizes toughness and thermal resistance.
- **Ballistic or conductive composites:** Include step 4. Pyrolyze at 750–900°C in an oxygen-free chamber.
- **High-conductivity composites:** Consider step 5. Graphitize above 2000°C using an arc or induction furnace.

Technical Notes

- Use a thermal ramp rate of 3–10°C/min to avoid cracking.
- Always carbonize in an inert atmosphere to prevent combustion.
- Cure profiles may vary depending on hemp oil composition or added catalysts.

Recommended Equipment

- **Curing Oven:** Programmable convection oven (up to 300°C)
- **Carbonization Furnace:** Tube or retort furnace with inert gas inlet
- **Graphitization Furnace (Optional):** Arc furnace or high-frequency induction furnace

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