DISPOSAL REFERENCE

Formulation	♻Bio	Burn	Toxic	Cure
Wheat Paste	✔Yes	✔Yes	✖No	24-48h
PVA Hybrid	~Mostly	~Partial	✖No	2-4h
Shellac	✔Yes	✔Yes	✖No	15-30m
Beeswax	✔Yes	✔Yes	✖No	24h
Paraffin	~Partial	✔Yes	✖No	24h
EVA / Oil Mix	✖No	✔Yes	✖No	24h
Canvas Wax A	✔Yes	✔Yes	! Caution	Days
Canvas Wax B	~Partial	✔Yes	✖No	Days
Canvas Wax C	~Partial	✔Yes	✖No	Days
Papercrete	~Slow	✖No	✖No	7-14d
Padobe	✔Yes	✖No	✖No	7-21d

SAFETY WARNINGS

Fire Hazards

Linseed Oil Rags

Can spontaneously combust due to oxidation heat. Store in water-filled metal container or spread flat outdoors to dry. NEVER bundle or leave in piles.

Melted Wax

Flammable when heated. Keep away from open flames. If wax catches fire, smother with lid - DO NOT use water!

Chemical Safety

Ventilation Required

Shellac and alcohol-based products

SAFETY WARNINGS (cont)

Turpentine and oil-based formulas

Melting waxes

Work outdoors or well-ventilated area

Dust Protection

Wear N95 mask when mixing dry powders (cement, TiO_2, ZnO). Cement dust is alkaline and can damage lungs.

Skin Protection

Wear gloves with cement mixtures (high pH burns skin). Wash hands thoroughly after all work.

⚠ Hot Materials

Melted Wax Burns

Typically 160-180°F (70-82°C). Always use double boiler method - never direct heat. Wear heat-resistant gloves.

First Aid for Wax Burns

Cool with running water. Do not peel off solidified wax.

⊘ Never Do This

✗ Reuse food containers for formulations

✗ Work near children or pets

✗ Use direct heat on wax (use double boiler)

✗ Bundle linseed oil rags

✗ Store wheat paste unrefrigerated

✗ Skip ventilation with chemicals

QUICK PROJECT GUIDE

🏠 Indoor Projects (No Moisture)

Adhesive

Wheat Paste (simplest, cheapest)

Protection

None needed or shellac for dust resistance

☂ Light Outdoor (Covered)

Adhesive

PVA + Wheat Paste Hybrid

Waterproofing

Shellac (2-3 coats)

UV Protection

TiO_2 in final coat

Full Outdoor Exposure

QUICK PROJECT GUIDE (cont)

Adhesive
PVA + Wheat Paste Hybrid
Waterproofing
Hot wax or Canvas Wax
UV Protection
Metal oxides + marine varnish topcoat

Structural Applications

Material
Papercrete with waterproof sealer
Protection
Must be fully sealed with waterproofing + UV protection

Eco-Friendly/Compostable

Adhesive
Wheat Paste (no additives)
Waterproofing
Shellac or beeswax
UV Protection
Shellac with zinc oxide
Structural
Padobe/Fidobe instead of papercrete

Maximum DurabilitY

Adhesive
PVA + Wheat Paste Hybrid
Waterproofing
Canvas Wax Recipe A
UV Protection
Combined TiO_2 + ZnO in polyurethane
Maintenance
Annual recoating required

WORKING WITH CARDBOARD

Cardboard Prep

Before Starting
Remove tape, staples, glossy/waxed coatings

WORKING WITH CARDBOARD (cont)

Flatten boxes and store flat

Single-wall corrugated easiest to work

Double/triple-wall provides more strength

Shaping Tips

Slightly damp cardboard is easier to shape and form

✂ Cutting & Scoring

Clean Cuts

Use sharp utility knife or box cutter

Scoring

Score or pre-fold before applying adhesive for cleaner folds

Cross-Bracing

Adds significant rigidity to large panels

RESOURCES & NOTES

Video Source

NightHawkInLight

YouTube channel - "Learn to Build With Cardboard! STRONG, Waterproof and Free"

Additional Sources

Traditional building techniques

DIY maker communities

Historical preservation methods

Disclaimer

This is a reference guide for educational and experimental purposes. Always test formulations on scrap material first. Follow local regulations for material disposal. Not intended for load-bearing structural applications without proper engineering. Use appropriate safety equipment and work in ventilated areas.

Version Info

Version 1.2 - Cardboard Construction Cheatsheet

Created for the maker community

Free to share and modify

Author: Research compiled from NightHawkInLight, traditional techniques, and DIY communities

Published: 2025

Last Updated: October 2025

ADHESIVES & PASTES

WATERPROOFING (cont)

* Disposal: Biodegradable, Compostable

* Note: Not for long-term moisture exposure alone

WATERPROOFING

STRUCTURAL MATERIALS (cont)

5. Combine all, add water to consistency

6. Pour into molds

7. Cure 7-14 days, keep moist first 3-5 days

STRUCTURAL MATERIALS

Wheat Paste (Universal Recipe)

Ingredients

* 1 part white flour (all-purpose)
* 4-5 parts water (use 5 parts for laminating)

Directions

1. Combine flour and cold water, whisk smooth
2. Heat on stove at medium-low, stirring constantly
3. Heat until just below boiling (thickens like gravy)
4. Remove from heat, cool before use

Properties

* Dry Time: 1-2 hours surface, 24-48 hours full
* Shelf Life: 2-4 days refrigerated
* Disposal: Biodegradable, Compostable, Burnable

Pro Tip: Alternate corrugation 90° when laminating for maximum strength

WATERPROOFING

Shellac Solution (Biodegradable)

Ingredients

* 125g shellac flakes
* 500ml denatured alcohol (ethanol ~91% IPA)
* Alternative: 99% isopropyl alcohol (slower dry)

Directions

1. Combine shellac flakes with alcohol in glass jar
2, Shake every 30 minutes for 2-4 hours until dissolved
3. Strain if needed
4. Apply with brush in thin coats

Properties

* Dry Time: 15-30 minutes per coat
* Coats Needed: 2-3 for basic protection

Hot Wax (Basic)

Ingredients

* 100g paraffin or beeswax

Directions

1. Melt wax in double boiler
2. Brush onto cardboard while hot OR dip small items
3. Use heat gun to melt wax into fibers

Properties

* Dry Time: Sets in minutes, full cure 24 hours
* Disposal: Biodegradable (beeswax), Partial (paraffin)

⚠☐ CAUTION: Flammable during heating

STRUCTURAL MATERIALS

Papercrete (Cardboard + Cement)

Basic Recipe

* 60% cardboard pulp (soaked 24-48 hours)
* 30% sand
* 10% Portland cement
* Water (thick oatmeal consistency)

Alternative (3-2-1 Method)

* 3 parts paper pulp
* 2 parts Portland cement
* 1 part vermiculite/perlite (optional insulation)

Directions

1. Soak/shred cardboard 24-48 hours
2. Blend to pulp with drill mixer
3. Squeeze out excess water (damp, not dripping)
4. Mix dry cement and sand together

Papercrete (Cardboard + Cement)

Basic Recipe

* 60% cardboard pulp (soaked 24-48 hours)
* 30% sand
* 10% Portland cement
* Water (thick oatmeal consistency)

Alternative (3-2-1 Method)

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Directions

1. Soak/shred cardboard 24-48 hours
2. Blend to pulp with drill mixer
3. Squeeze out excess water (damp, not dripping)
4. Mix dry cement and sand together
5. Combine all, add water to consistency
6. Pour into molds
7. Cure 7-14 days, keep moist first 3-5 days

Properties

* Cure Time: 7-14 days minimum (full cure 28 days)
* R-Value: 2-3 per inch (good insulation)
* Strength: 100-400 psi compressive
* Disposal: Biodegradable (eventually, over decades)
* Note: Must be sealed against moisture

PVA + Wheat Paste Hybrid

Ingredients

* 1 part wheat paste (prepared)
* PVA glue (10-20% by volume)

Directions

1. Prepare wheat paste as above
2. Mix in PVA while paste is still warm
3. Stir until fully incorporated

Properties

* Dry Time: 2-4 hours surface
* Disposal: Mostly biodegradable
* Benefits: Water-insoluble when dry, stronger bond

WATERPROOFING

Hot Glue/EVA Wax Formula

Recipe A - Hot Glue/EVA

* 100g hot glue sticks (EVA)
* 25g beeswax
*20ml mineral oil

Recipe B - Paraffin Alternative

* 100g paraffin wax
* 25g beeswax
*20ml mineral oil

Directions

1. Melt all ingredients in double boiler
2. Stir until fully combined
3. Brush onto cardboard while warm
4. Work into surface with heat gun if needed

Properties

* Dry Time: 30-60 minutes, full cure 24 hours
* Disposal: NOT Biodegradable
* Benefits: Lower melting point, easier application

Wax Formula Additives

Mineral Oil (5-10%) Lowers melting point, adds flexibility

Pine Resin Increases water resistance, adds stickiness

Tung Oil Natural waterproofing, penetrates well

Carnuba Wax Hardest natural wax, high shine

Soy Wax Eco-friendly paraffin alternative

WATERPROOFING

Canvas Wax (Oilcloth Style)

Recipe A - Classic (Most Durable)

* 2 parts beeswax (by weight)
* 1 part boiled linseed oil
* 1 part turpentine

Directions (Recipe A)

1. Melt beeswax in double boiler
2. Remove from heat, add linseed oil, stir
3. Add turpentine slowly while stirring
4. Cool to paste consistency
5. Rub onto cardboard, heat to penetrate

Recipe B - Simplified

* 1 part beeswax
* 1 part petroleum jelly

Recipe C - Greenland Wax

* 90% paraffin wax
*10% beeswax

Properties

* Cure Time: Several days for full cure
* Disposal: A: Biodegradable; B & C: Partial

⚠☐ FIRE HAZARD: Linseed oil rags can spontaneously combust!

UV PROTECTION

Metal Oxide UV Blockers

Titanium Dioxide (TiO_2) - 5-10% Best for UVB protection (290-320nm) Creates white/opaque finish

Zinc Oxide (ZnO) - 5-10% Better UVA protection (320-400nm) Less whitening than TiO_2

Combined (2.5-5% each) Full-spectrum UV protection

Base Carrier Options

* Acrylic paint or varnish
* Polyurethane
*Water-based varnish
* Shellac (natural option)
* Oil-based varnish

Application Mix thoroughly into carrier, apply 2-3 coats

Clear UV Absorbers (Commercial)

Available Options

* Benzophenone-based UV absorbers
* HALS (Hindered Amine Light Stabilizers)
* Clear UV-resistant polyurethane
* Marine spar varnish with UV inhibitors

Application Follow manufacturer instructions. Generally 2-3 coats minimum for outdoor use.

Properties

* Disposal: Follow local hazardous waste guidelines
* Benefits: Clear finish maintains cardboard appearance
* Maintenance: Reapply annually for outdoor projects

Wheat Paste Additives

Sugar (1 tbsp/cup) Increases tackiness and initial grab

Borax (2 tbsp/quart) Preservative, reduces odor, pest deterrent

Vinegar (1 tsp/cup) Extends shelf life slightly

PVA Glue (10-20%) Adds water resistance after curing

Salt (1 tsp/cup) Preservative alternative to borax

Alum (1 tsp/cup) Stiffens dried paste, pest deterrent

WATERPROOFING

Canvas Wax (Oilcloth Style)

Recipe A - Classic (Most Durable)

* 2 parts beeswax (by weight)

* 1 part boiled linseed oil

* 1 part turpentine

Directions (Recipe A)

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3. Add turpentine slowly while stirring

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5. Rub onto cardboard, heat to penetrate

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* 1 part beeswax

* 1 part petroleum jelly

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* 90% paraffin wax

*10% beeswax

Properties

* Cure Time: Several days for full cure

* Disposal: A: Biodegradable; B & C: Partial

⚠☐ FIRE HAZARD: Linseed oil rags can spontaneously combust!

WATERPROOFING

Hot Glue/EVA Wax Formula

Recipe A - Hot Glue/EVA

* 100g hot glue sticks (EVA)

* 25g beeswax

*20ml mineral oil

Recipe B - Paraffin Alternative

* 100g paraffin wax

* 25g beeswax

*20ml mineral oil

Directions

1. Melt all ingredients in double boiler

2. Stir until fully combined

3. Brush onto cardboard while warm

4. Work into surface with heat gun if needed

Properties

* Dry Time: 30-60 minutes, full cure 24 hours

* Disposal: NOT Biodegradable

* Benefits: Lower melting point, easier application

STRUCTURAL MATERIALS

Papercrete (Cardboard + Cement)

Basic Recipe

* 60% cardboard pulp (soaked 24-48 hours)
* 30% sand
* 10% Portland cement
* Water (thick oatmeal consistency)

Alternative (3-2-1 Method)

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* 2 parts Portland cement
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Directions

1. Soak/shred cardboard 24-48 hours
2. Blend to pulp with drill mixer
3. Squeeze out excess water (damp, not dripping)
4. Mix dry cement and sand together
5. Combine all, add water to consistency
6. Pour into molds
7. Cure 7-14 days, keep moist first 3-5 days

Papercrete Strength Additives

Chopped Fibers (hemp, sisal, glass) Adds tensile strength

Hydrated Lime Flexibility, breathability

Mica Fire resistance, UV reflection

Padobe/Fidobe (Clay-Based)

Ingredients

* 60% cardboard pulp
* 30% clay-rich soil
* 10% sand (optional, improves hardness)
* Water as needed

Directions

1. Prepare cardboard pulp (soak 24-48 hours)
2. Mix clay soil with sand if using

Padobe/Fidobe (Clay-Based) (cont)

3. Combine pulp with clay mixture
4. Add water to thick consistency
5. Form or mold as desired
6. Sun dry 7-21 days depending on thickness

Properties

* Cure Time: 7-21 days (sun dry, climate dependent)
* Disposal: Biodegradable, Compostable
* Benefits: Sustainable, no cement, traditional method
* Note: Requires waterproofing coating