HYDRATION & DRYING:

The Science Behind Card Restoration

Understanding Moisture, Heat, and Structural Recovery

Matthew Musick | Shiny Asset Exchange

WHO I AM

- Founder — Shiny Asset Exchange
- Creator of the Hydro Pump Method
- Creator of the Fire Blast Method
- Pioneer of modern heat press card restoration
- Thousands of cards restored for hundreds of collectors since January 2024

THE CORE MISCONCEPTION

"Not all cards respond the same way."

Same moisture

→ different results

Same heat

→ different results

Same damage

→ different solution

"Why? Because the cards are not the same."

THE WRONG WAY

THE TWO BIGGEST MISTAKES

01

Applying moisture directly to the card

Moisture hits surface unevenly before fibers can absorb

→ **Paint fade**

02

Using too much moisture

Card becomes oversaturated — swells beyond correction

→ **Bubble creasing / separating layers**

"These cause the exact damage people blame on the process."

WHAT GOES WRONG

CAUSE	*RESULT*
Direct moisture application	**Paint fade**
Residual moisture (not fully dried)	**Bubble creasing**
Too much moisture	**Permanent texture shift / layer separation**

WHAT A CARD IS MADE OF

FRONT	
PET / Foil	Cannot absorb moisture — responds to heat only
Cardstock	Primary moisture absorption layer (from back, moving forward)
Ink Core	Color and design — sandwiched between cardstock layers
Cardstock	Second fiber layer — moisture travels through here first
Image / Ink Finish	Surface print layer
BACK	

Moisture enters from the back and travels forward — stopping at the PET layer.

HOW EACH LAYER BEHAVES

PET / Foil ⚠ CANNOT HYDRATE	Physically impossible to hydrate — moisture cannot penetrate this layer
PET / Foil (heat response) 🔥 HEAT SENSITIVE	Reacts to heat faster than any other layer — this is where damage happens first
Cardstock (front)	Absorbs next as moisture travels forward through the fiber layers
Ink Core	Does not absorb moisture — sits between the two cardstock layers
Cardstock (back)	ABSORBS moisture first — moisture enters from the back of the card

FRONT

↑ *moisture travels this way*

BACK

"Hydration travels back to front. Heat damage travels front to back. They move in opposite directions."

CARD BREAKDOWN

POKÉMON — STOCK TIERS

THICKEST	**Base, Jungle & Fossil (English)** Star foil layer — thicker than any other standard Pokémon card
2ND	**Vintage English** Solid stock — reliable and even response to heat & moisture
3RD	**Mid-Era English** Slightly thinner — more variable behavior under heat
4TH	**Modern English** Thinner stock — more sensitive, less moisture needed
THINNEST	**Japanese Vintage & Modern** Thinnest of all — hardest to work on, least tolerance for error

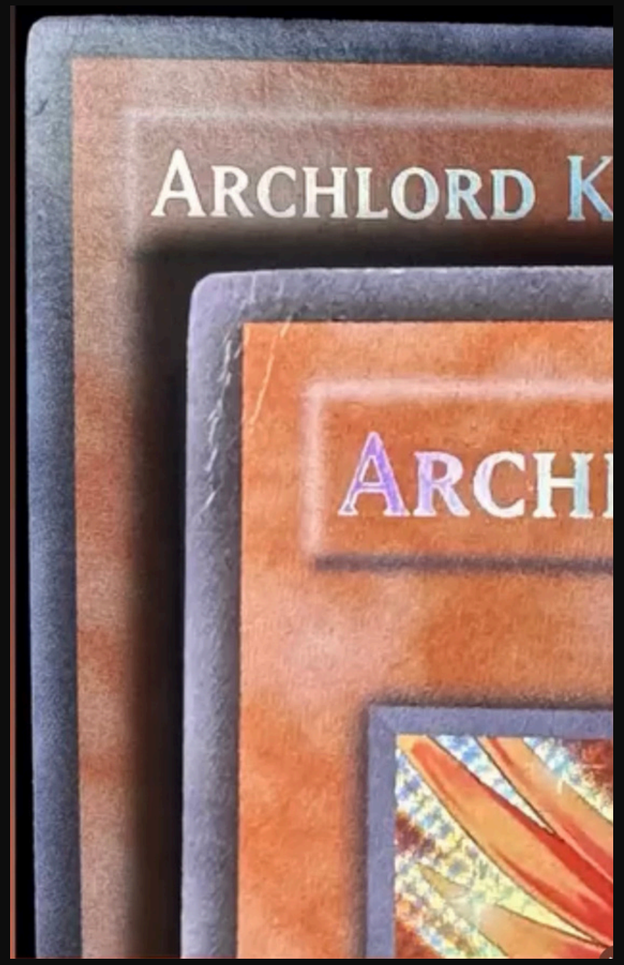
Same damage ≠ Same solution

POKÉMON — HOW IT HYDRATES

Vintage Pokémon	Absorbs slowly and evenly — longest hydration time
Modern Pokémon	Absorbs fast — less moisture needed
Japanese Pokémon	Fastest absorption — least moisture, most precision
Star Foil (Base/Jungle/Fossil) ⚠ SPECIAL RULE	Can ONLY be hydrated via humidor or Hydration Phase solution — no distilled water or card spray

YU-GI-OH!

- Thinner core than Pokémon
- Different foil bonding structure
- Reacts faster to moisture — monitor closely
- Less tolerance for error than thicker stocks

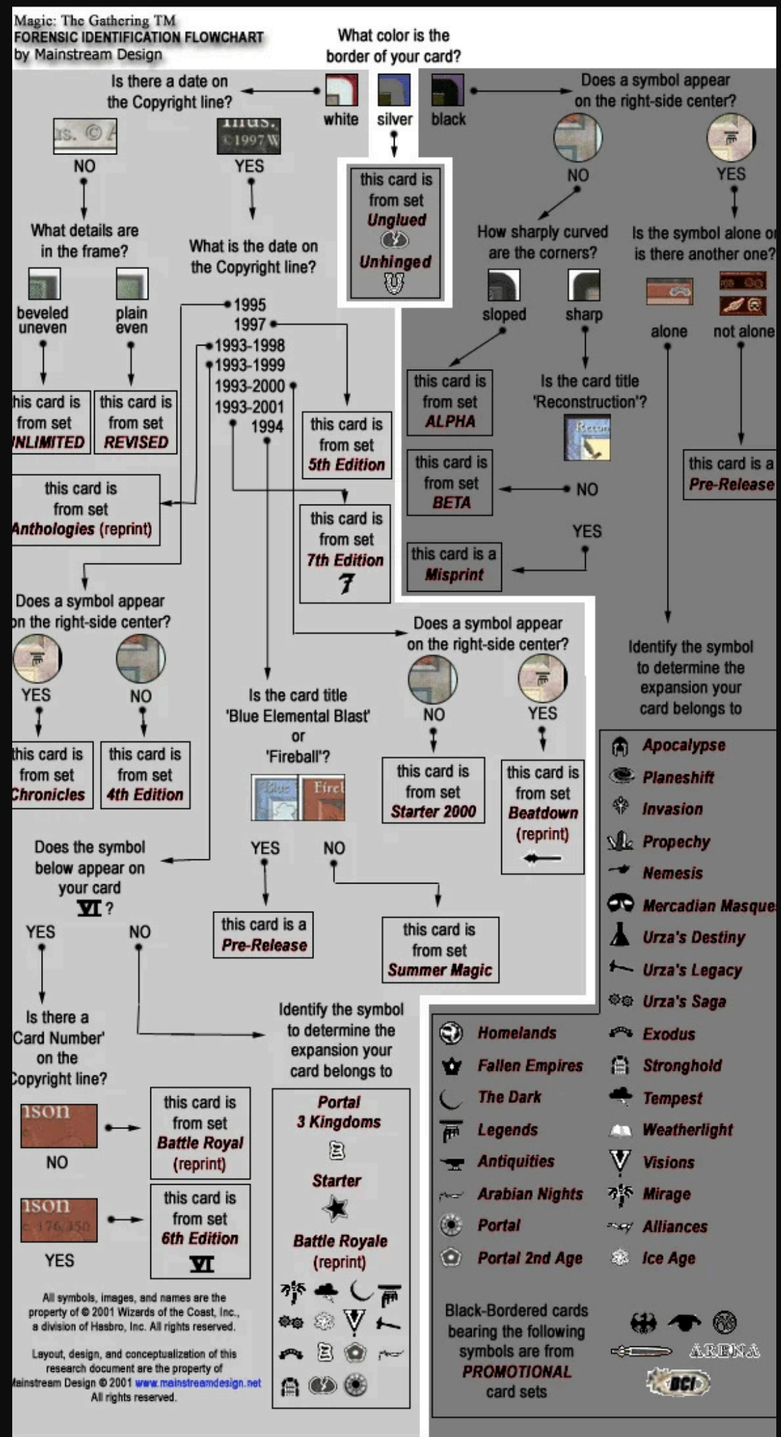


"Fast reaction = smaller window between right and wrong."

MAGIC: THE GATHERING

- Multiple card stock changes throughout the years
- Older stock behaves differently than modern printings
- Coating differences significantly affect moisture absorption
- Must identify era before determining hydration approach

"Know your set before you start."



CARD BREAKDOWN

ONE PIECE & DRAGON BALL Z

- Both manufactured by Bandai — same card stock
- New, thicker card stock
- Takes longer to hydrate fully

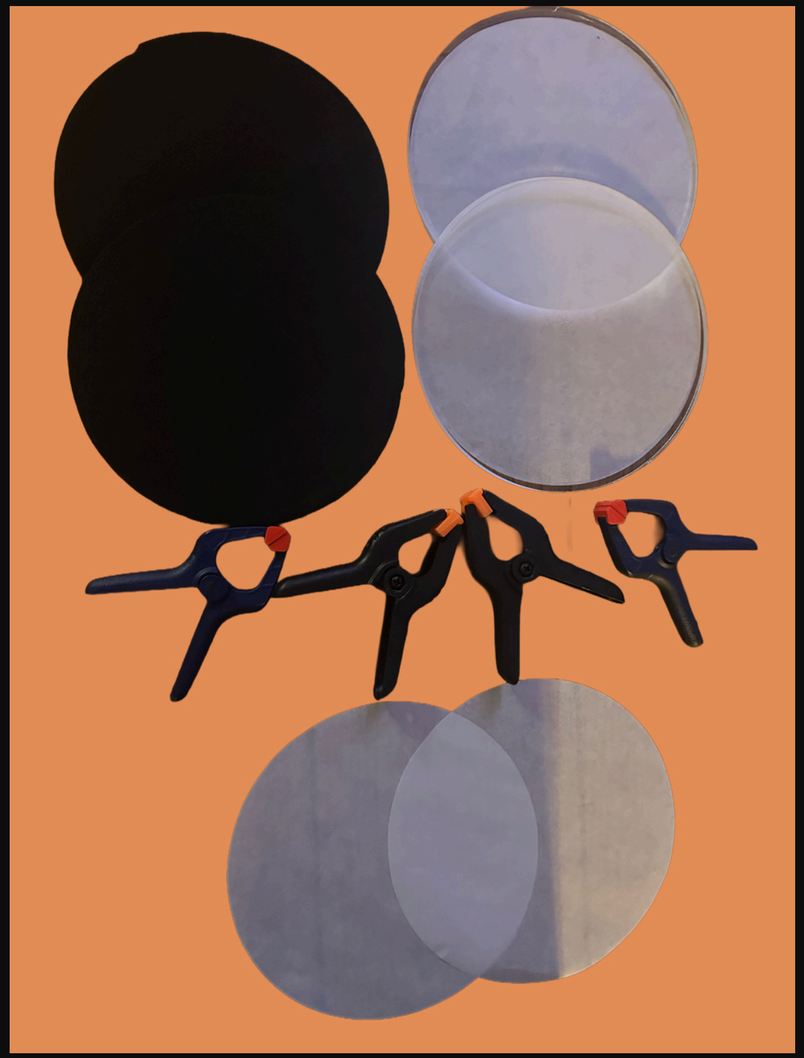
Bandai

Same manufacturer
Same stock
Same approach

"Thicker stock = more patience during hydration."

THE HYDRO PUMP METHOD

- Controlled moisture introduction — never direct application
- Moisture applied to EVA foam pad, not the card
- One layer of parchment paper on each side of the card
- Even distribution across the entire card surface
- Fibers are prepared without oversaturation



"The foam does the work. The card absorbs on its own terms."

THE HYDRATION PHASE SPRAY

- More consistent moisture control than distilled water
- Better surface preservation
- Allows lower press temperatures
- More predictable, repeatable results
- Two layers of parchment (vs one with distilled water)
- Ideal for Star foil and Japanese Pokémon

"Same method. Better results. Lower risk."

HOW MUCH IS TOO MUCH?

UNDER-HYDRATED

- Card still rigid
- Fibers not relaxed
- Press will fight the structure
- Result: incomplete correction

PROPERLY HYDRATED

- Card has slight flexibility
- Fibers relaxed, not saturated
- Moves evenly under pressure
- Result: controlled restoration

OVER-HYDRATED

- Card feels soft / limp
- Surface visually affected
- Layers beginning to separate

The goal: fibers relaxed, not saturated.

HYDRATION TIMING BY CARD STOCK

HYDRO PUMP — Distilled Water / Card Spray

5–6 sprays per EVA foam pad | 1 layer of parchment

2 hours	Yu-Gi-Oh!, Japanese Pokémon, Modern Pokémon
3–4 hours	Vintage Pokémon, Mid-Era Pokémon
6–8 hours	Magic: The Gathering, Bandai (One Piece / DBZ), Digimon

HYDRO PUMP — Hydration Phase Solution

5–6 sprays per EVA foam pad | 2 layers of parchment

5–6 hours	Yu-Gi-Oh!, Japanese Pokémon, Modern Pokémon
8 hours	Vintage Pokémon, Mid-Era Pokémon
2 × 6 hours	Magic: The Gathering, Bandai (One Piece / DBZ), Digimon

KNOWING WHEN IT'S READY

The flexibility test:

Lightly bend the card to feel how flexible and malleable the card stock has become.

Still rigid / snaps back quickly

Not ready — needs more time

Slight give — bends without cracking

Ready — proceed to card work

Soft / bends too easily

Over-hydrated — stop, let it air out

"The window between under and over is where results happen."

WHY DRYING IS HALF THE PROCESS

- Moisture in = moisture must come out evenly
- The press does dry the card — but it must be done correctly
- Uneven drying creates new damage
- How you dry is just as important as how you hydrate

Hydration
+
Drying
=
Restoration

Hydration
without proper
drying
=
New damage

WHAT IS PRE-WICKING?

- Place card in a book with a light weight on top — 12 hours
- Book pages slowly wick moisture out of the card
- The book does the drying work — not the press
- Saves energy — no need to run the press for hours on end

Eliminates:

✕ Back of card warping from excessive heat

✕ Card curving awkwardly after drying

✕ Parchment paper folding indents into the card

"Let the book do the drying. Let the press do the restoring."

THE COMPLETE SYSTEM

01

HYDRATION PHASE

Moisture prepares the card

02

CARD WORK

Work out creases & dents by hand

03

PRE-WICK

Let book dry card (skip if delaminating)

04

HEAT PRESS (DRY)

Restructure and lock in shape

** Pre-wick step is skipped when treating delamination*

Moisture + Hand Work + Drying + Heat = Control

CURRENT METHOD TEMPERATURES

METHOD	TEMP	TIME / PROCESS	NOTES
Fire Blast + Pre-Wick	**160°F**	4–5 hrs	Pre-wick before press
Fire Blast (No Pre-Wick)	**160°F**	6–8 hrs	Delamination treatment
Hydration Phase + Pre-Wick	**150°F**	1 hr → Pre-Wick	Pre-wick completes drying
Hydration Phase (Delamination)	**150°F**	1 hr → Pre-Wick → 1 hr	Both press sessions at 150°F

Hydration Phase spray reduces required temperature and time significantly.

HEAT PRESS — LAYERING ORDER

▲ HEAT PRESS — TOP PLATE

1 **3× Aluminum Sheets**
ZOFORTY 5052 — 12×12"

2 **EVA Foam**
Better Office Products — 2mm, 9×12"

3 **Parchment (folded in half)**
Katbite — 12×16" folded = 2 layers

4 **Cards — face down**
Max 8 | Recommended: 4

5 **Parchment (folded in half)**
Katbite — 12×16" folded = 2 layers

6 **EVA Foam ×2**
Extra layers balance heat tension on card front

7 **3× Aluminum Sheets**
ZOFORTY 5052 — 12×12"

▼ HEAT PRESS — BOTTOM PLATE

PRODUCTS USED

Aluminum Sheets

ZOFORTY 5052 — 12×12", 1/64" thin

EVA Foam

Better Office Products — 2mm Black, 9×12"

Parchment

Katbite Unbleached — 12×16", fold in half

NOTES

- Cards placed face down
- Max 8 cards — recommend 4
- Extra EVA foam (bottom) balances heat tension

RISKS OF DOING IT WRONG

CAUSE	*RESULT*
Direct moisture application	**Paint fade**
Residual moisture	**Bubble creasing**
Too much moisture	**Card bloating / layer separation**
Over-drying	**Fiber contraction / surface warping**
Wrong temperature	**Foil damage / orange peel**
Skipping pre-wick	**Parchment folds and indents into the card**

REAL RESULTS

BEFORE — Sabrina's Gengar 1st Ed.

AFTER — Sabrina's Gengar 1st Ed.

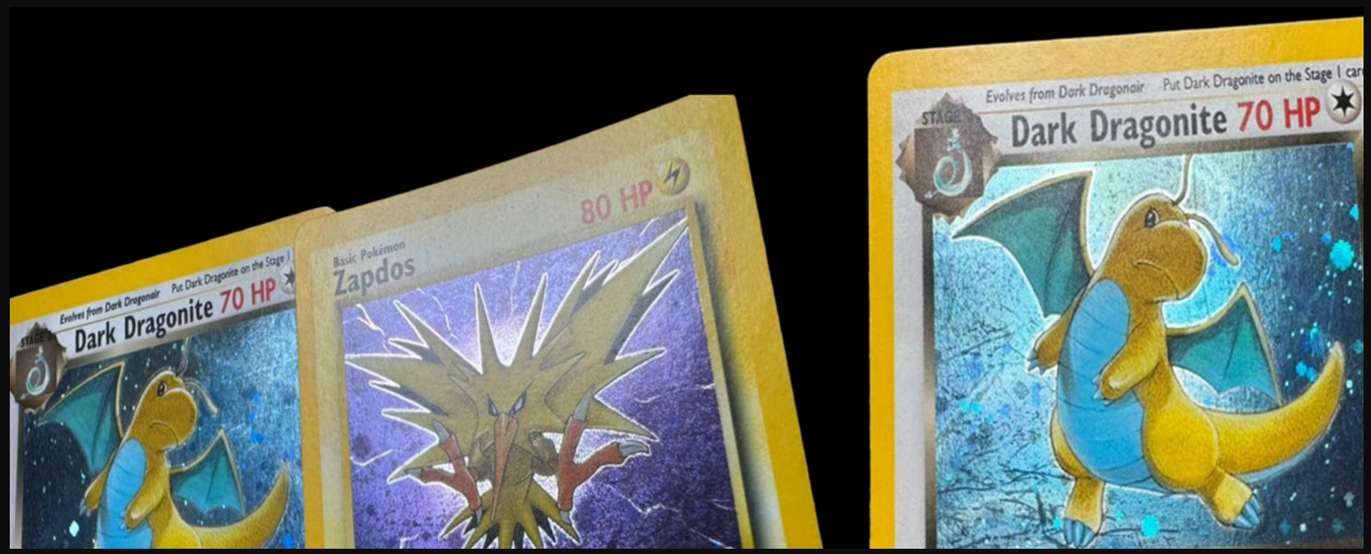
BEFORE — Typhlosion 1st Ed.

AFTER — Typhlosion 1st Ed.

"Consistent. Controlled. Repeatable."

WHAT CAN'T BE FIXED

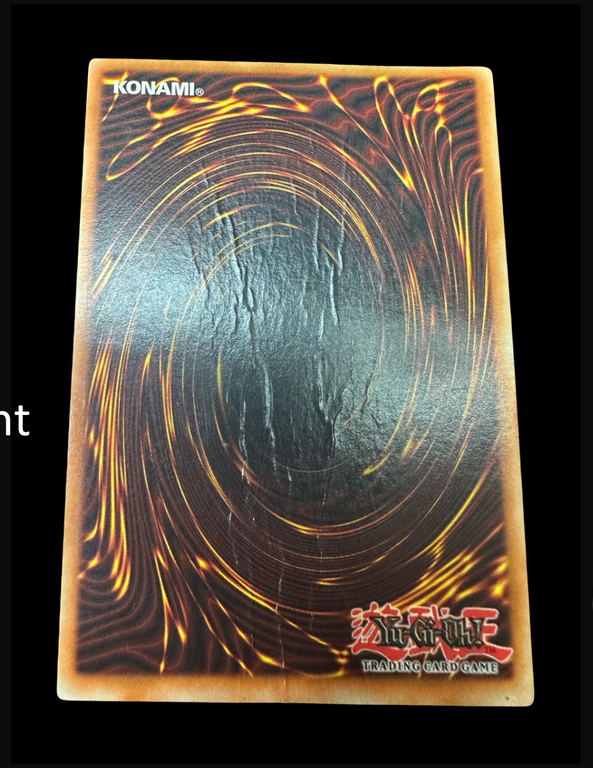
- Structural loss — fibers physically torn or destroyed
- Severe ink or paint damage
- Deep delamination past the point of reseating
- Cards too far gone — more moisture won't help
- Foil heat damage — permanent discoloration or burn



"Knowing the limit is part of the skill."

RESPONSIBILITY IN RESTORATION

- Precision over shortcuts — every time
- Know your card stock before you apply anything
- Match your hydration method to the card type
- When to say no to a card
- Overprocessing is one of the fastest ways to cause permanent damage



SETTING A STANDARD

CONSISTENCY

Over shortcuts

CONTROL

Over guesswork

QUALITY

Over speed

"The goal is restoration — not compromise."

"The goal isn't just to improve a card…
it's to restore it without compromising what makes it valuable."

TROUBLESHOOTING

HEAT PRESS MISTAKES — WHAT WENT WRONG

SYMPTOM	CAUSE
Orange peel texture remaining	Not enough heat / time too short
Foil burn	Too much heat / ran too long
Card warping / fiber contraction	Too much moisture going in / no pre-wick
Card curved after drying	Uneven moisture / skipped pre-wick
Parchment indents in card	Skipped pre-wick — residual moisture present

HOW TO AVOID THEM

01	Assess card stock before starting — know what you're working with
02	Match hydration method and timing to the specific card type
03	Never skip pre-wick unless intentionally treating delamination
04	Know your operating temperature window — stay in it
05	When in doubt: less moisture, more time

"Preparation prevents problems."

CLOSE

THE SYSTEM

"Hydration prepares.
Pre-wicking starts drying.
The heatpress finishes."

Moisture + Hand Work + Drying + Heat = Control

Not the other way around.

Understand the card before you touch it.

"The difference between damage and restoration is understanding."

Matthew Musick | Shiny Asset Exchange