

# Getting Started with MX Dyes

Workshop at PRO Chemical &  
Dye taught by Vicki Jensen

Presented by Megan MacBride





# PRO<sup>TM</sup> CHEMICAL & DYE

- Founded in 1969 by Adelle and Donald Wiener
- Based in Fall River, MA
- Offers dyes, textile paints, fabrics, books, batik supplies, safety equipment, resists, discharge supplies, workshops, dye classes and more

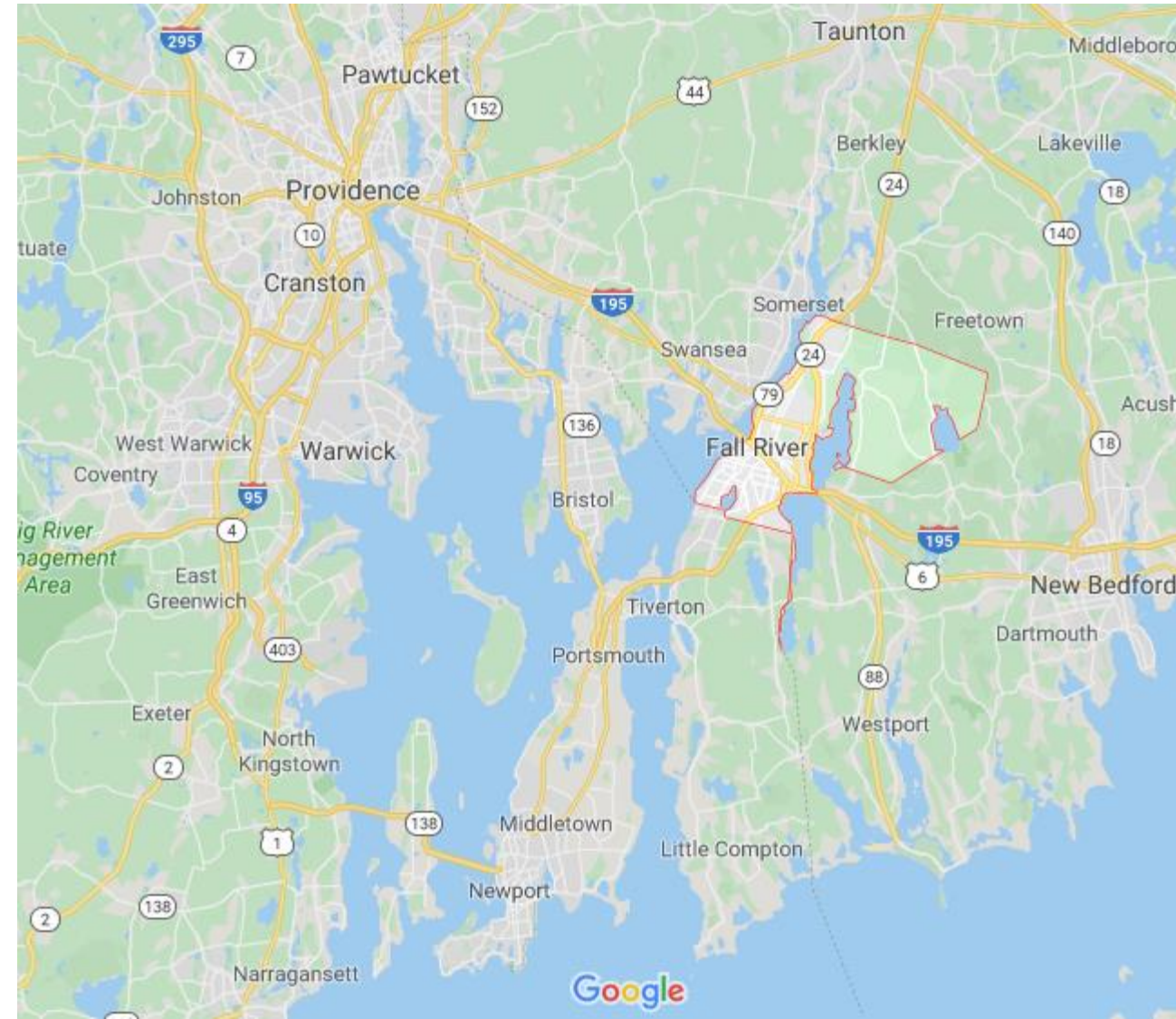




Housed in old mill building – top 3 floors burnt in 1946 and were removed

# Fall River, MA

- Center of textile industry from ~1810-1920s
- Largest Portuguese-American population in US: ~40% of town



# Newport, RI

- 9 Gilded Age mansions
- Topiary garden
- Public beaches and shoreline trail



**30 min** (19.8 mi) via W Main Rd and RI-24 N













# Getting started with MX dyes

- Two day workshop
- Taught by Vicki Jensen
  - 20+ year employee at PRO Chem
- Lots of handouts with detailed instructions
- Some lecture
- Mostly hands-on





# History of MX dyes

- Procion® MX dyes introduced by Imperial Chemicals Industries (ICI, a British company) in 1956
- Patents have since expired, so many companies manufacture/sell MX type fiber reactive dyes under a variety of names
  - Procion
  - Lamafix
  - Adiaactive
  - Cold Brand
  - Etc

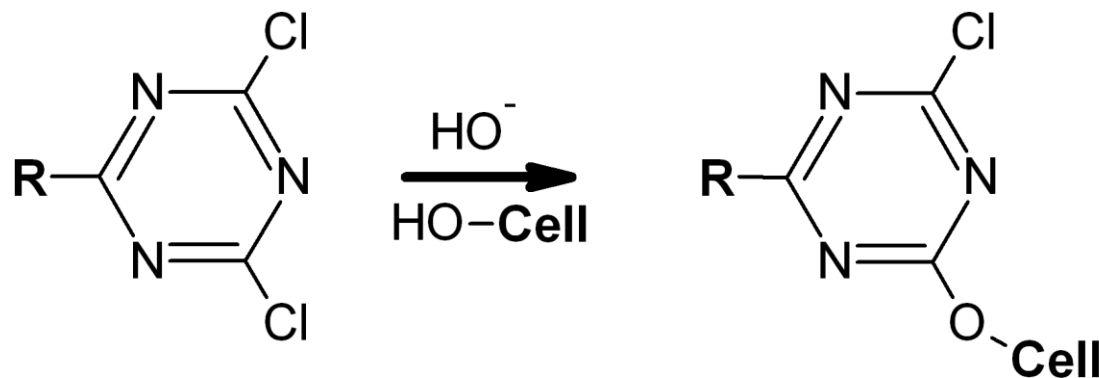


# MX Fiber Reactive Dyes

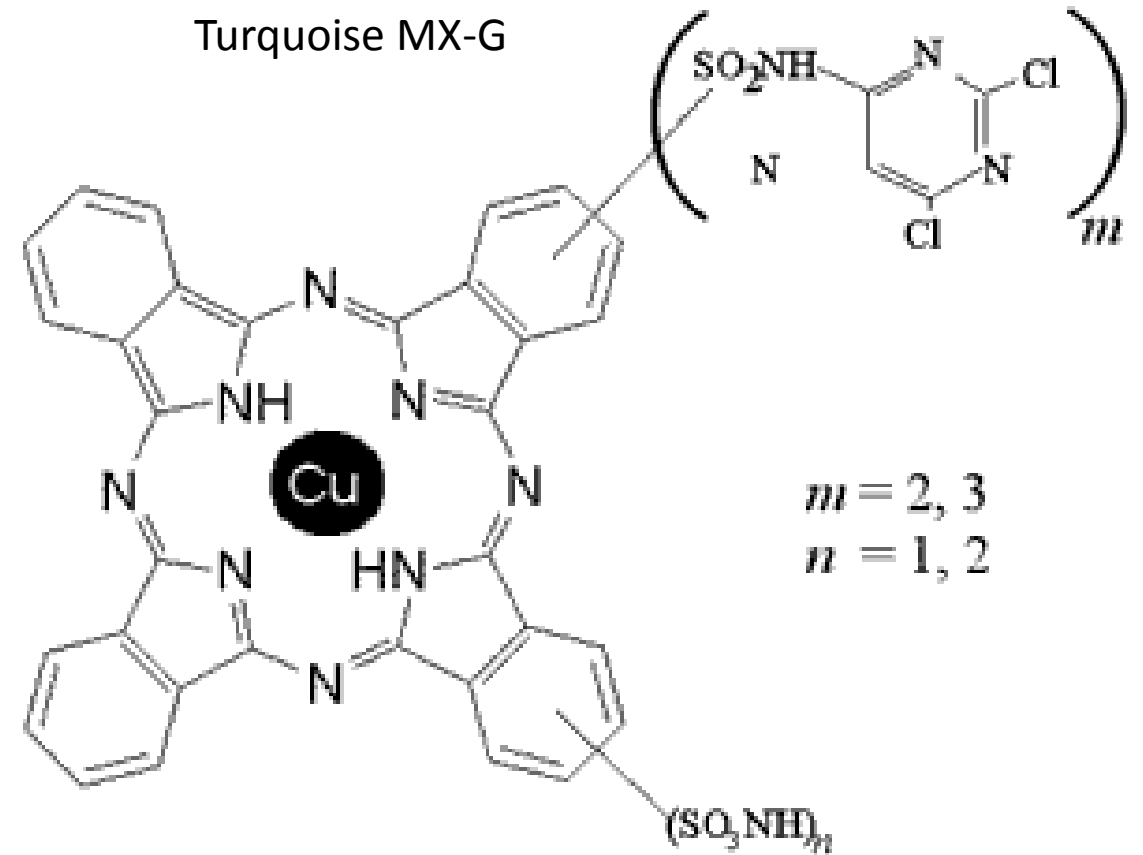
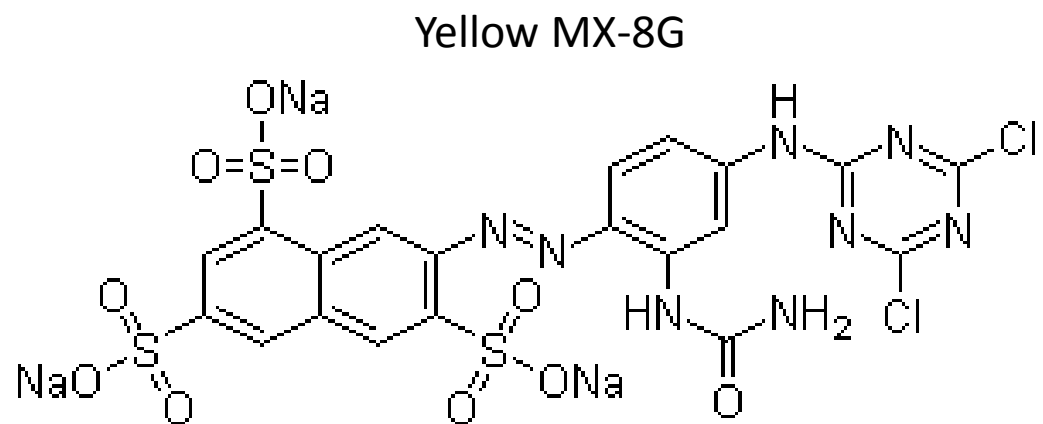
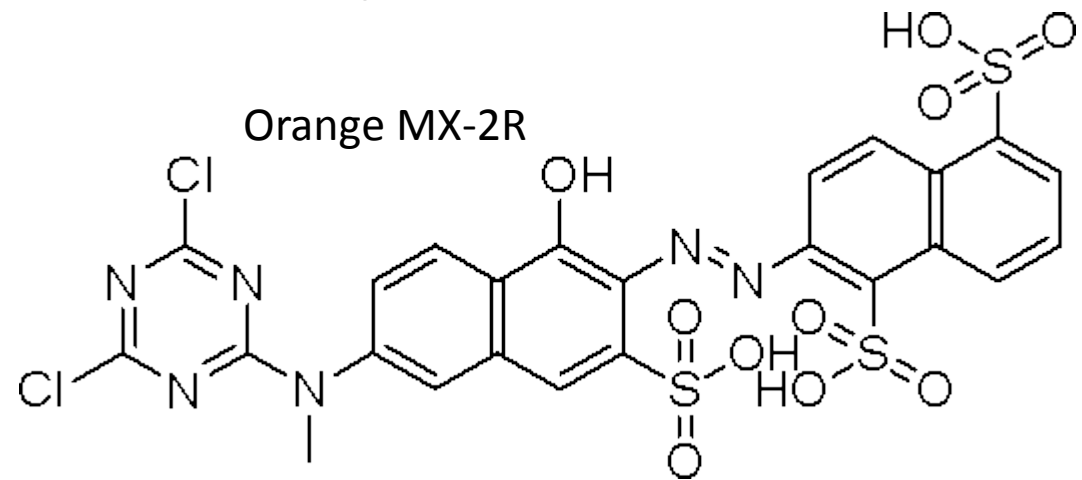
- “Cold water dyes”
- Primarily designed for use on cellulose
  - Cotton (mercerized or unmercerized)
  - Linen
  - Viscose rayon (not acetate rayon)
  - Silk (has fewer dye sites for reactive dyes)
  - Bamboo
  - Tencel
- Can be used on protein fibers – requires acid and heat
- Note that resulting color may be quite different on cellulose vs protein when using a mixed dye vs a pure dye

# MX dye chemistry

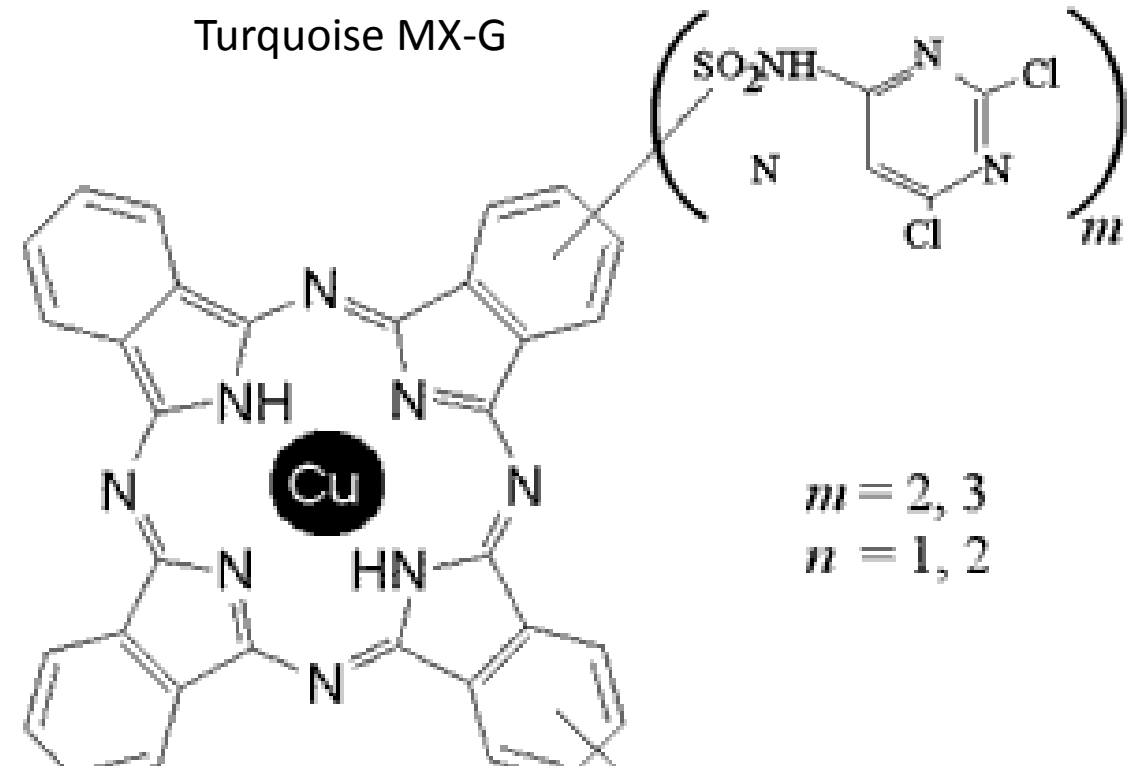
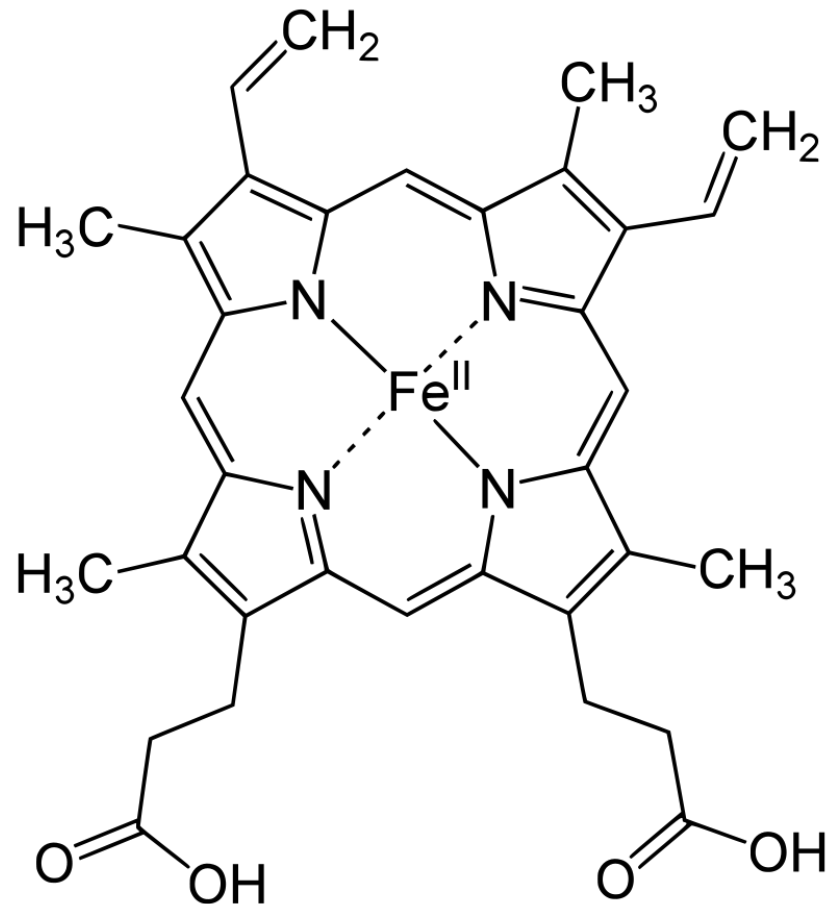
- Reactive dyes: chemicals which contain a chromophore and form a covalent bond to fiber
  - The covalent bond is a permanent bond – chromophore is physically affixed to fiber
- Dichlorotriazine dyes
  - Dichlorotriazine is a functional group which forms covalent bond with cellulose
  - Attached to varying chromophores (functional groups which produce color)



# Example chemical structures MX dyes



# Example chemical structures MX dyes



MX-G is a porphyrin, which is a type of large heterocyclic compounds which complex with metals. Heme (hemoglobin) is also a porphyrin.



# Pure dyes or mixed

- Pure dyes = single molecule
- Mixed = mixture of multiple molecules
- Practical effects



Pure Dyes	Mixed Dyes
Should be similar from vendor to vendor	May be vendor specific
May be better for further mixing	May not mix as well
Will not separate into components when snow dyeing	Will separate into component dyes when snow dyeing

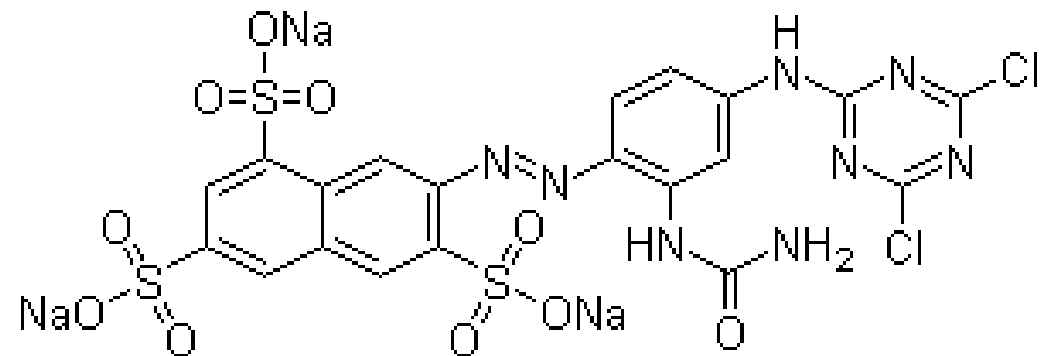


# Dye nomenclature for pure dyes

- Each pure dye also has a Colour Index (C.I.) generic name such as Yellow 86 and Colour Index Constitution Number such as CI 192755
- CAS registry # is a unique chemical ID, for example CAS 61951-86-8
- IUPAC names – unlikely to need this! [1,3-benzenedisulfonic acid, 4-((5-aminocarbonyl-1-ethyl-1,6-dihydro-2-hydroxy-4-methyl-6-oxo-3-pyridinyl)azo)-6-(4,6-dichloro-1,3,5-triazin-2-yl)amino)-, disodium salt]

You will mostly see MX and/or CI generic names used




Yellow MX-8G



# MX fiber reactive dyes

**Table 1. Pure unmixed single-hue Procion MX type (dichlorotriazine) dyes**

with links in the MX code names to some chemical structures. See [Sources](#) for contact information for the companies listed. Listed in approximate color wheel order. Color swatches are approximate at best and are intended only to give a vague idea of the color.

CODE	Colour Index reactive dye name	Dharma's name	PROchem's name	Custom's name	G&S Dye's name	George Weil's name	Standard's name	Kraft colour	Aljo Mfg. Co.'s name	Jacquard Products	Patchwork Shop.de	notes
 <a href="#">yellow MX-8G</a>	yellow 86	#1 lemon yellow	#108 sun yellow	#104 yellow MX-8G	208 bright yellow	-	yellow MX-8G	Yellow MX8G	#3 lemon yellow	004 lemon yellow	Zitronengelb	pure; good yellow primary for mixing colors
 <a href="#">yellow MX-4G</a>	yellow 22	-	#114 lemon yellow	-	214 yellow	M01 lemon yellow	yellow MX-4G	Yellow MX4G	#10 pure yellow	-	-	pure
 <a href="#">yellow MX-GR</a>	yellow 7	#3 golden yellow	#112 tangerine yellow	-	-	-	yellow MX-GR	-	-	-	-	being replaced by mixtures?

<http://www.pburch.net/dyeing/FAQ/pureMXcolors.shtml>

# Principles of dyeing

- Scour fiber (or fabric) before dyeing
  - synthrapol, PRO Dye Activator, hot water
- Apply dye to fiber at pH at which the dye has little or no affinity for the fiber. This promotes good levelness throughout. This is your dye bath: water, dissolved dye powder, scoured fiber.
- Adjust the pH to between 10-10.5 to trigger the dye reaction.
- Dye for the allotted time.
- Rinse in 3-4 buckets room temp water. Constantly move fiber during rinse to remove all dye activator and flush out unfixed dye.
- Wash in synthrapol as hot as possible to remove residual unfixed dye
- Warm rinse to remove synthrapol
- Air dry

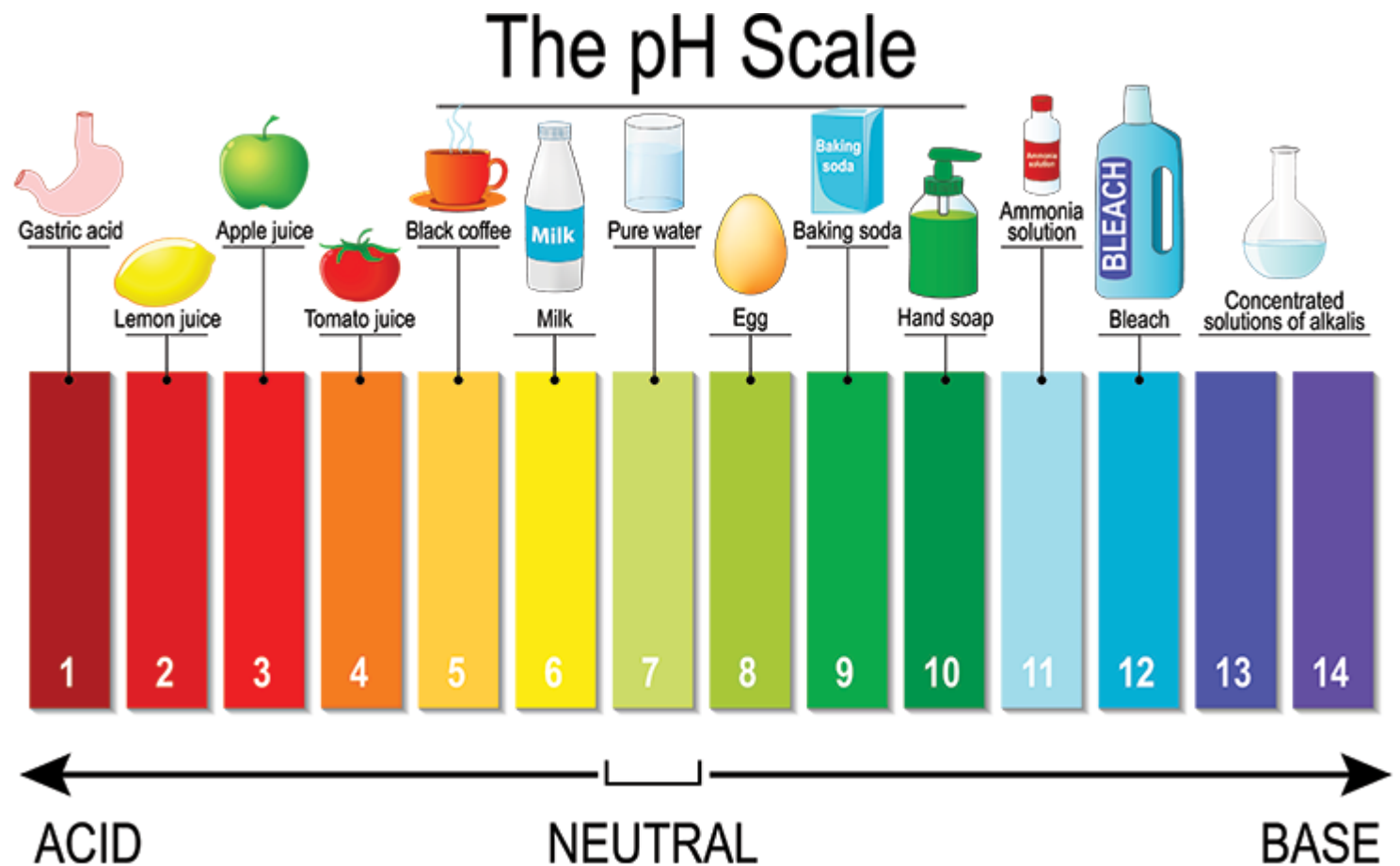


# Fiber prep

- Can purchase “PFD” fabric = “prepared for dyeing”
- Yarn may have spinning oil in it which can affect dyeing
- Unless PFD, scour your fiber first

# Dyebath pH

- For regular alkaline MX dye bath, want 10-10.5 pH
  - Use soda ash or dye activator (sodium carbonate)
- For acid MX dye bath, want 5.5-6.5 pH



# Misc notes

- Dry dye powders have minimum shelf life of 2 years
- Dye solution (not dye bath) has shelf life of 7-10 days. In warmer weather, this may be reduced.
- Use room temp water (75-95 F) to dissolve dyes, not warm or hot water.
- Salt (non-iodized) is required for immersion dyeing.
- Synthrapol helps fibers take up dye
- OWG = on weight of goods
- Weight of fiber x 30 = dye bath volume.
  - For 5 g sample, use 150 ml dye bath



# Misc notes

- Always wet out fiber with warm water and drop of synthrapol prior to going into dyebath to promote even dyeing
- If you have hard water, may need metaphos
- More stirring = more even color
- Process is ~2 hours start to finish for immersion dyeing

# Dye methods

- Immersion dyeing
- Low water immersion dyeing
- Direct application
- 12 step gradation dyeing
- Two color gradation dyeing in six steps

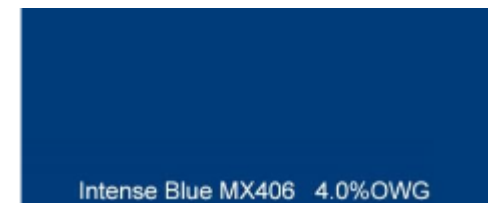
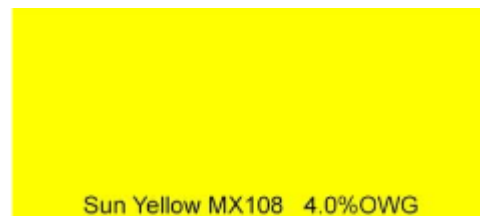
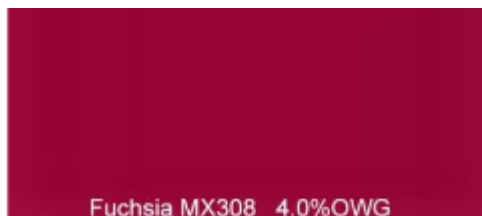


# Immersion dyeing

- Requires dye powder, dye activator or soda ash, synthrapol, common salt, metaphos (optional – water softener)
- Scour fabric
- Dissolve dye powder in water
- Prepare dye bath: room temp water
- Add salt
- Dissolve PRO Dye Activator or soda ash and add to dye bath
- Stir
- Rinse & wash

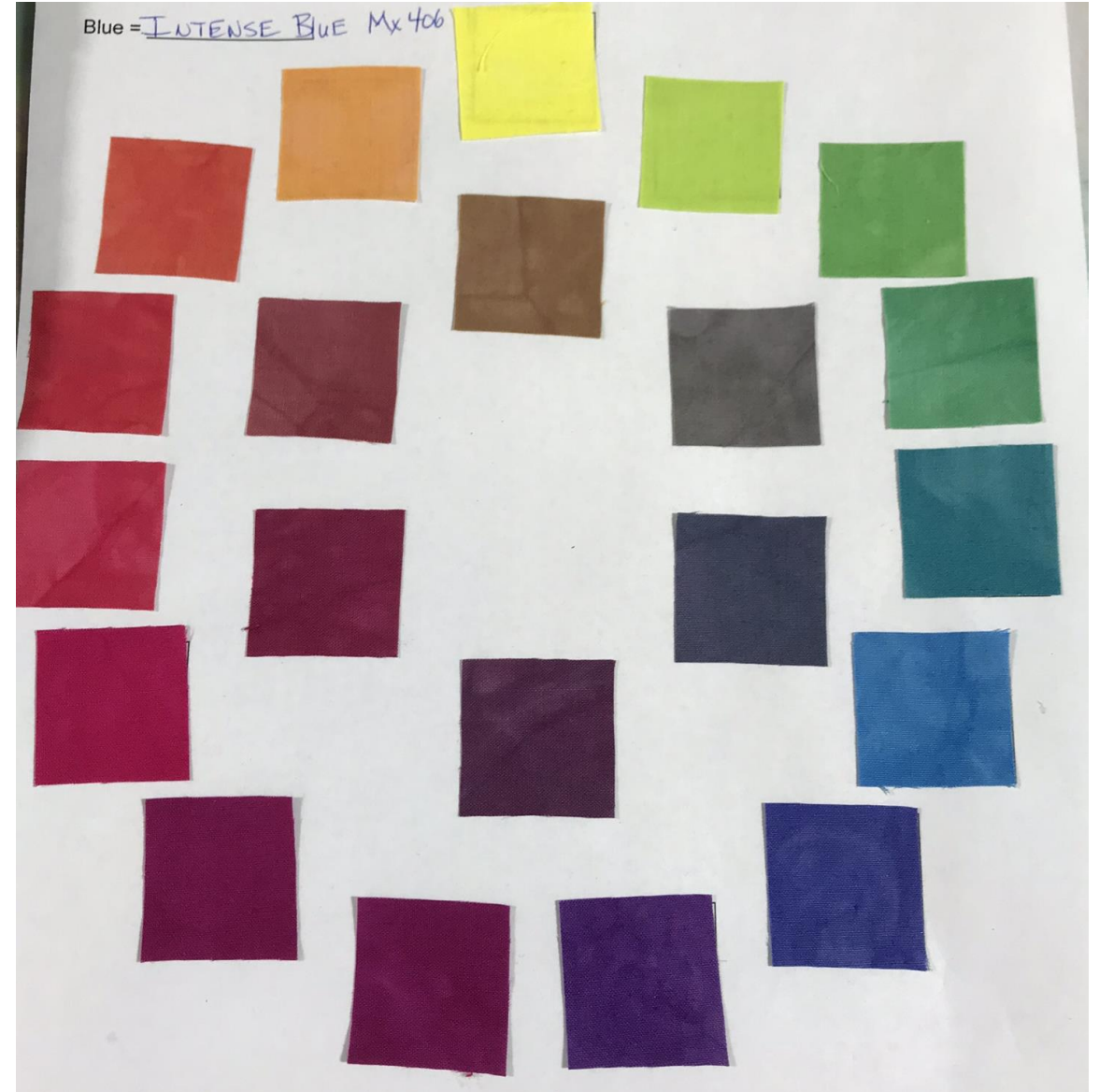
# 21 step color wheel

- There are not “set” primary colors, so pick 3 primaries you like (a red, yellow and blue)
- Do 2 and 3 color mixes starting from your primaries
- Buying just 6 primary colors can get you infinite colors
- Example color wheel uses
  - Red = Fuschia MX308
  - Yellow = Sun yellow MX108
  - Blue = Intense blue MX406



# 21 step color wheel

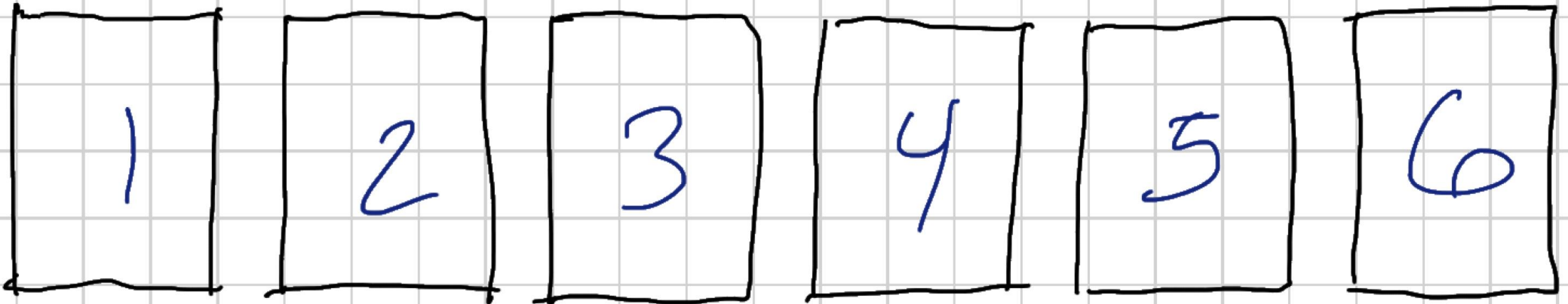
- Mixed up 3 1% dye solutions
- Made 21 small dye baths
- May use non-pure colors as your primary, but results may not be as bright





# Two color gradation dyeing in six steps

Dye baths



# Two color gradation dyeing in six steps









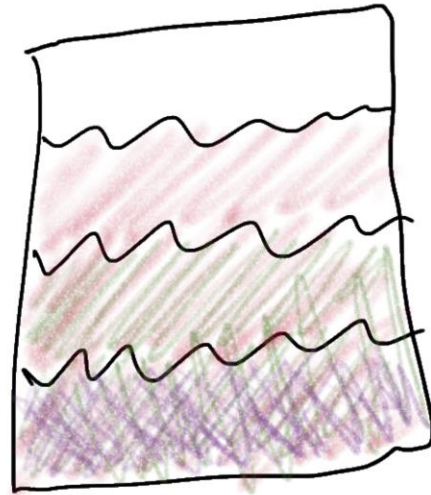
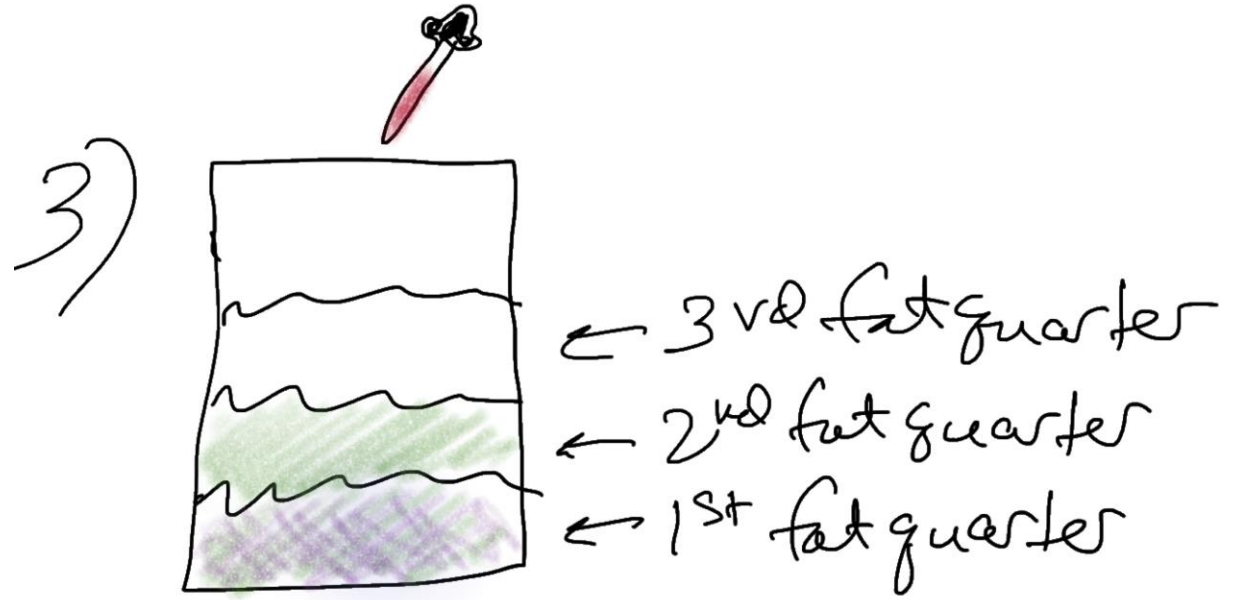
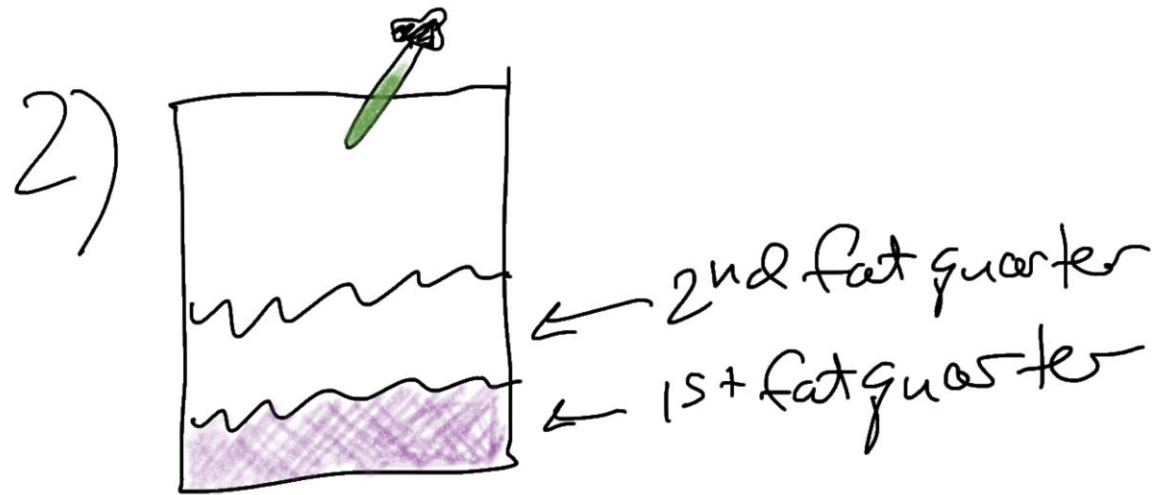
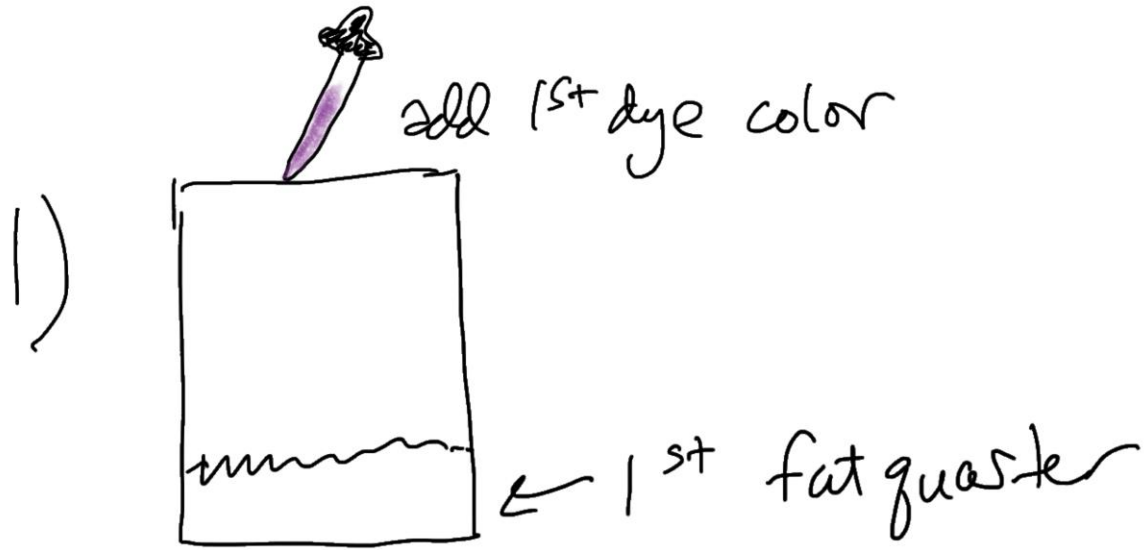
# Low water immersion dyeing

- Use one to three colors
- Only takes ~1 hour – very little water and no salt!
- Use dye container that holds ~1 L
  - Ideas: rectangular plastic shoebox, old roasting pan, large yogurt container
- Scrunch, twist, pleat or fold your fabric and place in dye container
- Pour prepared dyes over fabric, wait 15 min
- Pour warm dye activator or soda ash over fabric. Can change folds in fabric now if desired.
- Let sit 1-24 hours
- Rinse and wash

# Color parfait

- Put 1 fat quarter in 1 L container
- Add 1st dye color
- Add 2<sup>nd</sup> fat quarter
- Add 2<sup>nd</sup> dye color
- Add 3<sup>rd</sup> fat quarter
- Add 3<sup>rd</sup> dye color

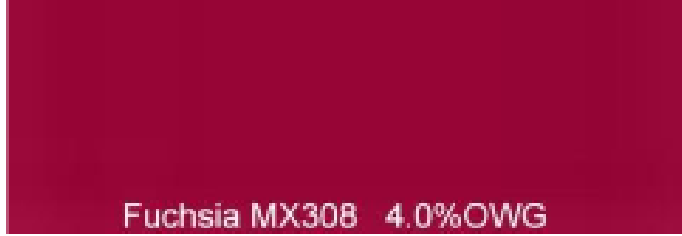








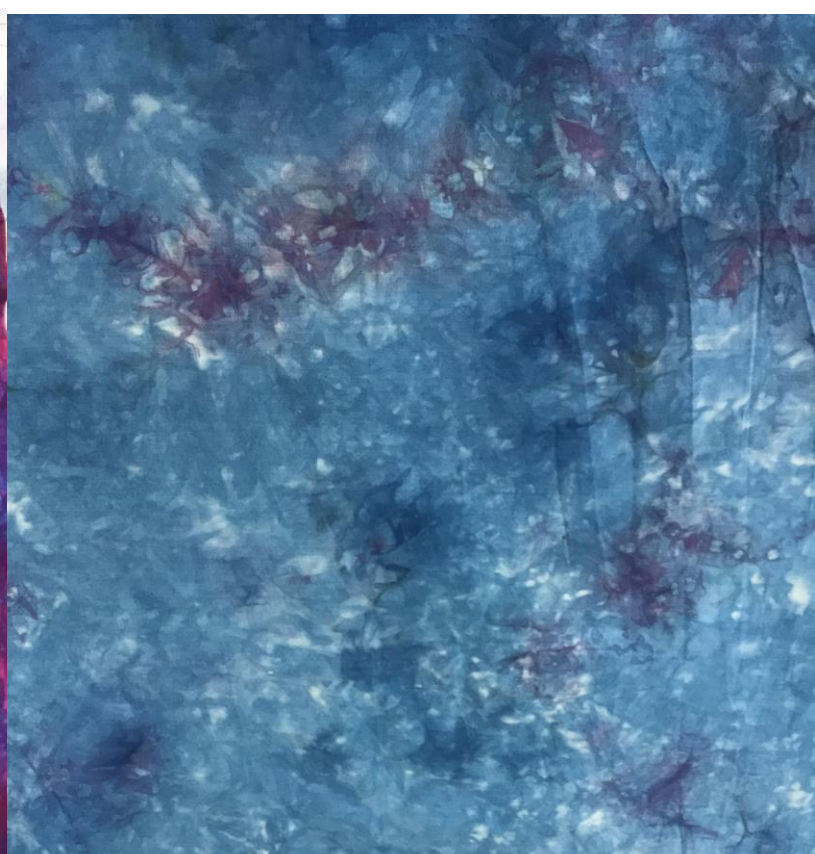
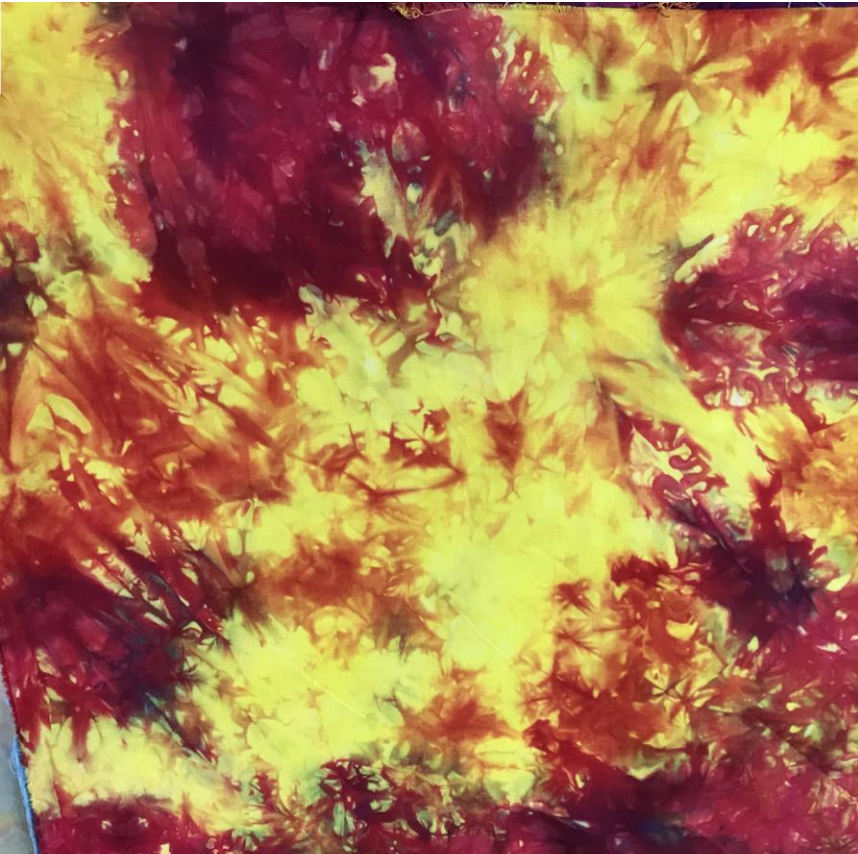
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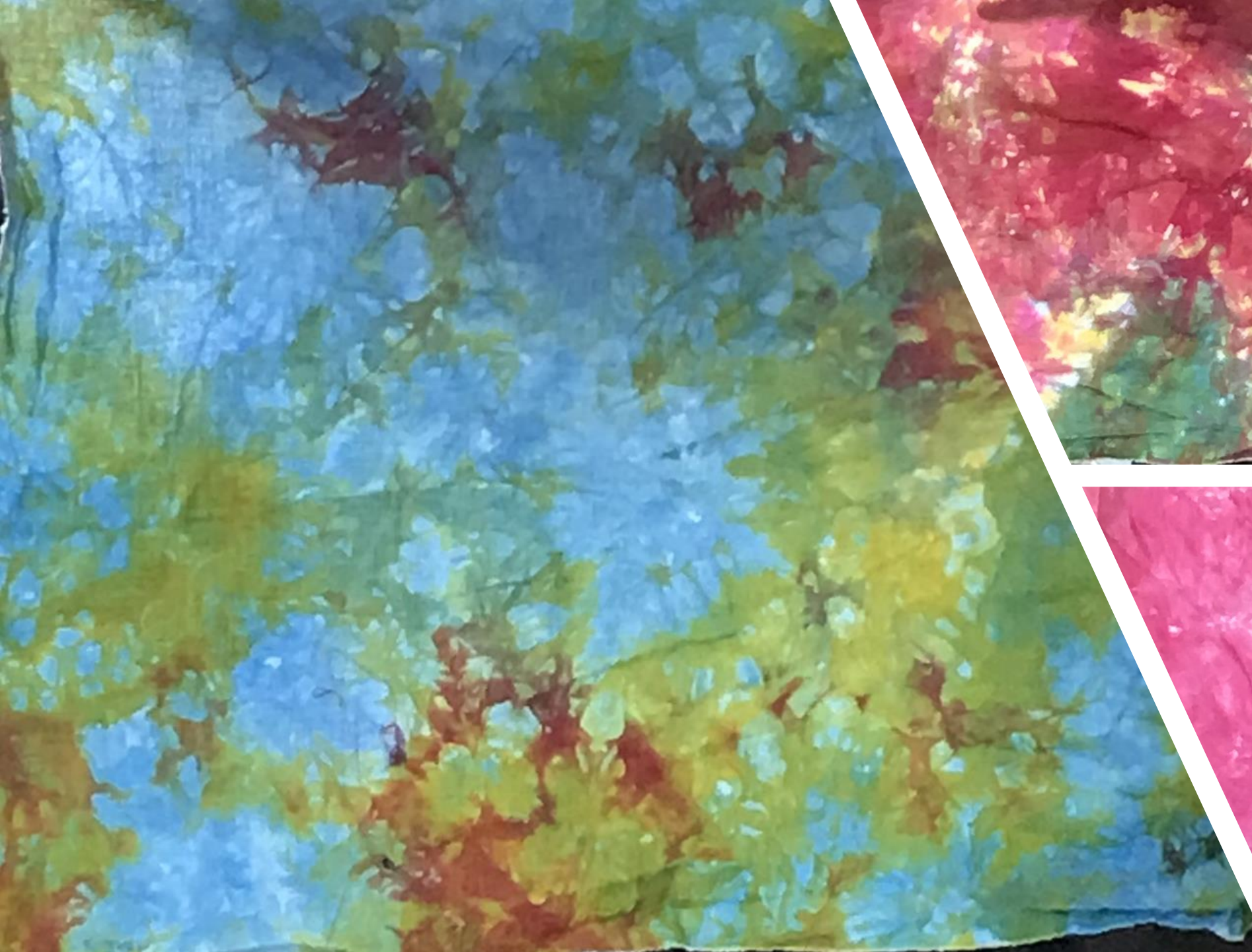


Middle

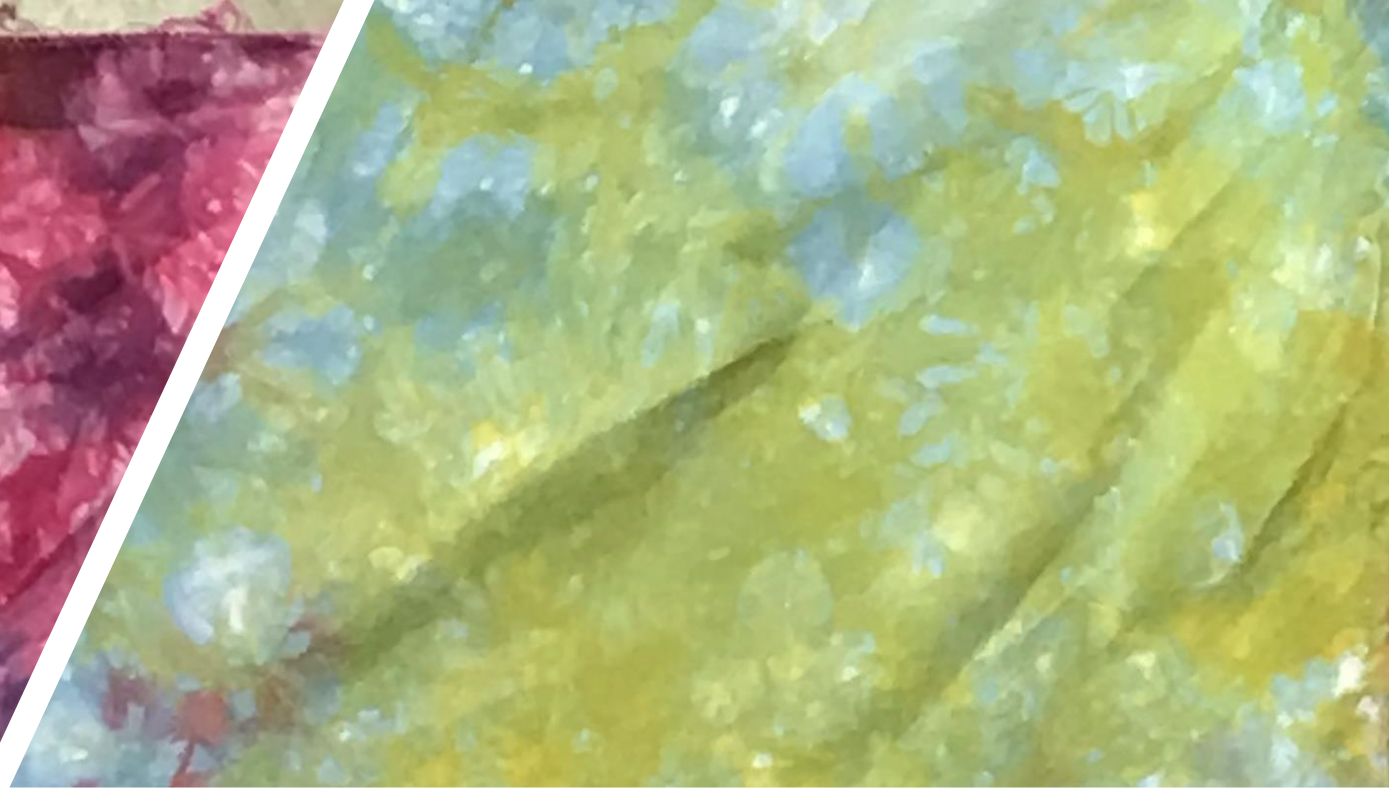
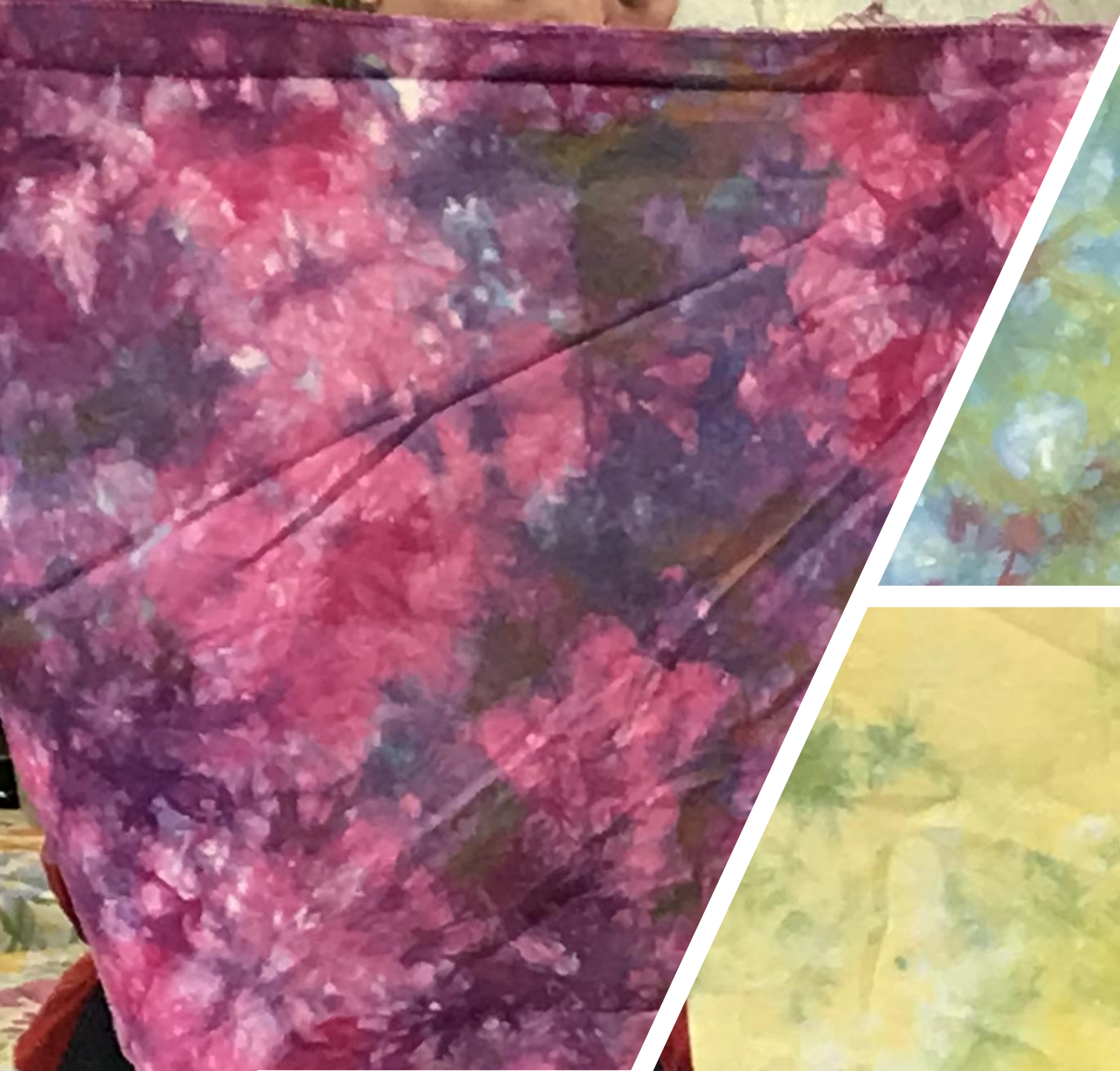


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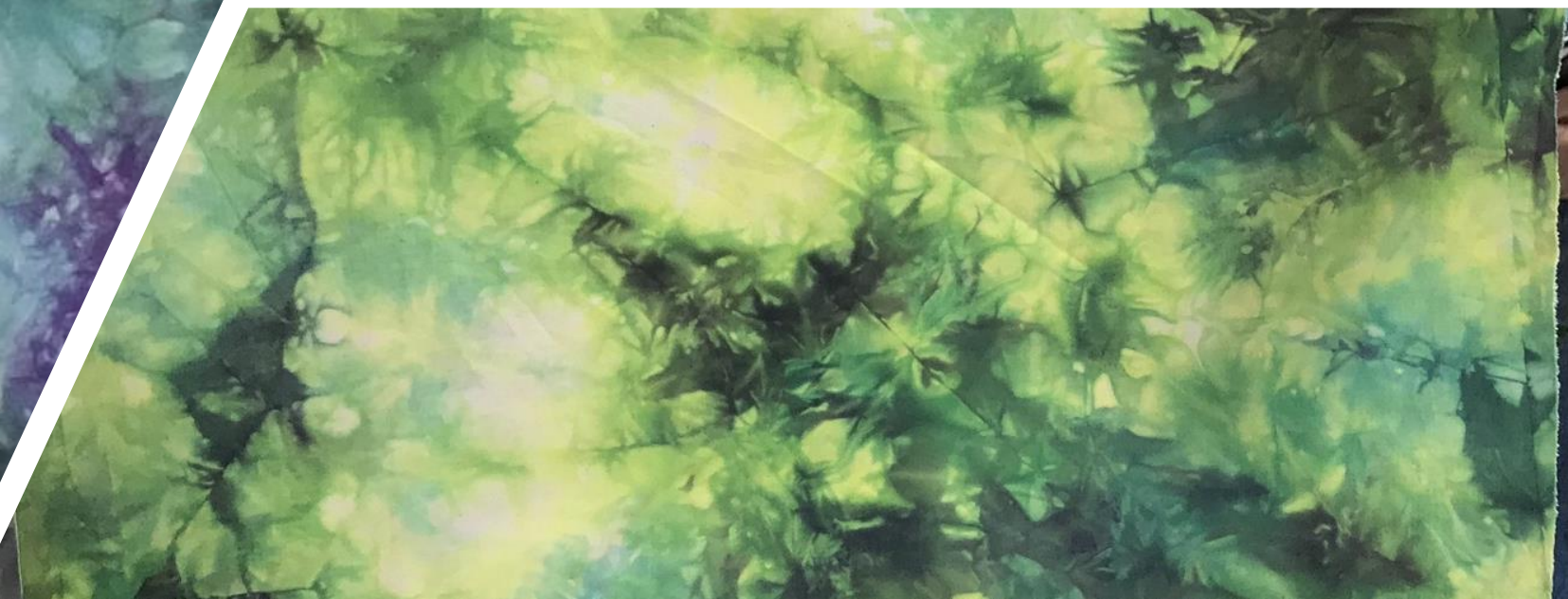
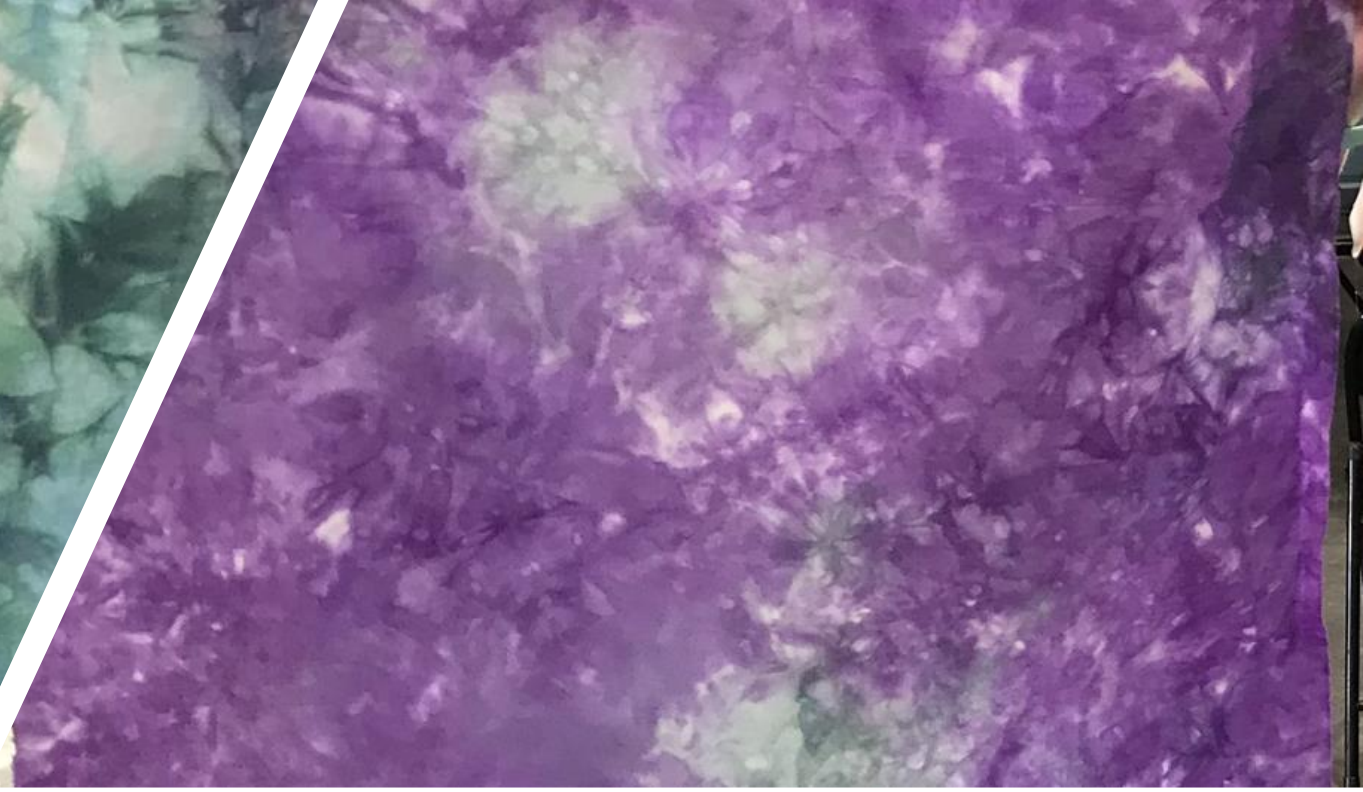












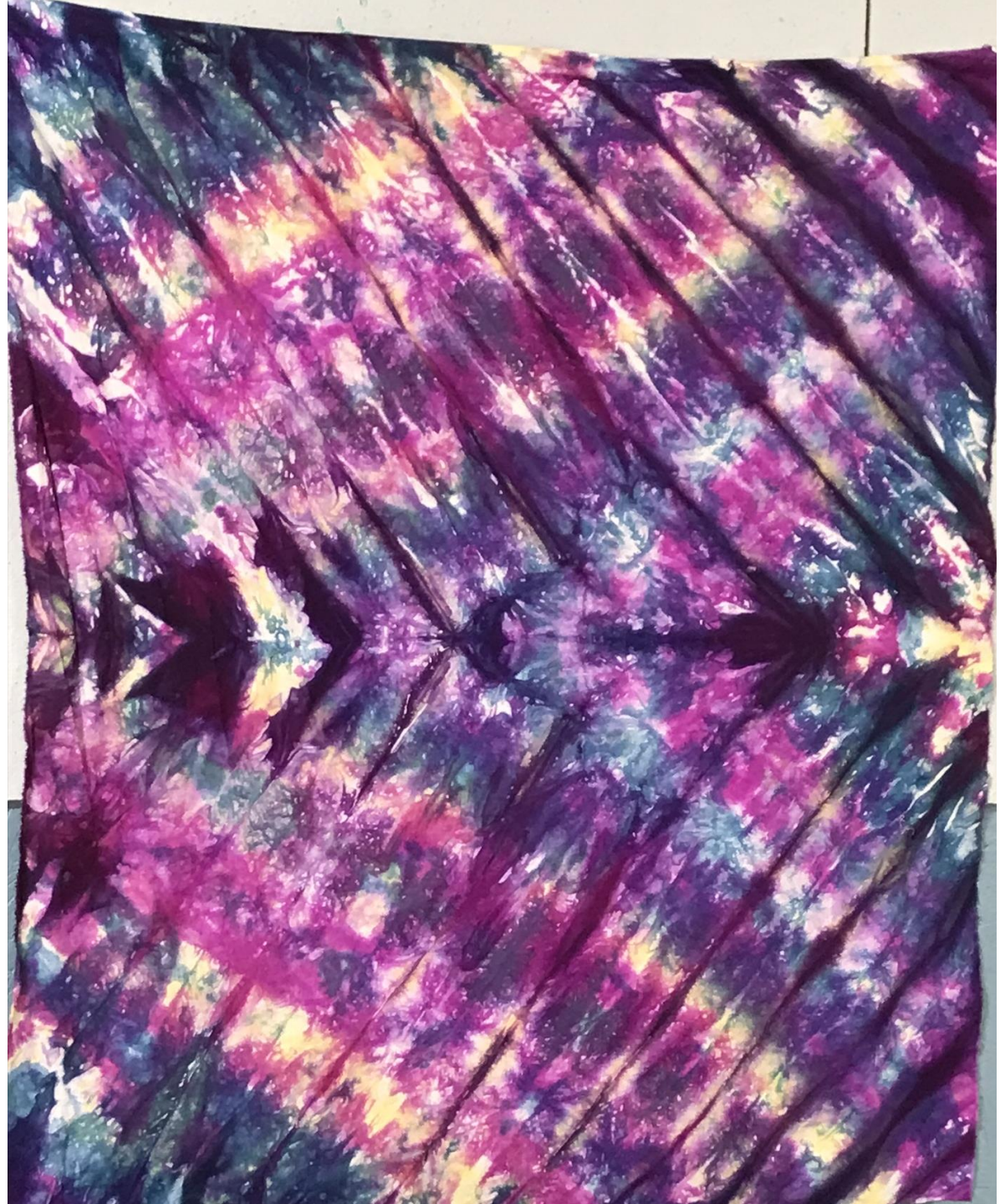
# One yard of multi-colored fabric

- Used plastic “shoeboxes”
- Scrunch, fold, pleat wet fabric
- Pour dye over fabric, press to distribute
- Use 1-3 colors







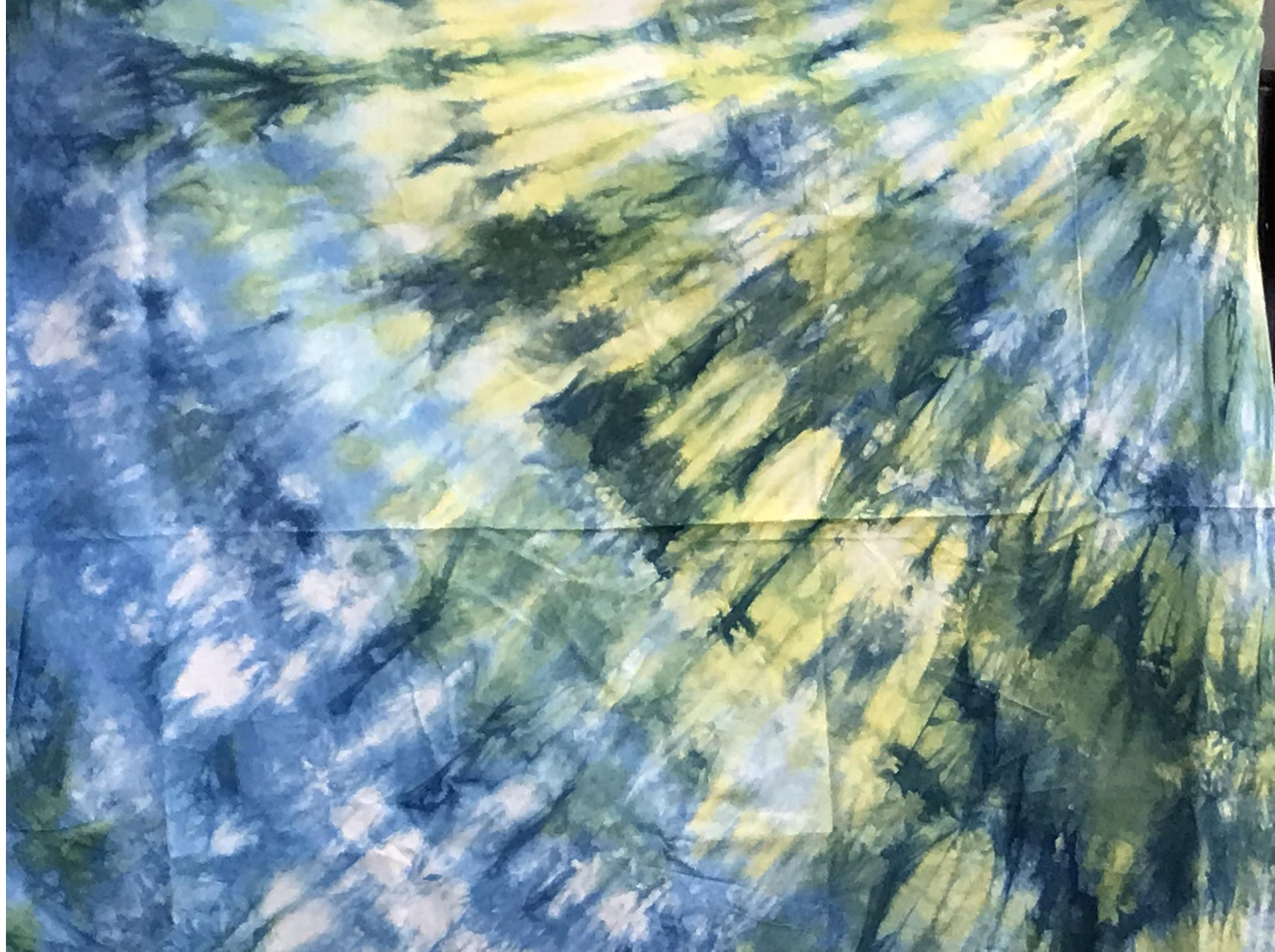
















# Direct application dyeing

- 3 ways to work with direct application
  - Unthickened dyes
    - Ex: tie dye, warp painting, watercolor effects (washes of color)
  - Thin dye paint
    - Add just a smidge of thickener. Handpaint.
  - Thick dye paint
    - Ex: screenprinting, blockprinting/stamping, stenciling

# Direct application dyeing

- Add dye fixative to fabric first
  - Dip and dry or work with wet fabric
  - Can rewet dry fabric with soda soak, but don't use plain water because you dilute the fixative
- Add dye
- Let set 4-24 hours

