

LAKE PIGMENTS FROM MADDER ROOT

NOTE: This protocol is quite forgiving. Your measurements do not need to be ultra-precise to produce a pigment, though variations in the quality of materials, amounts, temperature, technique, and time can produce differences in color from batch to batch.

RECIPE: STANDARD	
EQUIPMENT 1 hot plate 1 mortar and pestle 1 digital scale 1 large beaker (1 L) 1 small beaker (150 ml) 1 large jar (to catch the filtrate) 1 drawstring filter bag 1 pair of chopsticks 1 thermometer 1 potholder pH test strips 1 funnel 1 filter (or more, if necessary) 1 dull blade (i.e., palette knife) or stiff brush 1 oz plastic container with lid	MATERIALS 600 ml water (for soaking and alum (large beaker)) 100 ml water (for potash (small beaker)) 20 g madder root 10 g alum (aluminum potassium sulfate) 3.8 g potash (potassium carbonate)

Procedure:

- Grind the madder root coarsely with a mortar and pestle.
- Enclose madder in filter bag large enough for material to move freely and water to penetrate it. Close the bag and tie tightly so no particles can escape through its opening.
- Put 600 ml water in 1 L beaker and add the madder bag.
- *Optional:* Soak overnight.
- Heat solution (water + madder bag) to 70 °C and extract dye at this temperature for 30 min.
- Meanwhile, in 150 ml beaker, dissolve 3.8 g potash in 100 ml water using heat. Set aside for later.
- After extraction of dye in the large beaker, remove and discard madder bag.
- *If necessary:* filter dye solution through filter paper to remove particles.
- Add 10 g alum to dye solution and heat to 80 °C.
- Remove from heat.
- Pour the potash solution into the dye solution slowly and incrementally, stirring constantly.
 - Check the pH as you add the potash solution.
 - Keep adding potash solution to dye until a pH of 6-7 is achieved, there is no further effervescence, and precipitation of the lake pigment appears to be complete.
- Allow the solution to settle for at least 15 min (ideally overnight).
- Pour solution through filter in a funnel. What remains in the filter is pigment. Discard filtrate.
- Wash pigment, pouring batches of clean water through pigment in the filter until filtrate runs clear, discarding filtrate.
- Allow the pigment to dry thoroughly on the filter (at least overnight, perhaps longer if thick).
- Using a dull blade or stiff brush, carefully remove pigment from filter. Collect pigment in small container and secure lid.

TIMING			
DAY 1	DAY 2	DAY 3	DAY 4
<ul style="list-style-type: none"> - Crush madder and leave to soak overnight - Cleanup 	<ul style="list-style-type: none"> - Heat solution to 70°C and prepare work area, materials (~30 min) - Extract dye (~30 min) - Add alum and heat to 80°C (~10 min) - Add potash solution to precipitate (~10 min) - Leave to settle - Cleanup 	<ul style="list-style-type: none"> - Filter - Wash multiple times - Cleanup 	<ul style="list-style-type: none"> - Scrape dried pigment into container for later use - Cleanup
Schedule time: ~20 min	Schedule time: ~90 min	Schedule time: ~1 hour	Schedule time: ~20 min

NOTE: Overnight soak (i.e., Day 1) is optional. Activities do not need to take place on successive days.