

# Reactionary Art Lab

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Understanding how and why various substances react can be a powerful tool, and not only for those involved in science or medicine. Many of the finest chefs and artists have extensive knowledge of the chemistry behind their craft. In this lab you will predict reactions and use that knowledge to create your own piece of art.

## PRELAB

1. Use the activity series of metals (page 191) to predict whether or not the following combinations of metals and metal ions will react. (If a reaction will occur, write "rxn". If no reaction is expected write "nr".)

	CuSO <sub>4</sub> (aq)	FeSO <sub>4</sub> (aq)	MgSO <sub>4</sub> (aq)	AgNO <sub>3</sub> (aq)	ZnCl <sub>2</sub> (aq)
Zn (s)					
Ag (s)					
Mg (s)					
Fe (s)					
Cu (s)					

2. The galvanized coating on the steel plates contains a large amount of zinc that you will need to remove. Based on the activity series, should zinc replace hydrogen from an acid? (Hydrogen is obviously not a metal, but it is frequently involved in replacement reactions.)
3. Steel is mostly made of iron, so we will assume that iron is the metal involved in any reactions with the plate. We have several ionic solutions available that you may use to replace the iron. Determine which solution(s) will react with the iron plates. Explain why the solutions you select will or will not react with the iron plates.

*Solutions list:*

- a) FeCl<sub>3</sub>
- b) Ca(NO<sub>3</sub>)<sub>2</sub>
- c) CuSO<sub>4</sub>
- d) MgCl<sub>2</sub>
- e) KNO<sub>3</sub>

## PROCEDURE

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1. Completely cover a small piece of galvanized steel with one layer of masking tape. Be sure that all seams are sealed.
2. Using a pen, draw a design on the tape.
3. Use a utility knife to remove the tape from the areas where you would like the copper to cover the plate.
4. Using tongs, dip plate in HCl until most bubbling stops.
5. Dip plate directly into CuSO<sub>4</sub> solution for **7 - 10** seconds.
6. Rinse plate briefly in water to remove all residual CuSO<sub>4</sub>.
7. Carefully remove tape from the plate and gently dry it with a paper towel.
8. Use steel wool to very gently remove all of the loosely attached copper from the plate.
9. Repeat steps 5 -- 8 until the copper has completely covered the exposed iron.
10. When dry, **lightly** spray with shellac sealer in box outside.

## Alternative Procedure

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1. Using tongs, dip plate in HCl until most bubbling stops.
2. Using steel wool, remove any remaining zinc layer from the galvanizing process. Note: The final sheet of iron should be very shiny.
3. Rinse the plate with water and dry completely.
4. Completely cover the plate with one layer of masking tape. Be sure that all seams are sealed.
5. Using a pen, draw a design on the tape.
6. Use a utility knife to remove the tape from the areas where you would like the copper to cover the plate.
7. Dip plate directly into CuSO<sub>4</sub> solution for **7 - 10** seconds. You can also apply the CuSO<sub>4</sub> solution with a Q-tip.
8. Rinse plate briefly in water to remove all residual CuSO<sub>4</sub>.
9. Carefully remove tape from the plate and gently dry it with a paper towel.
10. Use steel wool to very gently remove all of the loosely attached copper from the plate.
11. Repeat steps 5 -- 8 until the copper has completely covered the exposed iron.
12. When dry, **lightly** spray with shellac sealer in box outside.