

Instructions for Making a Simple
Silver-Based Photographic Emulsion
Suitable for Coating on Glass or Film

制作简单的可涂抹在玻璃或胶片上的
银盐感光乳剂

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Ingredients: Gelatin, potassium bromide, potassium iodide, and silver nitrate.

成份：凝胶（明胶），溴化钾，碘化钾，硝酸银

Equipment: film or glass plates, metal plates, plastic stirring paddle, cheesecloth, gloves, safelight with light red filter (Kodak 1A or equivalent), 1 liter glass beaker or stainless steel bowl, 4 liter glass beaker or equivalent stainless steel bowl. A mechanical stirrer would be useful, but is not essential.

器具：透明胶片或玻璃板，金属板，塑料搅拌器，粗棉布，手套，安全灯（红色），1升的玻璃大口杯或不锈钢杯，4升的玻璃大口杯或等大的不锈钢杯，以及一个药品搅拌勺也许会派上用场。

1. Dissolve the gelatin. Dissolve 10 grams of gelatin in 360 ml warm distilled water.

1. 溶解凝胶：用 360ml 的温蒸馏水溶解 10 克凝胶。

2. Dissolve the potassium bromide and potassium iodide. Add 32 grams of potassium bromide and 0.8 gram potassium iodide to the gelatin solution and stir until dissolved.

2. 溶解溴化钾和碘化钾：将 32 克溴化钾和 0.8 克碘化钾放入凝胶溶液，并不断搅动直到溶解。

3. Heat the solution. Heat the mixture to 130° F (55° C). The solution must be maintained at that temperature. The simplest way to do this is to surround the solution with a water bath.

3. 加热溶液：将上述溶液加热到 55° C，并保持该温度。最简单的办法是水浴法。

4. Lights out. Turn out normal lights and work under a light red safelight.

4. 关灯：关掉普通的灯，打开安全灯。

5. Make a solution of silver nitrate. Wear gloves when working with silver nitrate. Dissolve 40 grams of silver nitrate in 400 ml distilled water.

5. 配置硝酸银溶液：此时需要戴上手套。将 40 克硝酸银放入 400ml 蒸馏水中，并溶解。

6. Combine the silver nitrate and gelatin solutions slowly. This is known as the precipitation stage. Add the silver nitrate solution slowly to the gelatin solution at a rate of 20 ml every 30 seconds for 10 minutes, stirring constantly. The more slowly the silver nitrate is added, the larger will be the silver halide grains produced--and the larger the grains, the faster the emulsion.

6. 混合两种溶液：这是个比较仓促的阶段。把硝酸银溶液缓慢的倒入明胶中，大约以 30 秒 20 毫升的速度持续 10 分钟。倾倒硝酸银溶液的速度越慢，银盐的卤化物生成的越多，从而感光度也越高。

7. Ripen the mixture. Keep the solution temperature at 130° F (55° C) for a further 10 minutes, then allow to cool slowly to 104° F (40° C). The ripening process allows the size of the silver grains to grow, increasing the emulsion speed. Heat speeds the ripening. (The mixture can also be cooled until it gels and stored overnight at this point. Simply reheat to 104° F (40° C) when ready and proceed with step 8.)

7. 使混合溶液熟化：使混合液的温度保持在 55° C，并保持 10 分钟，然后使其冷却到 40° C。这个过程会使银卤化物增加，并使感光度增加。加热会使熟化过程加速。（也可以让混合溶液冷却直至形成胶体，并储存一晚。在进行步骤 8 时，可以简单的重新加热到 40° C）

8. Swell additional gelatin. Soak 40 grams of gelatin in distilled water until softened (20–30 minutes), then pour off the excess water.

8. 增加明胶：用蒸馏水溶解 40 克明胶，并使其软化 20 到 30 分钟，然后倒出多余的水。

9. Combine the solutions (emulsification). Add the softened gelatin to the silver nitrate solution and mix thoroughly. Cool the mixture and allow it to set (this usually takes 2 to 4 hours).

9. 结合两种溶液：把软化的明胶（步骤8）加入硝酸银溶液（步骤7）中，持续搅拌，直至混合溶解。静置，并冷却混合液，一般需要静置2到4小时。

10. Strain through cheesecloth. Place the emulsion in a square of cheesecloth and fold the cloth over it. Hold the emulsion in a pan of cold water and twist the cloth so it is squeezed through the pores in the cheesecloth, making a kind of gelatin spaghetti. This is necessary in order to remove excess silver salts.

10. 用粗棉布积压：把做好的感光剂放到一个方形的粗棉布（我想用纱布也可以吧）中，并将其折叠。把感光乳剂放入冷水中，挤压棉布，使乳剂从不中挤出，就像做意大利面条一样。这样做很有必要，作用是去除乳剂中多余的银盐。

11. Leach out the excess salts (halides). Pour off excess water and place the shredded emulsion in a large beaker or other container. Pour 3 liters of cold water (below 68° F or 20° C) onto the shredded emulsion, let it sit for 2.5 minutes, then pour off 2 liters of the water and add 2 liters of fresh water. The use of distilled water is recommended, to reduce the possibility of unknown contaminants in the emulsion.

11. 去除多余的盐：倒出多余的水，不作成面条状的乳剂放入大烧杯（或较大的容器）中。倒入3升冷水（20°C），静置两分半钟，然后倒出2升水，再倒入2升干净的冷水。建议是用蒸馏水，以避免未知物质对感光剂的污染。

12. Repeat. Repeat the washing process 5 times, using cold water. Pour off the excess water.

12. 重复：用冷水重复水洗过程（步骤11）5次，然后倒出多余的水。

13. Melt and after-ripen. Melt the emulsion by heating to 130° F (55° C) for 15 minutes, then slowly cool it to 104° F (40° C). The after-ripening doesn't increase grain size much, but does increase speed.

13. 熔化和二次熟化：把乳剂加热到55°C,并保持15分钟，然后冷却到40°C。二次熟化的过程不会使乳剂的体积有明显增加，但会提高乳剂的感光度。

14. Coat. For a 3½ by 4½ inch glass plate, use 4 ml of emulsion solution. Pour it on the glass and spread it uniformly. This formula should make enough emulsion for approximately 100 such plates.

14. 涂抹乳剂：一般一个 3.5 X 4.5 英寸的玻璃板，需要使用 4 毫升感光乳剂。把乳剂倒在玻璃上，并均匀涂抹。这个配方足可以涂布 100 个这样大小的玻璃板。

15. Chill. Place the coated glass on a level cold metal plate until the emulsion sets, then place in the dark to dry.

15. 冷却：把涂抹了乳剂的玻璃放在水平的金属板上知道乳剂凝固，然后再把这些玻璃板放到无光的地方使其干燥。

16. Expose. Make your first test exposure at 1/30 second at f/8, and adjust up or down as necessary.

16. 曝光：第一次曝光参数要设定在 1/30 秒、f/8 光圈，然后根据情况再作增减。

17. Develop. Develop in an active developer such as Kodak D-8 (2:1), HC-110 (Dilution A), or Dektol (1:1).

17. 显影：显影液可以用 Kodak D-8 (2:1), HC-110 (Dilution A), or Dektol (1:1) 等。注：Dektol 显影液就是我们熟悉的 D72。



Print from a glass plate negative using a handmade silver bromide emulsion, by Terry Holsinger.