A Step-by-Step Guide to Making Your Own Penicillin at Home

By Susan Morrow

Contents

Disclaimer

This short book provides a description of a possible method to extract and prepare penicillin. It is not intended to provide a failsafe method of producing penicillin and I would advise the reader to read about the subject extensively before preparation.

All reasonable care in compiling the information has been made, but we make no warranty as to its accuracy. You are urged to read all the available material, understand the complexities in the process to extract penicillin and use the information, herein, to your individual needs.

We have made all efforts to make this book as accurate as possible. However, there may be mistakes, both typographical and in content. Therefore, use this text as a general guide only and not as the ultimate source of information – please refer to the all warnings and contraindications. Also please see references at the end of the book for other sources of information. The purpose of this book is to educate.

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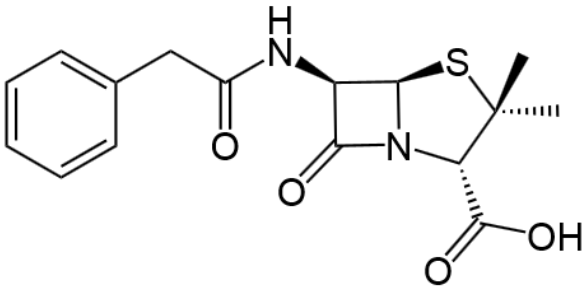
Making Penicillin on a Small Scale for Preppers

The advent of antibiotics was arguably one of the world's greatest ever discoveries. Before antibiotics, we had a set of drug called sulfonamides, which had an anti-microbial action rather than direct anti-biotic effect. Sulfonamides were used against disease like TB in the 1930s but many people had adverse reactions to the drugs. Sulfonamides are still used today, but large number of bacteria are resistant to the drugs.

Penicillin was discovered by a British scientist, Dr Alexander Fleming, in 1928. In 1942 it was used on the first civilian patient at a hospital in New Hampshire, USA. Penicillin was the new wonder drug. The industrialization of penicillin production so that the drug was available *en masse*, was due to the vital need for fast acting, effective anti-biotics during World War II.

Some General Penicillin Information



Penicillin G

Before we look at extracting penicillin, I'll go through some general information about penicillin, its uses and contradictors and any other issues that you should know about before making or using it.

There are a number of different types of penicillin that we have access to in the modern world. However, penicillins are often treated to improve efficiency and shelf life. The penicillin that I will show how to extract here is a narrow spectrum penicillin of the type used early on in the development of the drug.

Uses:

Penicillin works on bacterial infections NOT viral infections. It won't help you if you have a cold, unless that cold turns into a chest infection that has an underlying bacterial cause.

Penicillin is good for a variety of bacterial infections, including those in soft tissues. If you've got a strep throat, penicillin is the drug of choice. If you believe you have an infection in your throat, mouth, urinary tract, tonsils, lungs, ear or even heart, penicillin is a good choice.

Possible Side Effects

Some people are allergic to penicillin. I am, for example. If I take penicillin I come out in all over body hives. The rates of allergy amongst the population to penicillin vary up to about 10%, but even then it is thought that those people aren't actually allergic, just sensitive. If you are allergic, itchy hives is one symptom, but you may also experience, also swollen eyes, tongue and face.

In very rare cases penicillin can cause an anaphylactic reaction, including shortness of breath and wheezing. It would usually happen within an hour of taking the drug.

There are some cases where a delayed reaction can happen, usually about 8-10 days after taking the drug. In this case the patient would see a rash and some dermatitis and may feel nauseous.

Other more common side effects are:

- Nausea
- Vomiting
- Diarrhea
- Indigestion

A Simple Test for Penicillin Allergy

You can do a **simple skin test** called a pen test for penicillin allergy, but it isn't comprehensive. To do a skin test you need to have sterile conditions. A sterilized needle is used to prick the skin and inject a weak solution of the penicillin into the patient. Yu then have to wait an hour or so and if there is likely to be an allergic reaction to the drug, the patient's skin will become itchy and a red bump will appear. The bump will only last about half an hour but does indicate an allergy to penicillin.

However, even if patient doesn't show an allergic reaction during the skin test, you should still monitor anyone taking penicillin.

An **alternative method** to test for penicillin allergy is to do a 'challenge test'. IN this test, you start off with a very small dose of penicillin which you give, orally, to the patient. You wait an hour to see if there's an adverse reaction and then, if not, give a slightly larger

dose, again waiting an hour to check for a reaction. You do this until the full dosage is given (see below for dosage levels).

Contra-indicators

If you have any of the following illnesses/diseases, you should be cautious about taking penicillin:

- A blood clotting disorder, such as hemophilia
- Asthma

Pregnancy: It's generally viewed as OK to take penicillin during pregnancy, although a small amount will pass across the placenta.

Making the Penicillin

Please note: Making penicillin that is potent and has few contaminants is not an easy process. It has several parts to the method and each should be carefully followed and perfected through experimentation. It is very important to perform the extraction and purification using sterile containers and utensils. The method outlined here, for the preparation of crystalline penicillin G have been created using research from a number of sources, including **t**he Research Laboratories of John Wyeth and Bro. Ltd. in their research paper, of 1946, "Penicillin Production in Submerged Culture on a Pilot-Plant Scale", various pieces of work found in the Annals of Biological Research and various patents from the 40s and 50s including, 1948: "Method for production of penicillin" by Moyer, A.

Required Items and Reagents

Some of these items won't be readily available once the SHTF, so my advice is to stock up on some of these (non-perishables) now, many of the chemicals are available on eBay for purchase.

- Cantaloupe or similar fruit

- Corn steep liquor - this forms the growth medium for the penicillin and is a mix of amino acids, minerals and vitamins (you can buy this in preparation from fish suppliers or use ewe pellets as shown in step 2 below)
- Lactose
- Calcium carbonate
- Phenylacetamide
- Hydrochloric or phosphoric acid
- Ethyl acetate (solvent)
- Activated charcoal
- Potassium carbonate or bicarbonate
- Butanol or propanol
- Flask that can be sterilized (heat resistant) and closed with a bung
- Scales for measuring out the ingredients
- pH test kit (you can buy these in advance from garden supply stores, or make your own at home)
- Containers that can be sterilized (heat resistant) and bunged
- Variety of sterilized utensils, like knives and spoons
- Fine mesh cloth or filter paper for filtration
- Separation funnel with stand
- Large bowl that can contain ice

Modern methods of penicillin production are massive endeavors using 50,000-gallon extraction vessels with a 90% recovery yield. Using non-industrial techniques, you'll be lucky to get 20% yields. However, you don't need to make penicillin *en masse*.

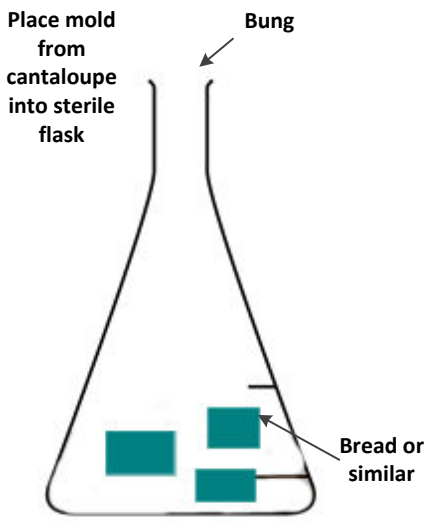
After much research in the early days of penicillin extraction, scientists found that the best medium to grow the mold, used to extract penicillin, was the cantaloupe. So your starting point if at all possible should be a cantaloupe. If you don't have a cantaloupe, then the next best thing is some other sugar based fruit as the sugar helps the penicillin to grow. The strain of penicillin you will be growing and is *Penicillium chrysogenum* and this will be your basis for the penicillin you'll extract to use as an anti-biotic.

Do not eat the mold from the fruit directly. It may contain toxins that are bad for you.

Ensure all glassware and other containers are sterilized.

Steps for Preparation

Step1: Growing the mold and incubation of the fungus



Leave the rind of a cantaloupe out in a warm moist place for a few days until bluish/green mold appears, this is *Penicillium chrysogenum*.

You need to take your flask and sterilize it. You can do this either by boiling the flask in water (be careful to not touch it with bare hands when taking it out, otherwise you'll contaminate the flask again). You can alternatively place the flask in a hot oven for about an hour.

The mold you grew earlier now needs to be placed onto an initial growth medium, held in the sterilized flask. This medium can be bread, or cake or something similarly open textured based on carbohydrates.

Carefully transfer your mold onto the growth medium in the flask.

Leave for a few days, in a warm and dark place.

Step 2: Preparing the Medium for growth

Corn steep liquor 30 ml

Lactose 40g

Calcium carbonate 10g

Phenylacetamide 0.25g

Water 1 liter

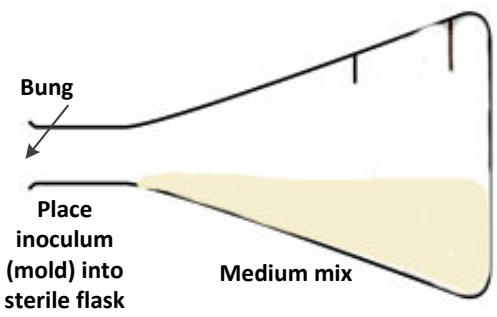
NOTE: You can buy CSL pellets, also called 'ewe nuts' which are used to fatten up lambs. You can steep these in water to create a broth. If you add a little fermented molasses it makes it even more potent. Just filter off the un-dissolved material and use the liquid as your CSL.

Dissolve the ingredients in the cold water.

The resulting liquor needs to be around pH 5. You can adjust the pH using hydrochloric or phosphoric acid. Add a few drops at a time, mixing in, then check the pH. You won't need much to get the pH down to around 5.

NOTE: You always add acid in small amounts, to larger volume solutions – NEVER the other way around.

Step 3: Inoculate the medium



Take your containers that will be used to grow the penicillin. Sterilize them as you did previously. You'll need to place some sort of bung in the top of the container; this is anything that will stop air getting into the vessel. This container will hold the medium and will be inoculated with your fungus.

Add some of your medium to your vessel. You'll be placing the vessel on its side to increase the surface area of the medium, so make sure you only put enough in so that it doesn't spill out of the top when you do this.

Now, using a sterilized utensil, like a knife, take some of your fungus from step 1 and place it into the medium.

Place your medium and fungus containers into a warm, dark place for 7 days. Do not disturb during this time.

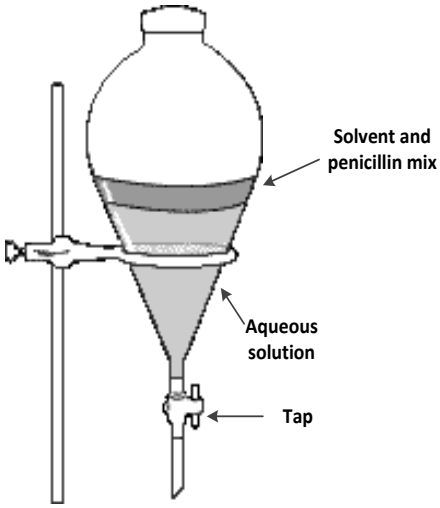
NOTE: experimentation has found that the optimum time for penicillin production from an inoculated medium is 6-8 days at a temperature of around 82F but no more than 86F*

Step 4: Extraction of the penicillin

To extract the penicillin from the medium you need two specific conditions:

1. A pH of about 2
2. Cold temperature of about 30-35F

Take your inoculated medium and strain through a cloth or filter to remove any spores and mycelia.



Add small drops of hydrochloric or phosphoric acid, checking to see the pH drop as you go. You need to get the pH to settle at around 2-3.

Add the solution to your separation funnel. Then add ethyl acetate (solvent) to the medium (aqueous) in the funnel. Gently invert the funnel to mix the medium and the solvent. The solvent will extract the penicillin form the medium.

Leave the funnel on the stand to allow the medium and solvent to separate out -you'll see the two as separate phases in the flask, the solvent (containing the penicillin) on top of the aqueous medium.

Once you can see a distinct separation of the two occur in the funnel, slowly open the funnel tap and remove the bottom layer leaving the top layer (solvent + penicillin). Remove this solvent layer, via the tap, into a beaker.

Place the beaker containing the solvent and penicillin into a bowl with ice. You need to cool this solution down to about 30-35F.

The resulting solution should be neutralized using potassium carbonate or bicarbonate, to about pH 5-6.

Step 5: Carbon treatment

Adding activated carbon to about 5% of the solution will remove any impurities from the solution. Carbon is highly porous and acts like a sort of filter to remove contaminants.

Step 6: Crystallization

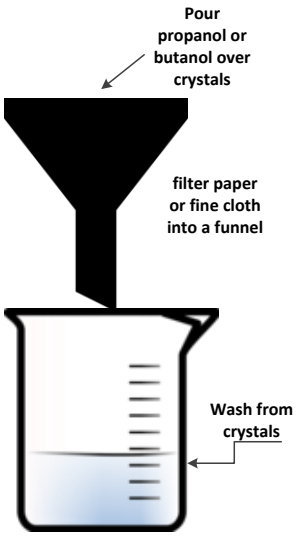
To get the penicillin (which is now in the form of penicillin G) crystals out of the solution you need to concentrate the solution down, ready for crystallization.

You can do this either by distilling the mix, if you have a still available. Or by keeping a warm temperature over the solution vessel - no more than 100F.

Once the solution has evaporated to a saturated solution, the crystals can be brought out of solution. One chemist's trick to do this is to scrape the sides of the vessel (if it's glass) with a glass rod. This precipitates crystal formation. Alternatively, you can pull a glass rod through the solution, pull it out, still wet with solution and watch as it dries out, leaving small amounts of crystal on the end of the glass rod. Use these crystals to 'seed' the solution. Seeding a saturated solution will start crystal growth.

NOTE: A saturated solution is one where there are solids that are dissolved in the solution at a warm temperature but when the temperature drops they come out of solution as un-dissolved solids (crystals)

Step 7: Washing the crystals



The penicillin crystals can still hold contaminants on their surface. To remove these extraneous chemicals you need to 'wash; the crystals. To do this you'll need to place the crystals onto a medium, such as a filter paper or fine mesh cloth and slowly pour a little butanol or propanol over the crystals.

Step 8: Drying the crystals

Probably the simplest way to dry penicillin crystals in a non-lab environment is to allow warm air to pass over the crystals. You can do this using a fan for example. You can alternatively, just use radiant heat and slowly dry the crystals out.

Step 9: Preparing your penicillin

Once your crystals are dried out you can grind them to a powder using a mortar and pestle or similar.

Treating the Patient

By Injection:

The best and most effective way to get penicillin G into a patient is by injection into a muscle – the buttocks are a good site to use.

It goes without saying, everything must be sterilized; this includes the needles, your hands and the patients injection site.

Dosage:

For an adult the injection dose is 600mg – 3600mg, dissolved in 2.0 ml of sterile water, daily divided into 4 shots. The patient usually only needs a single shot.

For children, 1-12 years old the dosage is 100mg/kg/day divided into 4 doses.

Orally:

However, if you are reticent about using an injection, then you can try taking the penicillin orally. This is often less effective.

Dosage:

This is a general guideline. Some diseases require larger doses, but in general:

Age	**Dose - every 6-12 hours in 5ml of sugar solution**
1-5 years	125mg
6-12 years	250mg
Adult	500mg

- If you have any renal (urinary) issues before or while taking penicillin, reduce the dose

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