



Eco Enzyme

The title 'Eco Enzyme' is rendered in a playful, bubbly font. 'Eco' is in green and yellow, while 'Enzyme' is in yellow, orange, pink, purple, blue, and light blue. The background is a dense field of green leaves. Various nature-themed icons are scattered around the text, including a globe, a kiwi slice, a tomato, a flower, and a small plant.

Activating
the Earth's
Self-Healing
power



Two small slices of fruit, a kiwi and a lime, are positioned at the bottom right of the text.

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Foreword

This handbook is complementary to the talk on “Eco Enzyme”. It tells us why we should make Eco Enzyme, how to make it, how to use it, and includes personal experience shared by active makers and users. We hope that you will cherish this booklet and put what you learn from it into practice—turning meat free food waste into useful Eco Enzyme. The transformative power lies in our hands.

As environmental problems are getting worse, we must take action to save the Earth without any delay. Making Eco Enzyme is our contribution to preserve Mother Earth.

“Cutting carbon emission” and “organic living” are two living concepts which are being adopted widely. It is believed that people should consume fruits and vegetables that are locally grown as they are a better choice for maintaining well-being. By doing so, we can also protect the environment and achieve sustainable development. Therefore, it is our duty to improve our community’s environment.

While we were editing this handbook, a volunteer told everyone, “Nowadays, when I get home, I’ll check the Eco Enzyme that I’m making to see if there are any changes. When I open the container and see some bubbles, I’ll be delighted.” Don’t take these bubbles lightly. They actually hold the power to save the Earth.

Many things in the world are given an expiry date. Canned food cannot be eaten once its shelf life has expired. A partnership ends when a contract lapses. But Eco Enzyme is different. After taking three months to ferment, it can be kept and used forever. Therefore, you should make Eco Enzyme an integral part of your life.

Global Warming: The Feverish Earth VS Eco Enzyme: Cooling down the Earth

The Atmosphere—the Armour of the Earth

Although air is invisible, it is always around us. Air consists of oxygen, nitrogen, vapor and other gases. Without air, we cannot live. We call the mixture of gases that surrounds the Earth “the atmosphere”.

Green House Effect

The ozone layer, which is about 20-30km above the Earth, protects all living things from damaging ultraviolet rays and cosmic radiations. Unfortunately, owing to the ever-increasing economic activities, the overuse of chemicals and air pollution are changing the structure of the atmosphere rapidly. As a result, byproducts of the burning of fossil fuels (coal and oil), for example, carbon dioxide, nitrous oxide and methane are causing green house effect. In fact, rainforests were able to absorb the excessive emissions of carbon dioxide. But due to uncontrolled logging, green house effect has become worse. Acting like a blanket, carbon dioxide and other green house gases trap heat from the sun in the atmosphere, causing the temperature of the Earth to rise. As the “blanket” is becoming thicker, Earth gets warmer.

What Al Gore Said

According to Al Gore, the previous vice president of the United States, the sea level is rising along with the Earth’s temperature due to the melting of glaciers. It is estimated that by 2100, the sea level will become 15-95cm higher and many low-lying areas, including Manhattan,

San Francisco, Beijing, India and Pakistan, will be flooded. Millions of lives will perish. Lives of one third of people living in coastal areas around the world will also be threatened.

Global Warming: The Feverish Earth

- Rising temperature, the melting of glaciers, the rising sea level, the decrease of land area.
- Floods caused by heavy storms.
- Coral reef, trees and pastures are being damaged. Various animals and plants are facing extinction.
- Climate change has caused poor harvest.
- New kinds of pest are attacking forests, farmlands and cities.
- Massive use of cleaning chemicals has affected people's physique adversely.
- Air pollution can cause allergies. It also leads to malfunction of nervous system and immune system.

VS

Eco Enzyme: Cooling Down the Earth

- Easing the greenhouse effect.
- Ozone, which is emitted during the process of making Eco Enzyme, can improve air quality and repair the atmosphere.
- Reducing CO₂ can make the ocean calm.
- Reducing rubbish and the cost to handle it.
- Eco Enzyme is a natural fertilizer, air freshener and pesticide.
- Diluted Eco Enzyme can replace cleaning chemicals and it is harmless to our health.

Earth

Communities

Individuals & families



What is Eco Enzyme exactly?

Let's hear what they say.

Dr. Rosukon

who develops the method of making Eco Enzyme. She is the first Eco Enzyme expert in Thailand. She treated nuclear contamination with Eco Enzyme. With a selfless heart, she shared her findings about Eco Enzyme with everyone.



Dr. Rosukon

It

is a kind of organic compound that is naturally synthesized with plant protein, minerals and juvenile hormone.

Through fermentation, the ingredients used for making Eco Enzyme will have effect on each other, creating a complex but stable enzymatic ecosystem. Eco Enzyme can inhibit activities of harmful microorganisms, especially pathogens and bad bacteria, and help plants to grow well. If every household makes and uses Eco Enzyme, pollution problems will be eased, and we will be able to live healthier lives.

Eco

Enzyme is our shared resource. Every step of making Eco Enzyme is useful for protecting the environment. As wives and mothers, we must work hard together to make Eco Enzyme and save the Earth, for our sake and future next generation.



Dr. Joean

Dr. Joean

Starting in 2006, she has been traveling from town to town to tell people the importance of Eco Enzyme, and teach people how to make and use it.

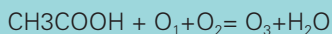


Mummy

A mother
After listening to the talk on Eco Enzyme, I tried to make it. My children always give me a hand.

By turning rubbish into Eco Enzyme, I can save money and protect the environment at the same time. My kids like to help me make Eco Enzyme. They will open the containers and let bubbles come out. Making Eco Enzyme has become a family activity, and it brings joy to our lives.

Starch and sugar are the main ingredients for making Eco Enzyme. An acid substance, CH_3COOH , can be derived from them. After dissolving in water, it will break into carbohydrate, fat, protein and Acetyl-CO-A. Its chemical equation is as follows:



Ozone (O_3), which is derived from the process, can kill bacteria, reduce toxic air pollutants and increase oxygen in the air.



Teacher

A Chemical Teacher

Promoting the use of Eco Enzyme is a meaningful activity. My family members give me their full support. Peels of fruits and vegetables were free at the wet market at first. But since many people started to make Eco Enzyme, hawkers in Sibu have been selling these ingredients at RM0.50~RM1.00 per kilogram nowadays.



Environmentalist

Yu Jing, a volunteer from Sibu. My elder sister brought me to a talk on Eco Enzyme. It made me understand the importance of Eco Enzyme and motivated me to become a voluntary promoter of Eco Enzyme.

Characteristics of Eco Enzyme

Eco Enzyme is easy to make and multifunctional. Its main ingredients are brown sugar, water and food waste. After fermentation, the brown-colored liquid will smell like orange. As unwanted materials are reused, we can reduce waste significantly by making Eco Enzyme.

When the Eco Enzyme is fermenting, ozone (O_3) emitted from it can separate carbon dioxide and other heavy metals from the air. As a result, heat trapped in the atmosphere will be reduced.

Eco Enzyme can also turn ammonia into nitrate (NO_3), which is a fertilizer. It can also transform carbon dioxide into CO_3 , which can nourish plants, fish and other living things in the ocean.

1. Decompose, transform and recombine different materials.
2. If enzymes (e.g. Photosynthesis bacteria) are not exposed to the air, they can remain active even at the temperature as high as $100^{\circ}C$.
3. If Eco Enzyme is full of its necessary nutrients, it can still survive even at pH value below 3.5.
4. It can produce antioxidants, which decelerate the aging of cells.



Functions of Eco Enzyme

Agriculture—Growing organic plants

Growing plants without using chemical fertilizers can protect the environment and keep us healthy. Eco Enzyme is very useful for agriculture.

- Building fertile soil

Eco Enzyme is a natural fertilizer. It can make a barren land fertile.

- Repelling pest without using pesticides

By spraying the mixture of Eco Enzyme, 1 kilogram of brown sugar and 10 liters of water on the lawn, the number of various pests, for example, mosquitoes, cockroaches and rats will be reduced.

- Helping plants to grow well

Eco Enzyme can enhance photosynthesis. As a result, plants will get more nutrients and their roots can absorb more air. In addition, ozone, which is emitted by Eco Enzyme, can help plants grow better and faster.

Example:

Fifteen years ago, Mr He Yongxiang helped some disabled people obtain a piece of free farm land measuring 30 acres for them to grow some plants and feed themselves. But the land was infertile. They tried many ways to improve the soil but failed. Eventually, they sprayed diluted Eco Enzyme on the land and plants started to grow well. Now, they plant vegetables, fruits and various kinds of herb on the land.

Livestock farming—Keeping Healthy Domestic Animals

Using Eco Enzyme to clean areas for keeping livestock can make them become healthier.

- Maintaining cleanliness

Eco Enzyme is natural air freshener. Spraying it on the floor of the shed for keeping animals can keep flies and foul odor away. As a result, domestic animals will have a cleaner place to live.

- Improving animal health

Adding Eco Enzyme to food and water for feeding domestic animals can boost their immune system and improve the quality of poultry or meat.

Example:

An owner of a pig farm in Thailand rejects using drugs or additives to keep his pigs healthy. Instead, he uses only Eco Enzyme, which has been proven to be very effective.

Drainage system—Cleaning Pipes and Water

Eco Enzyme can improve drainage around your house and clean wastewater from factories and farms.

- Cleaning drainage system

By pouring Eco Enzyme or its residues into sewers, cesspools and ditches, we can prevent pipes from being blocked, purify wastewater and ultimately clean rivers and oceans.

- Restoring ecosystems

Once drainage system becomes clean, fish and shellfish that have disappeared from rivers will emerge again. Consequently, ecosystems will be restored.

Example:

Some residents of Bukit Mertajam once organized a campaign for cleaning the “Lotus Pond”. Some people provided 900 liters of Eco Enzyme and they poured it into the pool. After about 7 minutes, they saw some bubbles appearing on the surface of the pool. Slowly, oily substances that were in the pool diminished and they could see reflections of plants on the surface of water.

Waste Pollution—Reducing Rubbish

As we know, the main ingredients for making Eco Enzyme are food waste such as leftovers and fruit peels. Therefore, we can cut down the cost of waste disposal significantly.

Example:

The town council of Sibul always tried to promote environmental protection but did not receive much support. In September 2008, a group of housewives, who actively made and used Eco Enzyme, approached Mr. Yan Jian-an, the deputy president of the town council, and proposed to cooperate with the town council to promote the use of Eco Enzyme. In just half a year, they taught a lot of people to make and use Eco Enzyme and the amount of waste in Sibul decreased 30-40%.

Eco Living—Going Green

Eco Enzyme can replace cleaning chemicals that we normally use. It can also be used to water plants. It is economical, useful and beneficial to our health.

- House cleaning

Diluted Eco Enzyme can be used to eliminate odor, mold, dirt and oil

stain. It is also effective for cleaning floor, air conditioners, toilets, exhaust fans etc. In addition, pests such as flies, mosquitoes, rats and cockroaches will become fewer if we use Eco Enzyme to clean our houses.

- Keeping personal hygiene

Eco Enzyme can decompose and eliminate microorganisms that are harmful to us. We can up keep our personal hygiene by using Eco Enzyme to take bath, wash hair and do laundry.

- Keeping healthy pets

Remove pets' odor and parasites on them.

- Wash vegetables and fruits

Soaking vegetables and fruits in diluted Eco Enzyme (2 teaspoons of Eco Enzyme and 1 liter of water) for 45 minutes can remove pesticides, herbicides, chemicals, heavy metals, bacteria and parasitic ova on them. They will taste better after being soaked.

Example:

Every year, many people will go to the Tzu Chi Charity Vegetarian Food Bazaar. In November 2008, volunteers of a bazaar held in Penang brought along with them a lot of Eco Enzyme and wood chips. In the past, they used dishwashing detergent to wash all the dishes and failed to remove curry smell remaining on them. Eversince they used Eco Enzyme for washing, all the dishes were surprisingly clean and odor-free.





- Electromagnetic Waves

Long-term exposure to electromagnetic waves emitted from electrical equipment causes fatigue, tired eyes, stiff neck, headache, drowsiness, uneasiness, etc. Electromagnetic waves can also weaken the immunity system, cause loss of calcium and lead to many other problems, such as difficult labour, miscarriage, visual impairment, leukemia, cancer and brain tumour. Babies, growing children, the elderly and pregnant women are vulnerable to the harm of electromagnetic waves.

Putting Eco-enzyme beside electrical equipment can reduce electromagnetic waves emitted from them, helping us to prevent various health problems



How to Make Eco Enzyme

Ingredients:

Brown sugar: 1 kilogram

Food waste (Leaves of vegetables, fruit peels): 3 kilograms

Water: 10 liters

Container: Ceramic jar, small tank or plastic pail

Step 1:

Pour 10 liters of water in the container (60% of the volume)

Step 2:

Put 1 kilogram of brown sugar in the container and stir.

Step 3:

Put 3 kilograms of food waste into the container.

Step 4:

Close the container and let the mixture ferment for 3 months.

(During the first month, we have to open the container daily to release gases produced by the mixture. Stir the mixture if those ingredients are floating on the surface.)



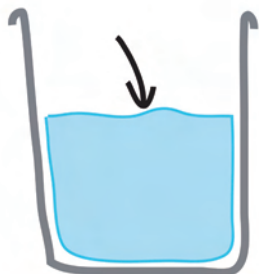
步骤Step1:

DIY: CONTAINER: Air tight plastic container.
INGREDIENTS: Water, fruit and vegetable dregs, brown sugar.

容器: 有密封盖口的塑胶容器

材料: 水、鲜垃圾 (蔬菜叶、水果皮等)、糖 (黑糖、黄糖或糖蜜)

10 Parts of water (Fill up 60% of container)
10份水 (填满容器的60%)



步骤Step2:

1 Part of brown sugar
(= 10% water content)

加1份糖
(= 水容量的10%)



步骤Step3:

3 Parts of kitchen waste
(Fill up to 80% full)
加3份鲜垃圾
(填满容器的80%)



步骤Step4:

Close tight
Keep 3 months (open daily to release gases for first month)
关紧瓶口, 发酵3个月
(第一个月需每日稍微打开瓶口卸放气体)



Notes:

Preparation:

- Don't use glass or metal containers that are not expandable.
 - Cut the ingredients into small pieces to let them decompose faster.
 - Don't use oily food waste (fish and meat) as ingredients for making Eco Enzyme as it will produce putrid smell.
 - Adding citrus peels or pandan leaves can make Eco Enzyme fragrant.
 - Leave some space (3/10 of the container) to let the mixture ferment.
-
- Ingredients can be added progressively later if you cannot gather enough food waste. The 3-month period for fermentation starts from the last time you put new ingredients into the container.
 - Put a label with the "manufacture date" on the container. The fermentation takes three months to complete. Be patient.
 - Be happy when you make Eco Enzyme. Its quality will be better.
 - Put the container at places which are well ventilated and cool. Don't put it in the fridge as low temperature will make enzymes less active.

Fermentation:

- Make sure that all ingredients are soaked in the brown sugar water.
- Open the container daily during the first month to release gases produced by the mixture.
- Containers may burst if the gases are not released.
- Eco Enzyme can be used after three months. But the ideal fermentation period is six months or longer.

Changes of Eco Enzyme:

- If the liquid turns black, the fermentation is unsuccessful. It is required to add more brown sugar and let it ferment for another three months.
- If small insects are found in the container, close it tightly and let those insects decompose to increase protein in Eco Enzyme.
- If there is a white layer on the surface of Eco Enzyme, it is a sign that it has fermented well. That white layer can be applied on skin directly as a kind of skin care cream.

Uses of Eco Enzyme:

- Well-fermented Eco Enzyme will turn yellowish brown and have a tangerine smell.
- Diluted Eco Enzyme is very useful for household cleaning.
- Residue of Eco Enzyme can be dried up and buried in soil as fertilizer. Flushing the toilet with it can purify septic tanks.
- Residue of Eco Enzyme can also be kept in the container for the next fermentation.

Ways of Using Diluted Eco Enzyme:



Dilution Ratio (Enzyme:Water)	Areas	Purposes	Amount	How to use
Concentrated Eco Enzyme	Bathroom	Taking bath	50-100cc	Use after exposing it to the air
		Washing machine	20-50cc	Each washing
	Toilet	Toilet bowl	A little	Occasionally
		Water tank	20-50cc	2-3 times per week
	Garden	Pond and water tank	1:1000	Occasionally
1:10-50	Indoor	Leather products	A little	1-2 times per week/month
		Carpet	Dampen it	1-2 times per week/month
	Indoor	Shoe box, shoes and car's interior	A little	Occasionally
		Kitchen Sink	A little	Occasionally
	Bathroom	Black mold	A little	Occasionally
	Pets	Excrement	A little	Occasionally
1:200-500	Indoor	Humidifier	A little	Occasionally
	Washroom	Sink	A little	Occasionally
1:200-500	Kitchen	Kitchen area and fridge	A little	Occasionally
		Drain	A little	Occasionally
	Pets	Odor	A little	Occasionally
	Toilet bowl	Toilet	A little	Wipe or spray
1:500-1000	Indoor	Cupboards, cabinets and clothes	Dampen them	Occasionally
1:1000	Garden	Sowing and planting	A little	Once



Frequently Asked Questions:

Q: Why should we use brown sugar for making Eco Enzyme? Can we use white sugar?

A: Brown sugar contains more minerals. White sugar is bleached. It is more ideal to use ingredients that are natural to make Eco Enzyme.

Q: Is it better to use only one kind of fruit peels to make Eco Enzyme? Or is it better to use different kinds of fruit peel?

A: Using various ingredients can create a complex but stable enzymatic ecosystem in the container. Therefore, it is better to use different kinds of fruit peel and vegetable leaf.

Q: Will the fermentation be successful every time? How can we make sure that the Eco Enzyme is well fermented?

A: If the fermentation is successful, the liquid will turn yellowish brown and it will form a white layer on the surface. Otherwise, it will turn black or become moldy. According to Dr. Rosukon, if it turns black, we only have to add brown sugar (same amount) and let it ferment for another month.

Q: Will there be bacteria in Eco Enzyme after fermentation? Is it safe to be used for personal cleaning?

A: Bacteria will be produced during the fermentation of Eco Enzyme, but at the same time, acetic acid and probiotics, which are anti-bacterial, are also found in it. PH value of Eco Enzyme below 4 after three months, means that it has fermented well. Eco Enzyme can reduce allergies caused by chemicals, eliminate harmful microorganisms and enhance cell regeneration.

Q: How can we make Eco Enzyme with a special scent?

A: To make Eco Enzyme with a special scent, we only have to add ingredients such as citrus peels or pandan leaves in it.

Q: Does Eco Enzyme have any side effects?

A: No. This is because it is natural. But we have to pay attention to the dilution ratio. Eco Enzyme is useful for mopping the floor. But if we do not mix it with water, the floor will become sticky. Concentrated Eco Enzyme is a weed killer, but diluted Eco Enzyme can help plants grow well. In conclusion, diluted Eco Enzyme is very useful for household cleaning.

Q: Why should we make Eco Enzyme? How many people have to make Eco Enzyme in order to save the Earth?

A: All of us are responsible for taking care of the Earth as it is seriously ill. We must put efforts in protecting nature and restoring ecosystems in order to create a sustainable environment for future generations. And making Eco Enzyme is an easy but effective way to save the Earth. Making Eco Enzyme is a way of recycling, as the ingredients needed are meat free food waste. If all of us make Eco Enzyme on a regular basis, it will be beneficial to our communities and ultimately, the Earth. Let's promote Eco Enzyme together. Everyone counts.



Profile:

Zhong Junsheng from Nibong Tebal

“Eco Enzyme saved my legs.”

Zhong Junsheng is seventy years old. People call him “Uncle Chin”. He has had diabetes for 30 years. A few years ago, ulcers started to form on his feet, toes and soles. Pus kept oozing from his wounds daily, and he was in great pain. Doctor Joean advised him to soak his feet in Eco Enzyme. He followed her advice and began to soak his feet in Eco Enzyme for few hours every day. After soaking for a while, his feet would feel comfortable. Uncle Chin said, “The Eco Enzyme for soaking feet can be reused until it becomes dirty.” At present, many wounds on his feet have healed.

Miss Yan Ni from Bukit Mertajam

“I had acne problem for years. I visited many doctors and tried various methods to solve the problem, but it was of no avail. After using Eco Enzyme for half a year, it was as if I got a new face.”

As Yan Ni runs an Internet café, she is always deprived of sleep. That made her face full of pimples. She always felt itchy, painful and her face would bleed if she scratched it. After she started to apply Eco Enzyme on her face two or three times a day, those pimples miraculously started to reduce after a month. Half a year later, those pimple marks on her face became less obvious. Nowadays, acne is no longer a problem for her because Eco Enzyme has taken care of her trouble.

Lian Muhai from Nibong Tebal

Mr Lian has a 2-hectare dragon fruit orchard. “At first, I only put Eco Enzyme in the soil for finding out its effects. To my surprise, the soil became fertile and every plant could produce 40 dragon fruits, each weighed 800 grams, during the season. As a result, the production per hectare reached 1,500 kilograms. Eco Enzyme is very useful for agriculture,” he said.

Master Danmela from Kedah

“Eco Enzyme is an alternative way to solve termite woes”

Master Danmela’s house was infested with termites. When he realized it, it was too late. About half of the scriptures in the cabinet had been damaged. As Master Danmela is merciful, he used a vacuum cleaner to remove those termites and released them on a field. Then, he cleaned the wall and sprayed Eco Enzyme on it. He re-painted the wall after that and there were no more termites.

Lin Jinzhu from Butterworth

Mrs. Lin uses Eco Enzyme to clean almost everything, including clothes, dishes, floors and toilets. She is well versed in the various uses of Eco Enzyme. “By using 2 ml of Eco Enzyme, one pail of water and detergent to do laundry, we can make sure that our clothes are clean and odorless. To mop the floor, we only have to use a little of Eco Enzyme and a half-full pail of water. By adding diluted Eco Enzyme in dishwashing liquid, we can remove chemicals remaining on dishes. We can also improve ventilation in our cars by washing them with Eco Enzyme.”



Complimentary

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