



Intermediate Cooking with Gas

Lesson 1: Poaching

BEGINNER



Introduction

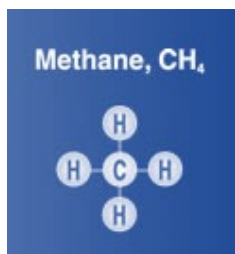
Welcome to Intermediate Cooking with Gas. Today's topic is understanding what natural gas is and where it comes from. Once you learn about natural gas, you will learn how to cook with gas to make your own poached egg or egg alternative dish.

This lesson can be completed in a classroom or at home. Your teacher will provide instructions for completing the assignment from home.

Opening Assessment

1. What is natural gas?
 - a. a fossil fuel
 - b. an atmospheric gas
 - c. an elemental fuel
 - d. residue from burning fossil fuels
2. What does it mean to "poach" food?
 - a. cook in steam over boiling water
 - b. cook in boiling water at a high temperature
 - c. cook in a hot liquid at a low temperature
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3. What is the best way to check if water is ready to use for poaching?
 - a. looking for bubbles
 - b. using a thermometer
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 - d. dropping a small piece of food in
4. What is hydrocarbon fuel?
 - a. a fuel made up of other fuels
 - b. a fuel type found underground
 - c. a fuel made of hydrogen and carbon
 - d. a fuel type found underwater
5. A BTU or British thermal unit is:
 - a. a temperature scale
 - b. an amount of heat energy
 - c. a type of burner on a range
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What is Natural Gas?

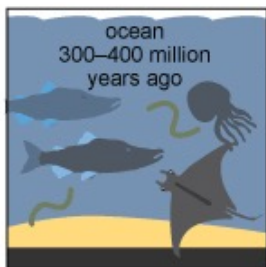


Natural gas is formed deep underground. Natural gas is used for cooking, heating and cooling, among other things. Many power plants also use natural gas to generate electricity. It is a gas that is primarily made of **methane**. Methane is made of one carbon atom and four hydrogen atoms and is written as CH₄. Methane is a type of **hydrocarbon fuel**, which is a fuel made up of hydrogen and carbon atoms. Other fossil fuels such as coal and petroleum are also hydrocarbon fuels. Each hydrocarbon fuel has a different number of carbon and hydrogen atoms.

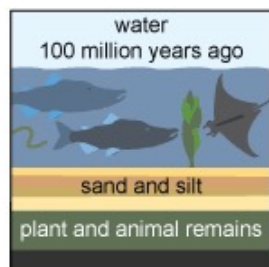
Natural gas is a colorless and odorless **fossil fuel** in its natural state. Fossil fuels formed over hundreds of millions of years ago from the remains of plants and animals deep within Earth's surface. The remains were buried under thick layers of sand, silt and rock. As the remains underwent increasing amounts of heat and pressure, the organic material (carbon, hydrogen, nitrogen and oxygen) turned into coal, oil and natural gas. Due to the very long time and specific conditions needed for fossil fuels to form, they are considered **nonrenewable resources**. Fossil fuels are removed from the deep layers of rock and refined to be used for various purposes, including producing energy.

Petroleum and natural gas formation

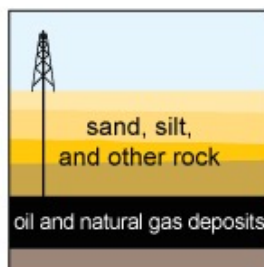
Tiny marine plants and animals died and were buried on the ocean floor. Over time, the marine plants and animals were covered by layers of silt and sand.



Over millions of years, the remains were buried deeper and deeper. The enormous heat and pressure turned the remains into oil and natural gas.



Today, we drill down through layers of sand, silt, and rock to reach the rock formations that contain oil and natural gas deposits.



Source: Adapted from National Energy Education Development Project (public domain)

Image from the [EIA](#)

Natural gas can be found in various locations underneath Earth's surface. For example, natural gas that is found in large cracks and spaces between layers of rock is called **conventional natural gas**. Natural gas that is found in the tiny spaces within sedimentary rocks, such as shale and sandstone, is called **unconventional natural gas**. Unconventional natural gas sources are much more difficult to access and typically require specialized tools to extract the gas.

Geologists (scientists who study Earth and its processes) use various technologies and research to find just the right place to drill for natural gas. For example, seismic surveys allow geologists to make seismic waves (like a miniature earthquake) and measure how the waves travel through various layers of material and rock formations underneath the surface. This process helps geologists map where natural gas deposits are underground. Using these and other methods, geologists have determined that there are several large natural gas reserves across North America.

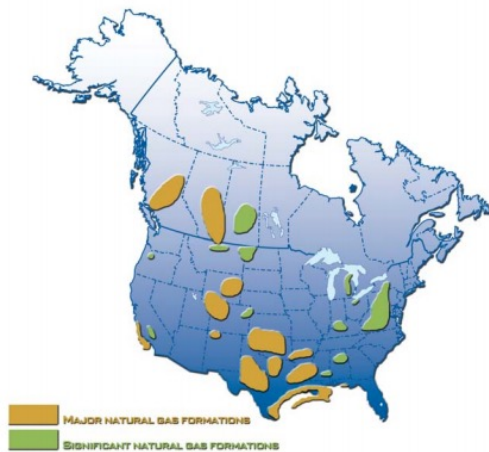


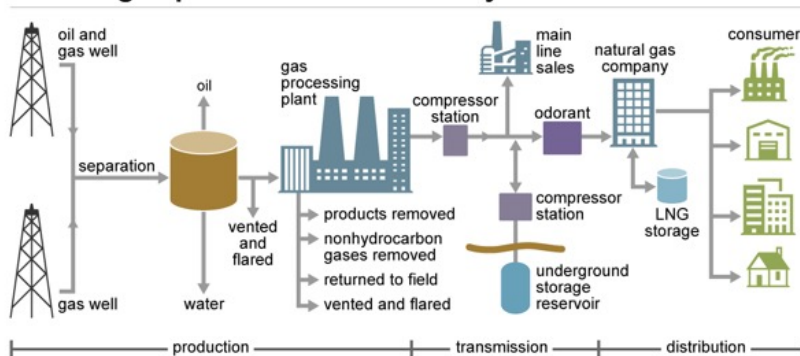
Image from the energy.gov

When a location has been selected and initial tests show that it would be a good place to find natural gas, drills are put into place and production begins. Before natural gas can be used in homes it must go through a processing plant. From there, the natural gas is either placed into underground storage or sent to a natural gas company for distribution to homes and businesses.

Because natural gas is colorless and odorless in its natural state, it can be difficult to detect if there is a gas leak. Natural gas leaks are unsafe because it is harmful to breathe in natural gas and the fumes can also cause fires and explosions if ignited.

Therefore, all natural gas used for energy is mixed with a gas called mercaptan (CH_4S), which adds a foul odor similar to rotten eggs. This helps people detect if there is a natural gas leak in their home. Natural gas is not safe to breathe and the added odors allow people to detect and trace the source of the leak so that it is quickly repaired.

Natural gas production and delivery



eia Source: U.S. Energy Information Administration

Image from the [EIA](http://eia)

Cooking with Natural Gas

Natural gas is the preferred fuel source for cooking by both commercial foodservice operators and professional chefs. It is adjustable, abundant, reliable and is more cost-effective and energy efficient.

There are several fuels to power cooking appliances in commercial kitchens: natural gas, electricity and induction. Each of these types of appliances has their advantages and disadvantages, but natural gas is seen as the preferred standard for cooking appliances, particularly ranges, ovens, and fryers.

Natural gas also offers flexibility when controlling the temperature – the heat can instantly be turned on or off and the temperature can be precisely controlled. Electric ranges, for example, take time to heat up and cool down, and any changes in temperature take additional time. The ability to quickly turn a natural gas range on or to adjust the temperature by changing the size of the flame allows cooking times to decrease, which also leads to higher efficiencies. The ability to precisely control the temperature is also important for the heat to be evenly distributed while cooking or baking.

Natural gas ranges work by having gas flow through a pipe toward the burner. The pipe narrows near the burner, which increases the pressure of the gas. This is similar to putting your finger over half of the hose nozzle while the hose is on. The pipe widens a little closer to the burner, which decreases the pressure of the gas. As the pressure decreases, oxygen is pulled in, which makes the mixture combustible. The gas then flows through the burner when the knob is turned. The burner is a hollow disk with holes around the sides. When the knob is held at the ignition setting, a spark is created that ignites the gas. Turning the knob to high increases the gas flow, which increases the size of the flame, and turning the knob to low decreases the gas flow, which decreases the size of the flame.

Most natural gas ranges can also be used during power outages, even though most ranges use electric burner ignitors. A match can be used carefully to light the gas and allow you to cook on a range. Note, however, that natural gas ovens use additional electric components to function and will not be usable during a power outage. It is never advised to stick a match in a gas oven.

Investing in energy efficient natural gas cooking appliances whenever possible can not only lower your energy bills each month but also allows for less time for the appliances to be used while cooking. It is also important that gas appliances be properly maintained to avoid gas leaks.

Cooking Methods

There are three types of cooking methods that utilize natural gas:

1. **Moist cooking** involves cooking with moisture in either liquid or steam form.
2. **Dry cooking** involves cooking without any moisture.
3. **Combination cooking** combines moist and dry heat cooking.

Today, you will be learning about and preparing food using a moist cooking method.

Moist Cooking: Poaching

Moist cooking methods include poaching, simmering, boiling, steaming and blanching. Each method utilizes liquid or steam in order to cook the food. This lesson will utilize a range and the poaching cooking method.

A natural gas range or cooktop in commercial kitchens is either found in combination with an oven or as a separate appliance built into a countertop. The burners are connected to a gas line with a valve controlled by a knob. To turn on the burner, the knob is turned to the ignition setting to start the flow of gas and produce a spark to ignite the gas. The size of the flame is controlled by the knob, which controls the temperature of what you are cooking.

The amount of heat energy a gas range has is measured in British thermal units (BTUs). BTUs are defined as the amount of heat needed to raise the temperature of one pound of water one degree Fahrenheit. Each gas range can have a different amount of BTUs, and each burner on a gas range can also have different amounts of BTUs. This is important to keep in mind as varying amounts of BTUs can lead to different cook times: the higher the BTU, the higher the temperature the range can get, and the faster the water will boil or the food will cook.

Poaching is a method of cooking that involves hot water or other liquid that is not boiling or even simmering. Poaching liquid is typically between 140°F and 180°F. For comparison, boiling water (many rapid bubbles) has a temperature of 212°F and simmering water (a few tiny bubbles, some of which may break the surface of the water) typically has a temperature between 180°F and 205°F.

Poaching foods is a very gentle method of cooking that works well for delicate foods or foods that are likely to dry out in other methods of cooking. Poaching also preserves the flavor of many foods and enhances the flavor of others by adding herbs and spices to the water or by using a different liquid such as broth, wine or even milk.

Liquid is typically warmed in a pot for use in cooking. If the liquid just begins to create tiny bubbles, lower the heat slightly and your liquid is ready for you to use in your recipe.

Foods like eggs, poultry, fish and fruit cook well in poaching. You will learn how to utilize poaching, as well as other forms of moist heat, to cook various proteins, vegetables and starches throughout your lessons on moist cooking.



Instructor Demonstration

Watch the instructor demonstration on proper natural gas range safety and how to poach an egg. Answer the following questions as you watch the demonstration.

- What safety tips did the instructor give during the demonstration?
- What type and how much liquid did the instructor add to the pot?
- How high did the instructor have the flame underneath the pot?
- What did the instructor say to look for when the liquid is ready?
- How did the instructor determine how long to cook the egg/egg substitute/tofu?
- What cooking tips did the instructor give during the demonstration?

Selecting and Preparing a Recipe

The following section can be completed at home if the preparing and cooking can be performed safely. Residential and commercial cooking equipment vary; while the information focuses on natural gas equipment, electric ranges and stoves may also be used to complete the cooking assignment.

Now you are going to make your own poached egg or tofu dish. Once cooked, the poached eggs or tofu can be used in many different, optional ways including on their own, with a sauce or as finishing touches on other meals.

Your teacher will review your recipe and dish based on the criteria listed below. If you are learning remotely, your teacher will provide you with instructions on how to submit your recipe and images or video(s) of your completed dish.

Criteria	Excellent 3	Proficient 2	Emerging 1
Procedure	clearly followed given instructions and the example provided in the demonstration	somewhat followed given instructions and/or the example provided in the demonstration	did not follow given instructions and/or the example provided in the demonstration
Content (submitted photos, procedure, videos, etc.)	content and explanations were thorough and well detailed	included content and explanation but included few specific details	included little to no additional content or explanations and/or no specific details
Organization	organized when preparing and making their recipe	somewhat organized when preparing and/or making their recipe	not organized when preparing and/or making their recipe

Create Your Recipe

For this recipe you will need eggs, liquid egg substitute or silken tofu. You can choose to add any additional toppings or flavors based on your preference, dietary restrictions, allergies and available ingredients. Before starting to cook, it is important to have all of your ingredients, tools and equipment prepared ahead of time – what chefs call “mise en place” or “everything in its place.”

Select an egg or egg alternative:

egg

liquid egg substitute

silken tofu, cut into large cubes

Select optional ingredients:

toast or English muffin

arugula

smashed avocado

vegetable hash

burger

pesto or chimichurri

chopped fresh herbs

roasted root vegetables

salt and pepper

breakfast pizza

bacon, Canadian bacon, or vegetarian bacon

sautéed spinach or kale

ramen or pho

pancakes or waffles

Safety first:

- Always keep a Class ABC fire extinguisher nearby.
- Make sure there are no pot holders, towels or other flammable materials next to the burner.
- Make sure there are no plastic or meltable objects next to the burner.
- Always use dry, flame-retardant potholders to protect your hands from burning on hot cooking tools.
- Always pour hot liquids away from you.
- Never use wet or moist potholders, oven mitts or towels as they will conduct heat, burning your hands.

Equipment:

- saucepan or pot
- pot holders
- wide, slotted spoon
- small bowl or shallow cup
- paper towel
- thermometer
- gas range or cooktop

Ingredients:

- egg, egg substitute or silken tofu
- water
- white vinegar and salt (optional for adding to the water)
- any other optional ingredients of your choice

Procedure:

1. Fill the saucepan with water about 3 inches high. Place the saucepan on the burner and turn the burner on to medium to medium-high heat.
2. When little bubbles start to form and just start to break the surface of the water, turn the heat down to low to medium-low heat. The temperature of the water should be approximately 170–180°F. If adding vinegar or salt to your water (see tips), do so now.
3. Gently crack the egg, or pour the egg substitute, into a small bowl. Then, gently tip the egg or egg substitute into the center of the saucepan. With the spoon, stir slowly around the inner edge of the pot two or three times, being careful not to hit the egg or egg substitute with the spoon. Then, make sure you do not disturb the water as the poaching is taking place. You can observe how the egg or egg substitute changes as it poaches. If poaching silken tofu, gently drop the cubes into the hot liquid.
4. Poached eggs typically take three to five minutes. Use the slotted spoon to carefully remove the egg, egg substitute or silken tofu from the liquid and place on a paper towel to soak up the excess water. If using natural eggs, the egg white should be set but not feel rubbery.
5. Serve the egg, egg substitute or tofu warm on its own or with any of the optional ingredients.

Tips:

- The fresher the egg, the more the egg whites will hold together and the less likely the egg yolk will break.
- A small amount of white vinegar in the water will help the egg white coagulate and can help make the egg white more tender.
- Adding salt to the poaching water can infuse extra flavor into the egg or silken tofu as it cooks.
- Stir gently around the inner edge of the pot immediately after adding the egg to help the egg whites coagulate around the yolk instead of spreading out.
- Place the poached eggs, egg substitute or silken tofu on a paper towel to absorb excess water to prevent the rest of your dish from getting soggy.
- Silken tofu is a great substitute for poached eggs but can disintegrate if the liquid is bubbling too much.

Activity

After you finish cooking your poached egg or tofu dish recipe, you will create a sample menu for a restaurant that serves eggs with every dish. What would you name the restaurant? Include three creative egg dishes that can be served for either breakfast, lunch or dinner. Each menu item should include a creative name, a list of ingredients, a description and a drawing of the dish.

4	3	2	1
<p>The student response ...</p> <ul style="list-style-type: none">• fully responds to each part of the writing prompt with relevant, strong details• has logical organization• uses effective language and word choice for purpose and audience• contains no errors in usage or grammar	<p>The student response ...</p> <ul style="list-style-type: none">• addresses each part of the writing prompt with sufficient details• has sufficient organization• uses mostly effective language and word choice for purpose and audience• contains minor errors in usage or grammar that do not affect meaning	<p>The student response ...</p> <ul style="list-style-type: none">• addresses some of the writing prompt with weak details• attempts organization• uses some language and word choice for purpose and audience• contains minor errors in usage or grammar that slightly affect meaning	<p>The student response ...</p> <ul style="list-style-type: none">• does not address a large portion of the writing prompt• lacks organization• rarely uses appropriate language and word choice for purpose and audience• contains major errors in usage or grammar that greatly affect meaning

Final Assessment

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Intermediate Cooking with Gas—Beginner

Lesson 1: Poaching

Teacher Guide

(1-2 class sessions depending on setting)

Introduction

This lesson covers a basic understanding of natural gas, including where it is found. Then, students will learn how natural gas is used on a range or cooktop to heat water to cook poached eggs. Keep in mind that students may have dietary preferences, restrictions or allergies that may need to be accommodated in order for them to complete the recipe. Note that students may have different types of appliances at home, such as an electric or induction range, which will not prevent them from completing the assignment. If the student is preparing food at home, ensure that appropriate adult supervision will be available.

This lesson could be completed in a classroom or at home. Suggestions and instructions will be given for both scenarios.

Opening Assessment Answer Key (3 minutes)

Use these questions to obtain a baseline for what your students know before beginning the lesson. The correct answers are highlighted.

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What is Natural Gas? (5 minutes)

Students will read about natural gas, including what it is, how it formed and how it is found. The following questions could be used for a class discussion or given to students to complete individually.

- Why does natural gas only form deep underground?
- How do the differences in conventional and unconventional natural gas affect how the gas is found and mined?
- What are the properties of natural gas?
- Where is natural gas primarily found in North America?

Cooking with Natural Gas (5 minutes)

Students will read about the benefits of cooking with natural gas appliances. The following questions could be used for a class discussion or given to students to complete individually.

- What are the benefits of natural gas appliances over electric appliances?
- How is natural gas utilized for cooking?
- For what reasons is natural gas preferred by chefs?

Cooking Methods (2 minutes)

Students will understand that there are three cooking methods that utilize natural gas: moist cooking, dry cooking and combination cooking.

Moist Cooking: Poaching (5 minutes)

Students will read about cooking with moist heat and the poaching technique. The following questions could be used for a class discussion or given to students to complete individually.

- What are the benefits of cooking with moist heat?
- How does the poaching method work?
- What is the difference between poaching, boiling and simmering?

Instructor Demonstration (10 minutes)

The demonstration can either be performed in class or recorded for remote use. If the demonstration is done in person, consider bringing saucepans to poaching temperature while the students complete their readings in time for your demonstration.

You may also consider heating the water during this time so that the students will be able to cook along with the demonstration, or having the students start heating their water during the demonstration so that they may begin cooking directly following the demonstration rather than waiting for the water to heat.

The demonstration should include:

- how a gas range works
- safety tips when using a gas range
- how to heat water to proper poaching temperatures, including tips for how much to fill the saucepan and how high to have the flame.
- benefits of using poaching as a cooking technique
- how to cook eggs, egg substitute or silken tofu, noting how to check for doneness
- finishing the eggs, egg substitute and silken tofu with optional ingredients

Students will use the following questions as a guide to either a class discussion after the demonstration or note taking during the demonstration:

- What safety tips did the instructor give during the demonstration?
- How much water did the instructor put into the saucepan?
- How high did the instructor have the flame?
- How did the instructor determine the proper temperature of the water?
- How long did the instructor cook the egg/egg substitute/tofu?
- What cooking tips did the instructor give during the demonstration?

Selecting and Preparing a Recipe (15 minutes)

If the students will be cooking in the classroom, ensure that the ingredients are available to the students ahead of time. Make sure that student allergies, dietary restrictions and preferences are taken into account. Also be sure to plan a few minutes at the end of class for cleanup.

If the students will be cooking at home, be sure to provide the list of ingredients or the “mise en place” ahead of time to give the students time to assemble the ingredients. Take into consideration the time the recipe typically takes to cook and the ability for students to purchase their ingredients from the grocery store.

Students will use the instructor demonstration as a guide to cook their own egg or silken tofu dishes. Students will select their protein and optional flavorings and toppings from a list in order to complete their recipe.

Students cooking at home can submit a description of the ingredients and procedure they used along with pictures of their completed dishes or a video of themselves cooking the recipe. Be sure to share instructions with your students on what to submit and how to share it with you.

Scoring Rubric:

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Activity (10 minutes or as homework)

This activity is provided to be used either in the classroom during any down-time or as homework. Students will create a sample menu based around three egg dishes to serve at a restaurant that centers around eggs for each meal. Students will use the techniques they learned and their creativity to describe each dish, list the ingredients and sketch or draw a picture of the dish.

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Final Assessment: Answer Key (3 minutes or as homework)

Use these questions in conjunction with the discussion questions in each section to formatively assess student growth over the course of the lesson. Address any student misconceptions that remain at the end of the lesson. Consider having students compare their opening assessment with their final assessment to see how their understanding of cooking with gas improved over the course of the lesson.

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**Blue
flame**