



Intermediate Cooking with Gas

Lesson 2: Simmering

ADVANCED



Introduction

Welcome to Intermediate Cooking with Gas. Today's topic is understanding how natural gas gets from the ground to homes and businesses, where it can be used to cook delicious meals. After you learn about how homes and businesses access natural gas, you will learn how to cook with gas to make your own quinoa and beet salad.

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

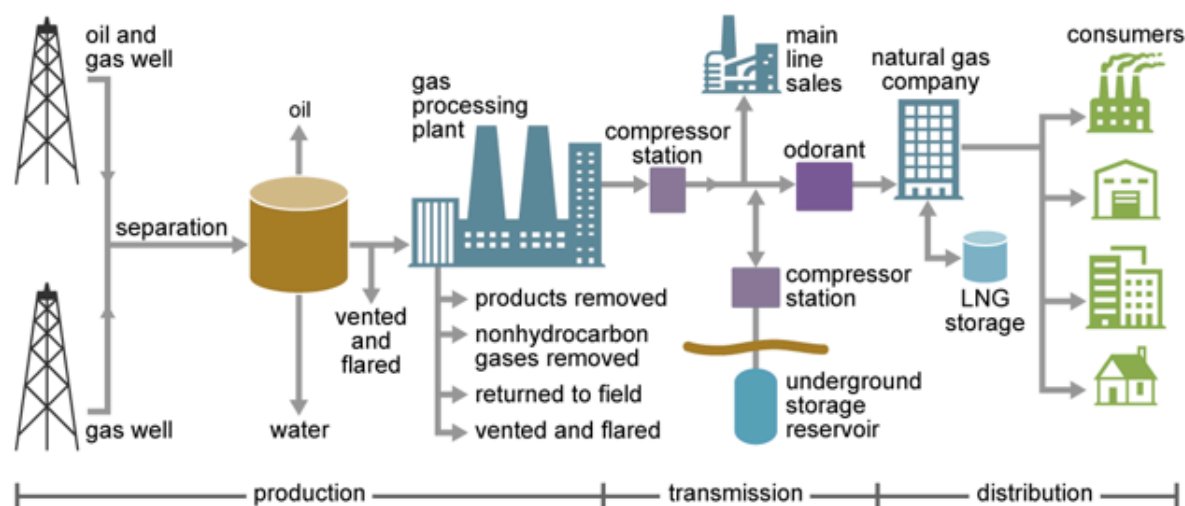
Opening Assessment

1. The process of seismic imaging involves using:
 - a. special digging tools
 - b. sound waves
 - c. large pipes
 - d. wells and pumps
2. In order to be transported by ship, natural gas has to be:
 - a. stored at a high temperature
 - b. turned into a solid
 - c. turned into a liquid
 - d. kept in a gas form
3. Where are gas burners located?
 - a. on top of a gas range
 - b. next to a gas meter
 - c. along gas pipelines
 - d. inside a venturi tube
4. What is one indication that a gas range should be cleaned?
 - a. Air is flowing into the burner.
 - b. The size of the flame cannot be adjusted.
 - c. The knobs do not turn all the way.
 - d. The flame exhibits a yellow color.
5. Why is gas sent to a processing plant?
 - a. to allow companies to monitor its use
 - b. to remove water vapor and other components
 - c. to raise its temperature
 - d. to distribute it to homes and businesses

How Does Natural Gas Get Into the Kitchen?

Natural gas is found in rock formations deep below the Earth's surface. Engineers locate deposits of natural gas using different techniques. One method of locating gas, called seismic imaging, utilizes air guns or explosives to send sound waves deep into the Earth. The waves reflect off underground layers, allowing engineers to analyze the different reflections and determine if gas is present or not.

Natural gas production and delivery



Source: U.S. Energy Information Administration

Natural Gas Explained Image credit [U.S. Energy Information Administration](https://www.eia.gov)

Once they locate gas, companies need to bring it to the surface. Big wells and pumps extract gas from underground, and the journey begins. Gas is sent to processing plants to remove water vapor and other components. From the processing plants, gas enters a complex network of pipelines. Gas in the United States is shipped through a variety of intrastate and interstate pipelines. From these larger pipelines, the gas is next sent into a distribution pipeline system. Alternatively, gas can be stored in large tanks for later use. From the distribution system, gas arrives at homes and businesses through service lines maintained by gas companies. The service lines are attached to meters, which gas companies use to monitor and bill for gas usage.

Pipelines are not the only way to transport gas. When pipelines are not available or accessible, or when large bodies of water need to be crossed, gas can be shipped in large ships called tankers. Before being transported by ship, gas has to be turned into **liquid natural gas (LNG)**.

LNG actually takes up less space than gas in its other form, making it easier to ship and store. On tanker ships, gas is stored in large, super-cooled tanks. How cool? Try -260°F! Tanker ships are really another part of the pipeline system. There are pipelines connected to ports to bring the gas to tankers and take the gas off tankers. There are also liquefaction plants that turn gas into liquid and back into gas form.



LNG Tanker Image credit [Office of Fossil Energy](#)

Cooking with Natural Gas

By the time natural gas reaches your range, it has traveled hundreds – maybe thousands – of miles. It has been extracted from the ground, processed, sent through pipelines, and maybe liquified and transported by ship, all so that you can turn a knob on your range and get a nice, hot flame to cook your food. Now, let's look a little closer at that gas range.

Gas burners are located on top of gas ranges. A burner assembly is attached to a small gas intake valve, which is attached to a gas line. Turning the knob on the range to the “light” position opens the valve and allows gas to flow through a pipe called the venturi tube. The gas mixes with air and flows into the burner, a hollow metal disk with holes or slots around the outside edge. Many burners are covered with a metal or ceramic cap, which directs the flames.

By using the knob, you can control how much gas and air flow into the burner, which in turn affects the size of the flame coming out of the burner. This allows you to precisely control the amount of heat you are cooking with.

In order to perform at their peak, gas ranges need to be cleaned regularly to remove food, grease buildup, etc. Many range manufacturers recommend cleaning burners at least once a month. You can do this more often if you notice that the flame is blowing or lifting, or if it exhibits a yellow color. You should also clean and periodically season the grates that cover the top of the range.

How to clean the grates, burner caps and burners on a gas range:

Grates/Burner Caps

- Make sure the burners are completely cool.
- Remove the grates.
- Submerge the grates in a shallow pan filled with half water and half white vinegar.
- Allow the grates to soak for 30 minutes.
- Remove the grates from the water/vinegar and rinse.
- Coat the grates with a water/baking soda paste and allow to sit for 15 minutes.
- Scrub the grates with an old toothbrush to remove any residue.
- Rinse the grates with water and dry them with a towel or paper towels.

Burners

- Mix a solution of half water and half white vinegar in a spray bottle.
- Spray the burners until they are well coated and allow the spray to sit for 15 minutes.
- Apply a thin coat of water/baking soda paste to the burners and allow to sit for 15 minutes.
- Scrub the burners with an old toothbrush to remove any residue.
- Wipe the burners with a wet cloth or paper towel to remove the paste.
- Dry the burners with a towel or paper towel.

Please refer to the Cleaning Guide (provided separately) for more information.

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: Simmering

Moist cooking methods include boiling, poaching, blanching, simmering and steaming. Each method utilizes water or some other liquid in order to cook the food. This lesson will utilize a gas range, a pot, a knife, a cutting board, a wooden spoon, a can opener and the simmering cooking method.

Simmering is a cooking method that involves cooking food in water, broth or some other liquid that is just below boiling (around 180–205°F). Some recipes call for boiling the ingredients first and then lowering the temperature of the water and simmering the food. Many foods can be simmered for a long period of time to bring out the flavor.

Foods like rice and soups cook well with the simmering method. You will learn how to use simmering, 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 use liquid to simmer food. Answer the following questions as you watch the demonstration.

- What safety tips did the instructor give during the demonstration?
- How high did the instructor turn up the flame on the range?
- How did the instructor add the quinoa to the boiling water?
- How did the instructor bring the rice from a boil to a simmer?
- How did the instructor determine how long to cook the quinoa?
- 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 a quinoa and beet salad with dressing and optional toppings. 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 of your completed dish.

Scoring Rubric:

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 to choose one item from the protein category and one item from the liquid category. You can choose to add any additional toppings or flavors based on your dietary preferences, restrictions or allergies, as well as available ingredients. Before starting to cook, it is important to have all of your ingredients, tools and equipment prepared ahead of time, which chefs call “mise en place” or “everything in its place.”

Select a Grain:

tri-color quinoa
white quinoa

Select a Vegetable:

cooked beets
arugula
mixed salad greens

Select Additional Seasoning and Ingredients:

olive oil
red wine vinegar
white mushrooms
red onion
salt
black pepper
crumbled feta
crumbled goat cheese
fresh dill
lemon zest
lemon juice

Safety first:

- Always keep a Class ABC fire extinguisher nearby.
- Make sure the handle of the pot is facing toward the middle of the range so the pot will not get accidentally knocked over.
- Make sure there are no pot holders, towels or other flammable materials next to the burner.
- Make sure there are no plastic or other meltable objects next to the burner.
- Always use pot holders to protect your hands from burning on the hot pot.
- Never use wet or moist pot holders, oven mitts or towels, as they will conduct heat, burning your hands.
- Practice knife safety when cutting foods and use knives that are properly sharpened.

Equipment:

- medium-sized pot
- baking sheet
- sink
- gas range
- oven mitts
- cutting board
- knife
- teaspoon
- tablespoon
- large salad bowl
- salad tongs
- wooden spoon
- small bowl
- zester

Ingredients:

- 1 bag arugula or mixed salad greens
- 1 package cooked beets
- 1 red onion, chopped
- 1 cup white mushrooms, chopped
- 2 tbsp olive oil
- 1 cup quinoa
- 1 $\frac{3}{4}$ cup water
- 1 tsp salt
- 1 tsp black pepper
- 2 tbsp red wine vinegar
- $\frac{1}{4}$ cup chopped dill
- zest and juice from one lemon
- $\frac{1}{2}$ cup crumbled feta or goat cheese

Procedure:

1. Preheat the oven to 425°F.
2. Remove the skin from the onion and chop; chop the mushrooms; add the onion and mushrooms to a baking sheet, drizzle with 1 tbsp olive oil and roast for 15 minutes.
3. Add the quinoa and water to the pot and bring to a boil.
4. Reduce the heat and simmer for 15 minutes or until all water is absorbed.
5. Remove the cooked beets from the package and dice; add to the salad greens.
6. In a small bowl, mix the remaining 1 tbsp olive oil, red wine vinegar, salt, pepper, lemon juice and lemon zest.
7. Finely chop the dill and add to the greens.
8. Add the onions and mushrooms to the greens.
9. Add the quinoa to the ingredients in the bowl.
10. Add the dressing to the greens and toss all the ingredients.
11. Top with feta or goat cheese.

Tips:

- Be careful not to get seeds from the lemon in the dressing.

Activity

After you are finished making your quinoa and beet salad, complete the activity.

You are so excited about your salad that you want to encourage others to live a healthy lifestyle. You start a podcast about eating healthy and making other healthy choices. Plan five episodes for your podcast. Which topic will you focus on for each podcast? What will you call your podcast? Who are some guests that you might have on your podcast? What are some other recipes you might share?

Final Assessment

1. The process of seismic imaging involves using:
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5. Why is gas sent to a processing plant?
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 - b. to remove water vapor and other components
 - c. to raise its temperature
 - d. to distribute it to homes and businesses

Intermediate Cooking with Gas—Advanced

Lesson 2: Simmering

Teacher Guide

(1-2 class sessions depending on setting)

Introduction

This lesson covers a basic understanding of how natural gas gets from the ground to homes and businesses. Students will then learn how natural gas is used on a range to cook quinoa to make a quinoa and beet salad. Keep in mind that students may have dietary preferences, restrictions or allergies that 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 students are 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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How Does Natural Gas Get Into the Kitchen?

(5 minutes)

Students will read about where natural gas comes from and how it arrives in people's kitchens for them to use. The following questions could be used for a class discussion or given to students to complete individually.

- Where is natural gas found?
- How is natural gas located?
- How is natural gas transported?

Cooking with Natural Gas (5 minutes)

Students will read about how the burner on a gas range works and how to clean the components of a gas range. The following questions could be used for a class discussion or given to students to complete individually.

- What are the main components of a gas range?
- How do you adjust the heat/flame on a gas range?
- What can cause a range to become dirty?
- Why is it important to clean a range?

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: Simmering (3 minutes)

Students will read about cooking with moist heat and the simmering 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?
- What is simmering?
- How is simmering different from boiling?
- What are some liquids that can be used for 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 opening the package of cooked beets and mixing the dressing ahead of time.

The demonstration should include:

- how a gas range works
- safety tips when using a gas range
- how to simmer, including tips for how find the right temperature
- benefits of using simmering as a cooking technique
- how to use a zester
- how to chop ingredients
- how to measure ingredients
- how to combine ingredients
- how to use knives safely

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 high did the instructor have the flame?
- How did the instructor safely chop the ingredients?
- How did the instructor determine how long to cook the quinoa?
- How did the instructor add the quinoa to the other ingredients?
- What cooking tips did the instructor give during the demonstration?

Selecting and Preparing a Recipe (20-25 minutes)

Note to instructor(s): In order for students to have time to complete the curried chickpeas, you could provide them with opened cans; chopped onions, garlic and ginger; and the spices premixed in a bowl (excluding cayenne). Cayenne can be very spicy, so you may want to assist students with adding a “pinch” after asking if they are sensitive to spicy food. Also, make sure that students wash their hands immediately after handling cayenne. To save time, students can begin cleanup and work on the assessment questions while the recipe is simmering.

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 curried chickpeas. Students will select a protein, liquid 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.

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Activity (can be completed during downtime or as homework)

Students will engage in a writing activity based on the prompt. Share the short answer scoring rubric with students before they complete their writing activity.

After you are finished making your quinoa and beet salad, complete the activity.

You are so excited about your salad that you want to encourage others to live a healthy lifestyle. You start a podcast about eating healthy and making other healthy choices. What are some of the topics you will talk about on your podcast? What will you call your podcast? Who are some guests that you might have on your podcast? What are some other recipes you might share?

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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