

### Ancient Grains Cooking Table

This table provides a quick, handy reference for cooking many different types of grains. The ratios given are for volumetric measuring. Grains are all measured as 1 (one) unit\* and the corresponding measure of prepared stock is listed in an equivalent unit size.

For example when cooking “Barley (pearled)”, the measure is listed as 2-½. So for every 1 Cup of barley, 2-½ Cups of prepared stock is needed. If quarts are used, the ratio would be 1 Quart of barley to 2-½ Quarts of stock. This is a handy technique when working in a busy kitchen, as the ratio will hold true no matter what container or measurement is used.

\* With volumetric measuring, any unit of measure can be used— including quarts, gallons, 1/6th pan, etc.



1 Unit  
Cup / Quart / Gallon

QUICK COOKING GRAINS							
Grain to Broth Ratio	Yield	Cook Time (minutes)	Cooking Method	Pre-Soak	Gluten Free	Instructions	
Amaranth	1: 1-1/4	1-1/4 units	:15 - :20	Steam or Pilaf	-	Yes	Cook via pilaf or steam method using stock prepared with <i>Minor's</i> ® Roasted Mirepoix Flavor Concentrate.
Buckwheat Groats	1: 2	2 units	:15	Pilaf	-	Yes	Toast grains briefly in oil and sautéed onion. Add hot stock and cover. Cook until all liquid is absorbed.
Bulgur (quick cooking)	1: 1	2 units	:05	Steam	-	-	With the pot steaming, pour boiling stock over grains until just submerged. Cover and let stand. Fluff if necessary.
Bulgur (medium, coarse)	1: 1-3/4	2 units	:10 - :20	Pilaf	-	-	Toast grains briefly in oil and sautéed onion. Add hot stock and cover. Cook until all liquid is absorbed.
Couscous (small)**	1: 1	1-1/2 units	:05 - :10	Steam	-	-	With the pot steaming, pour boiling stock over grains until just submerged. Cover and let stand. Fluff if necessary.
Couscous (large)**	1: 1-1/4	2-1/2 units	:05 - :10	Pilaf	-	-	Toast grains briefly in oil and sautéed onion. Add hot stock and cover. Cook until all liquid is absorbed.
Farro (semi pearled)	1: 2	2 units	:20 - :25	Pilaf	-	-	Toast grains briefly in oil and sautéed onion. Add hot stock and cover. Cook until all liquid is absorbed.
Freekeh (greenwheat)	1: 1-1/2	2 units	:20	Pilaf	-	-	Toast grains briefly in oil and sautéed onion. Add hot stock and cover. Cook until all liquid is absorbed.
Millet	1: 2	3 units	:15 - :20	Pilaf	-	Yes	Toast grains briefly in oil and sautéed onion. Add hot stock and cover. Cook until all liquid is absorbed.
Quinoa*	1: 1-3/4	2-1/2 units	:12 - :15	Pilaf	-	Yes	Toast grains briefly in oil and sautéed onion. Add hot stock and cover. Cook until all liquid is absorbed.
Teff	1: 1	2 units	:15 - :20	Pilaf	-	Yes	Toast grains briefly in oil and sautéed onion. Add hot stock and cover. Cook until all liquid is absorbed.



1 Unit  
Cup / Quart / Gallon

SLOW COOKING GRAINS							
Grain to Broth Ratio	Yield	Cook Time (minutes)	Cooking Method	Pre-Soak	Gluten Free	Instructions	
Barley (pearled)	1 : 2-1/2	3 units	:30 - :40	Simmer	Quick Soak (optional)	Yes	Optional pre-soak. Toast grains in oil and sautéed onion. Add 1/2 of hot stock & cover for 2-3 hours. Add remaining 1/2 of hot stock and simmer for :30-:40 minutes until all liquid is absorbed.
Barley (hulled)	1 : 3	3 units	:45 - :60	Simmer	Overnight	Yes	Bring 1/2 of prepared stock to boil and pour over grain. Soak overnight. Add remaining stock and simmer for :45-:60 until all liquid is absorbed.
Einkorn	1 : 1	2 units	:20	Pilaf	Overnight	-	Bring 1/2 of prepared stock to boil and pour over grain. Soak overnight. Add remaining 1/2 of stock and simmer for :45-:60 minutes until all liquid is absorbed. Rinse to remove extra starch.
Farro (whole grain)	1 : 3	2-1/2 units	:45 - :60	Simmer	Overnight	Yes	Bring 1/2 of prepared stock to boil and pour over grain. Soak overnight. Add remaining stock and simmer for :45-:60 until all liquid is absorbed.
Kamut	1 : 4	2 units	:50 - :60	Simmer	Overnight	Yes	Bring 1/2 of prepared stock to boil and pour over grain. Soak overnight. Add remaining stock and simmer for :50-:60 until all liquid is absorbed.
Oat Berries / Groats	1 : 1-3/4	2-1/2 units	:30 - :40	Simmer	Quick Soak (optional)	-	Optional pre-soak. Toast grains in oil and sautéed onion. Add 1/2 of hot stock & cover for 2-3 hours. Add remaining 1/2 of hot stock and simmer for :30-:40 minutes until all liquid is absorbed.
Rye Berries	1 : 3	2 units	:50 - :60	Simmer	Overnight	Yes	Bring 1/2 of prepared stock to boil and pour over grain. Soak overnight. Add remaining stock and simmer for :50-:60 until all liquid is absorbed.
Sorghum	1 : 3	2 units	:60 - :75	Simmer	Quick Soak (optional)	Yes	Optional pre-soak. Toast grains in oil and sautéed onion. Add 1/2 of hot stock & cover for 2-3 hours. Add remaining 1/2 of hot stock and simmer for :60-:75 minutes until all liquid is absorbed.
Spelt Berries	1 : 2	2 units	:45 - :50	Simmer	Overnight	Yes	Bring 1/2 of prepared stock to boil and pour over grain. Soak overnight. Add remaining stock and simmer for :45-:50 until all liquid is absorbed.
Triticale Berries	1 : 3	2 units	:50 - :60	Simmer	Overnight	Yes	Bring 1/2 of prepared stock to boil and pour over grain. Soak overnight. Add remaining stock and simmer for :50-:60 until all liquid is absorbed.
Wheat Berries	1 : 4	2 units	:50 - :60	Simmer	Overnight	-	Bring 1/2 of prepared stock to boil and pour over grain. Soak overnight. Add remaining stock and simmer for :50-:60 until all liquid is absorbed.



1 Unit  
Cup / Quart / Gallon

RICE							
Grain to Broth Ratio	Yield	Cook Time (minutes)	Cooking Method	Pre-Soak	Gluten Free	Instructions	
Basmati Rice	1 : 1-3/4	3 units	:20 - :25	Pilaf	-	Yes	Toast grains briefly in oil and sautéed onion. Add hot stock and cover. Cook until all liquid is absorbed.
Black or Purple Rice	1 : 2-1/4	2 units	:35	Pilaf or Pasta	-	Yes	Cook via pilaf or pasta method using stock prepared with <i>Minor's</i> ® Roasted Mirepoix Flavor Concentrate.
Brown Rice (long)	1 : 2-1/2	2 units	:40 - :45	Steam or Pilaf	Quick Soak (optional)	Yes	Cook via pilaf or steam method using stock prepared with <i>Minor's</i> Roasted Mirepoix Flavor Concentrate.
Brown Rice (short)	1 : 2-1/2	3 units	:40 - :50	Steam or Pilaf	Quick Soak (optional)	Yes	Cook via pilaf or steam method using stock prepared with <i>Minor's</i> Roasted Mirepoix Flavor Concentrate.
Himalayan Red Rice	1 : 2	3 units	:35	Pilaf	-	Yes	Toast grains briefly in oil and sautéed onion. Add hot stock and cover. Cook until all liquid is absorbed.
Sushi Rice	1 : 1-1/2	2-1/2 units	:20 - :25	Steam	-	Yes	With the pot steaming, pour boiling stock over grains until just submerged. Cover and let stand. Fluff if necessary.
Wild Rice	1 : 3	2 units	:45 - :60	Pasta	-	Yes	Bring 1 gallon of stock to boil for every 2 lbs of rice. Simmer until tender, approximately :45-:60 minutes. Drain away extra stock.

## Ancient Grains Cooking Table

Generally speaking, cooking techniques for grains can be similar to cooking rice— and is typically accomplished using one of the following three (3) basic methods:

1. Pilaf / Simmer Method
2. Steam Method
3. Pasta Method

**Chef's Tip:** For an extra boost of flavor, add *Minor's®* Herb de Provence Flavor Concentrate to the prepared stock (1 Tbsp of concentrate : 1 Gal of prepared stock).

### ***Pilaf / Simmer Method***

In a saucepan, sauté diced onion with a little oil. Add grain of choice and toast briefly, coating in oil. Add the recommended amount of hot stock prepared with *Minor's* Roasted Mirepoix Flavor Concentrate (Gluten Free) or Low Sodium Chicken Base (GF). Cover with lid and cook until all the liquid is absorbed. Remove cover to release excess heat and steam. Fluff if necessary.

*Note: Simmering is basically a longer method of the pilaf method. Some grains will need extended simmering time to absorb the stock.*

### ***Steam Method***

Bring stock prepared with *Minor's* Roasted Mirepoix Flavor Concentrate (Gluten Free) or Low Sodium Chicken Base (GF) to a simmer and pour over grain. Cover and let stand. Alternatively, you can steam in a pressure steamer. Simply add flavored stock over grain until it is just covered. Cover tightly with plastic wrap and steam (see chart for cooking times). Remove wrap and fluff. Cool or let stand until needed.

### ***Pasta Method***

A simple method that yields a clean grain that's not starchy or sticky. Prepare 1 gallon of stock for every 2 pounds of grain/rice using *Minor's* Roasted Mirepoix Flavor Concentrate (Gluten Free) or Low Sodium Chicken Base (GF). Bring stock to a boil and add grain of choice. Simmer until tender. Drain away the excess stock after cooking.

*Note: This method will cause nutrient and flavor loss if done for an extended period of time.*

### ***Soaking Shortcut for Longer Cooking Grains***

For faster prep times on longer cooking grains, bring half of the recommended amount of *Minor's* prepared stock to a boil and pour over grain. Let stand for 2-3 hours before cooking. When ready, heat the grains with the remaining stock and cook per the recipe. You'll find the cooking time is much shorter with a little pre-soaking. For tougher grains, pre-soak overnight (see Grain Cooking Table).

*Note: Do not pre-soak overnight in unseasoned water. The grains will absorb unflavored water and take on very little flavor later in the cooking process.*

## Ancient Grains Cooking Table

### *Prepared Stock vs. Plain Water*

To achieve robust flavor with any type of grain or cooking method, use stock prepared with Minor's® Gluten Free Concentrates or Low Sodium Bases. This will gently imbue the grain with flavor during the cooking process and make them tender, tasty, and ready to use in any hot or cold recipe.

It's important to use prepared stock, rather than plain water, as the cooking liquid because it is extremely difficult to add sufficient flavor after the grains have been cooked. Grains will swell to 2-3 times their original size and absorb the liquid they are prepared in. Once cooked in plain water, the grain will forever "fight" the addition of more flavor and will result in a bland tasting grain. This is never more evident than in semi- and un-milled grains.

### *Important: Cooking Times Vary*

Grains vary in cooking time depending on a couple of factors: the age of the grain; how long it's been stored; the variety of grain; the pans used; and type of cooking equipment. Recommended cooking times are provided, but ultimately the grains are done when the desired level of flavor and tenderness is reached. Given the factors above, if the grain is not as tender as you like when the "time is up," simply add more prepared stock and continue cooking. Or, if the grains are tender and tasty before all the liquid is absorbed, drain the excess liquid.

With respect to equipment, convection ovens will cook quicker than conventional ovens, and modern accelerated ovens such as a combi-oven will cook quicker still (approximately 25% faster than a convection oven). Combi-ovens have the added benefit of steam, so the amount of cooking stock could be cut by approximately 20%. Be sure to track results in your Cook Table and record for future use.

**Bulgar with Roasted Mirepoix Flavor Concentrate**

Ancient grain cooked using Minor's® Roasted Mirepoix Flavor Concentrate and the steam method.

Yield	2 qts
Serves	32
Preparation time	5 minutes
Cooking time	5 minutes

**Recipe details**

Qty	Unit	Alt Qty	Alt Unit	Ingredient	Preparation
32	fl oz		1 qt	Water, boiling	
1	oz		2 tbsp	<u>Minor's Roasted Mirepoix Flavored Concentrate Gluten Free 6x1 lb.</u>	
2	lb		1 qt	Bulgar wheat	

**Preparation Steps**

1. Whisk Roasted Mirepoix Flavor Concentrate into simmering water until thoroughly incorporated.
2. Place bulgur into a container large enough to hold both it and the flavored broth. Pour flavored broth over bulgur and cover tightly with plastic wrap or a tightly fitting lid. Allow bulgur to steam with the broth for at least 5 minutes or until all the liquid is absorbed.
3. Remove the lid and fluff the grain with a fork to release excess heat and moisture.

**Chef's tip**

For an excellent flavor enhancement, add Minor's Herb De Provence Flavor Concentrate to the cooking liquid (1 tbsp to 1 gallon of stock).

**Nutrition**

Nutritional analysis per serving	
Energy (Kcal)	98
Energy (KJ)	410.5
Protein (g)	3.2
Carbohydrate, total (g)	21.7
Fats, total (g)	0.5
Sugars, total (g)	0.2
Fats, saturated (g)	0.1
Fiber, total dietary (g)	3.5
Sodium (mg)	11.9
Calcium (mg)	9.9
Cholesterol (mg)	0
Iron (mg)	1.3
Fats, monounsaturated (g)	0.1
Fats, polyunsaturated (g)	0.2
Vitamin A (µg_RAE)	2.9
Vitamin C (mg)	0

The nutritional analysis is based on a theoretical computation, not on a laboratory analysis.

**Farro with Roasted Mirepoix Flavor Concentrate**

Ancient grain cooked using Minor's® Roasted Mirepoix Flavor Concentrate and the pasta method.

Yield	2 qts
Serves	32
Preparation time	24 hours
Cooking time	55 minutes

**Recipe details**

Qty	Unit	Alt Qty	Alt Unit	Ingredient	Preparation
128	fl oz		1 gal	Water, boiling	
4	oz		1/2 cup	<u>Minor's Roasted Mirepoix Flavored Concentrate Gluten Free 6x1 lb.</u>	
2	lb		1 qt	Farro (Wheat)	

**Preparation Steps**

1. To a pot of simmering water, add the Roasted Mirepoix Flavor Concentrate. Whisk until thoroughly incorporated. Cool to room temperature or below.
2. Add 1-3/4 qt. of roasted mirepoix broth to the farro, and refrigerate for at least 8 hours or overnight.
3. After the farro has soaked, bring remaining broth to a simmer and add farro. Simmer for 45-55 minutes. Add additional broth if necessary.
4. Once farro is tender, strain to drain any excess liquid and cool.

**Chef's tip**

Minor's Herb de Provence Flavor Concentrate added to the cooking liquid (1 tbsp to 1 gallon of stock) is an excellent flavor enhancement.

**Nutrition**

Nutritional analysis per serving	
Energy (Kcal)	100.7
Energy (Kj)	447.3
Protein (g)	4
Carbohydrate, total (g)	19.6
Fats, total (g)	0.1
Sugars, total (g)	0.4
Fats, saturated (g)	0
Fiber, total dietary (g)	1.8
Sodium (mg)	62.5
Calcium (mg)	5.7
Cholesterol (mg)	0
Iron (mg)	1.1
Fats, monounsaturated (g)	0
Fats, polyunsaturated (g)	0
Vitamin A (µg_RAE)	11.8
Vitamin C (mg)	0.2

The nutritional analysis is based on a theoretical computation, not on a laboratory analysis.

**Millet with Roasted Mirepoix Flavor Concentrate**

Ancient grain cooked using Minor's Roasted Mirepoix Flavor Concentrate and the pilaf method.

Yield	3 qts
Serves	48
Preparation time	3 minutes
Cooking time	30 minutes

**Recipe details**

Qty	Unit	Alt Qty	Alt Unit	Ingredient	Preparation
1/2	fl oz		1 tbsp	Olive oil	
3	oz		2/3 cup	Onions	diced
2	lb		1 qt	Millet	
80	fl oz		2-1/2 qts	Water	
2.5	oz		5 tbsp	<b>Minor's Roasted Mirepoix Flavored Concentrate Gluten Free 6x1 lb.</b>	

**Preparation Steps**

1. In a pot over medium heat, sweat onions in olive oil. Gently cook until translucent and soft.
2. Add millet and continue to stir until all of the grain has been coated with the oils.
3. Add water and thoroughly whisk in the Roasted Mirepoix Flavor Concentrate. Bring to a simmer and tightly cover.
4. Place in a preheated 325°F convection oven for approximately 30 minutes. When fully cooked, the liquid should be absorbed and the millet should be tender.
5. Remove the lid, and fluff the grain with a fork and to release excess heat and moisture.

**Chef's tip**

For an excellent flavor enhancement, add Minor's Herb De Provence Flavor Concentrate to the cooking liquid (1 tbsp to 1 gallon of stock).

**Nutrition**

Nutritional analysis per serving	
Energy (Kcal)	76.6
Energy (KJ)	321.1
Protein (g)	2.1
Carbohydrate, total (g)	14.3
Fats, total (g)	1.1
Sugars, total (g)	0.3
Fats, saturated (g)	0.2
Fiber, total dietary (g)	1.7
Sodium (mg)	20
Calcium (mg)	3.3
Cholesterol (mg)	0
Iron (mg)	0.6
Fats, monounsaturated (g)	0.4
Fats, polyunsaturated (g)	0.4
Vitamin A (µg_RAE)	4.9
Vitamin C (mg)	0.2

The nutritional analysis is based on a theoretical computation, not on a laboratory analysis.

**Quinoa with Roasted Mirepoix Flavor Concentrate**

Ancient grain cooked using Minor's Roasted Mirepoix Flavor Concentrate.

Yield	2-1/2 qts
Serves	30
Preparation time	3 minutes
Cooking time	30 minutes

**Recipe details**

Qty	Unit	Alt Qty	Alt Unit	Ingredient	Preparation
64	fl oz	2	qt	Water	
2	oz	4	tbsp	<u>Minor's Roasted Mirepoix Flavored Concentrate Gluten Free 6x1 lb.</u>	
24	oz	1	qt	Quinoa	rinsed

**Preparation Steps**

- Over medium high heat, whisk together water and Roasted Mirepoix Flavor Concentrate. Add quinoa and bring to a simmer.
- Cover pot with lid and place in a 350°F convection oven for 25-30 minutes or until quinoa is tender. Be sure to test the quinoa for doneness.

**Nutrition**

Nutritional analysis per serving	
Energy (Kcal)	92.9
Energy (KJ)	412.7
Protein (g)	3.5
Carbohydrate, total (g)	15.1
Fats, total (g)	1.8
Sugars, total (g)	1.2
Fats, saturated (g)	0
Fiber, total dietary (g)	5.6
Sodium (mg)	29.3
Calcium (mg)	9.8
Cholesterol (mg)	0
Iron (mg)	1.1
Fats, monounsaturated (g)	0.4
Fats, polyunsaturated (g)	0.5
Vitamin A (µg_RAE)	38.6
Vitamin C (mg)	0.1

*The nutritional analysis is based on a theoretical computation, not on a laboratory analysis.*



**Spelt with Roasted Mirepoix Flavor Concentrate**

Ancient grain cooked using Minor's® Roasted Mirepoix Flavor Concentrate and the pasta method.

Yield	1-3/4 qts
Serves	28
Preparation time	24 hours
Cooking time	55 minutes

**Recipe details**

Qty	Unit	Alt Qty	Alt Unit	Ingredient	Preparation
128	fl oz		1 gal	Water, boiling	
4	oz		1/2 cup	<b>Minor's Roasted Mirepoix Flavored Concentrate Gluten Free 6x1 lb.</b>	
2	lb		1 qt	Spelt, uncooked	

**Preparation Steps**

1. To a pot of simmering water, add the Roasted Mirepoix Flavor Concentrate. Whisk until thoroughly incorporated. Cool to room temperature or below.
2. Add 1-3/4 quarts of roasted mirepoix broth to the spelt berries and refrigerate for at least 8 hours or overnight.
3. Once the spelt has soaked, bring the remaining broth to a simmer and add spelt. Simmer for 45-55 minutes. Add additional broth if necessary.
4. Once spelt is tender, strain to drain any excess liquid and cool.

**Chef's tip**

For an excellent flavor enhancement, add Minor's Herb De Provence Flavor Concentrate to the cooking liquid (1 Tbsp. : 1 gallon of stock).

**Nutrition**

Nutritional analysis per serving	
Energy (Kcal)	114.5
Energy (Kj)	480.5
Protein (g)	4.8
Carbohydrate, total (g)	24.1
Fats, total (g)	0.9
Sugars, total (g)	2.7
Fats, saturated (g)	0.1
Fiber, total dietary (g)	3.6
Sodium (mg)	54.6
Calcium (mg)	12.7
Cholesterol (mg)	0
Iron (mg)	1.4
Fats, monounsaturated (g)	0.2
Fats, polyunsaturated (g)	0.5
Vitamin A (µg_RAE)	16.7
Vitamin C (mg)	0.2

The nutritional analysis is based on a theoretical computation, not on a laboratory analysis.

**Wheat Berries with Roasted Mirepoix Flavor Concentrate**

Ancient grain cooked using Minor's Roasted Mirepoix Flavor Concentrate and the pasta method.

Yield	2 qts
Serves	32
Preparation time	24 hours
Cooking time	55 minutes

**Recipe details**

Qty	Unit	Alt Qty	Alt Unit	Ingredient	Preparation
128	fl oz		1 gal	Water, boiling	
4	oz		1/2 cup	<u>Minor's Roasted Mirepoix Flavored Concentrate Gluten Free 6x1 lb.</u>	
2	lb		1 qt	Wheat, berries	

**Preparation Steps**

1. To a pot of simmering water, add the Roasted Mirepoix Flavor Concentrate. Whisk until thoroughly incorporated. Cool to room temperature or below.
2. Add 1-3/4 quarts of roasted mirepoix broth to the wheat berries and refrigerate for at least 8 hours or overnight.
3. Once the wheat berries have soaked, bring the remaining broth to a simmer and add wheat berries. Simmer for 40-55 minutes. Add additional broth if necessary.
4. Once wheat berries are tender, strain to drain any excess liquid and cool.

**Chef's tip**

For an excellent flavor enhancement, add Minor's Herb De Provence Flavor Concentrate to the cooking liquid (1 tbsp to 1 gallon of stock).

**Nutrition**

Nutritional analysis per serving	
Energy (Kcal)	100.9
Energy (Kj)	447.8
Protein (g)	3.6
Carbohydrate, total (g)	21.3
Fats, total (g)	0.7
Sugars, total (g)	0.4
Fats, saturated (g)	0
Fiber, total dietary (g)	4.3
Sodium (mg)	45.5
Calcium (mg)	3.5
Cholesterol (mg)	0
Iron (mg)	0.9
Fats, monounsaturated (g)	0
Fats, polyunsaturated (g)	0
Vitamin A (µg_RAE)	11.8
Vitamin C (mg)	0.2

*The nutritional analysis is based on a theoretical computation, not on a laboratory analysis.*

**Wild Rice with Roasted Mirepoix Flavor Concentrate**

Wild rice cooked using Minor's Roasted Mirepoix Flavor Concentrate.

Yield	3 qts
Serves	10
Preparation time	3 minutes
Cooking time	45 minutes

**Recipe details**

Qty	Unit	Alt Qty	Alt Unit	Ingredient	Preparation
128	fl oz		1 gal	Water	
3	oz		1/3 cup	<u>Minor's Roasted Mirepoix Flavored Concentrate Gluten Free 6x1 lb.</u>	
24	oz		1 qt	Wild rice	

**Preparation Steps**

- Over medium high heat, whisk together water and Roasted Mirepoix Flavor Concentrate. Add wild rice and bring to a simmer.
- Cover pot with lid and place in 350°F convection oven for 45 minutes or until rice is tender. It may be necessary to strain excess liquid from the rice once it is tender.

**Nutrition**

Nutritional analysis per serving	
Energy (Kcal)	253.3
Energy (KJ)	1062.8
Protein (g)	10.1
Carbohydrate, total (g)	53.1
Fats, total (g)	0.9
Sugars, total (g)	2.7
Fats, saturated (g)	0.1
Fiber, total dietary (g)	4.4
Sodium (mg)	115.8
Calcium (mg)	24.4
Cholesterol (mg)	0
Iron (mg)	1.4
Fats, monounsaturated (g)	0.2
Fats, polyunsaturated (g)	0.5
Vitamin A (µg_RAE)	29
Vitamin C (mg)	0.5

*The nutritional analysis is based on a theoretical computation, not on a laboratory analysis.*