Solution to Certified Reference Material recipe challenge

Catherine A. Rimmer · Melissa M. Phillips

© Springer-Verlag Berlin Heidelberg 2013

Although there is no “correct” answer to this analytical challenge, we found the following two recipes to be particularly appealing with regard to the number and variety of CRMs utilized in their preparation and the overall cost of preparation—thankfully this was a creative exercise, and not a practical one!

The winners of the Certified Reference Material recipe challenge (published in volume 405 issue 13) are:

Katherine Sharpless, Chemical Science Division, National Institute of Standards and Technology (NIST), Gaithersburg, MD 208 99, USA

and

Mallory J. Morris, Department of Chemistry and Biochemistry, Florida State University, Tallahassee, FL 32306-4390 USA

The award entitles the winners to select a Springer book of their choice up to a value of €100,-.

Our Congratulations!

Solution/recipes

Peanut butter and jelly sandwich (Katherine Sharpless)

Two slices of rich white bread (recipe below)
2 tsp. blueberry jam (recipe below)
2 tsp. peanut butter

Slice bread. Spread one slice with peanut butter and the other slice with jam. Place slices together, peanut butter

layer in contact with jelly layer. Serve. Suggested accompaniment: glass of reconstituted BCR-607 Milk Powder, chilled.

Rich white bread

Stir together yeast, half the flour, and the other dry ingredients (Table 1). Combine butter fat and water and heat to 50 °C. Add liquid to yeast mixture and stir until well blended. Add 200 g flour and stir. Continue stirring, adding additional flour to make a soft dough. Knead until smooth and elastic, 8 min to 10 min.

Place the dough in a large greased bowl, turning the dough so that the top is greased. Cover with a towel and leave to rise in a warm place until the size has doubled, approximately 60 min. Punch down dough and leave to rise again, approximately 30 min. Divide dough in half and place in two greased loaf pans. Cover and leave to rise until the size has doubled, approximately 45 min. Bake in a 200 °C oven for 30 to 40 min or until dark golden brown and sounds hollow when tapped. Immediately remove from the oven and cool the bread on racks.

Blueberry jam

Combine blueberries (880 g), sucrose (500 g), and water (450 g). Bring slowly to the boil, then cook rapidly until ingredients begin to gel. (Test by freezing a spoonful.) Stir frequently to prevent sticking. Cool.

The sources and costs of the ingredients required to make a peanut butter and jelly sandwich are listed in Table 1. The total cost is ca. 27,000 USD.

Spaghetti beans (Mallory J. Morris)

Spaghetti beans is a Kentuckian's take on Cincinnati-style chili, which typically includes a hearty serving of chili on top of a pile of spaghetti noodles.

This article is the solution to the Analytical Challenge to be found at <http://dx.doi.org/10.1007/s00216-013-6844-y>

C. A. Rimmer (✉) · M. M. Phillips
Chemical Science Division, National Institute of Standards and Technology, 100 Bureau Drive, Stop 8392,
Gaithersburg, MD 20899-8392, USA
e-mail: Catherine.rimmer@nist.gov

Table 1 Ingredients and costs for peanut butter and jelly sandwich

Quantity	Ingredient	Cost (USD)
Bread		
25 g	NRC SELM-1 Selenium-Enriched Yeast	1060
30 g	NIST SRM 17f Sucrose	337
7.5 g	NIST SRM 919b Sodium Chloride	335
850 g	IRMM BCR-396 Wheat Flour	522
64 g	IRMM BCR-607 Milk Powder	502
30 g	IRMM BCR-632A Butter Fat	1414
30 g	NIST RM 8445 Spray-Dried Whole Egg	1896
340 g	NIST SRM 1640a Trace Elements in Natural Water	856
Jam		
880 g	NIST SRM 3287 Blueberry (Fruit)	15505
500 g	NIST SRM 17f Sucrose	3033
450 g	NIST SRM 1640a Trace Elements in Natural Water	856
Peanut butter		
30 g	NIST SRM 2387 Peanut Butter	687

Spaghetti

Ingredients:

306 g flour – Wheat Flour BCR 396
 2.845 g salt – Sodium Chloride SRM 919b
 48 g eggs – Whole Egg Powder RM 8445
 203 mL water – Groundwater ERMCA 616
 4.67 g oil – Coconut Oil BCR 459

In a large bowl, stir together 238 g wheat flour and the sodium chloride. Make a well in the center of the flour mixture. In a small bowl, combine egg powder, water, and oil. Then pour the egg mixture into the well in the flour mixture, stirring to combine.

Sprinkle a clean kneading surface with the remaining flour. Turn dough out on to the floured surface. Knead the dough until it is smooth and elastic (8 to 10 min total). To knead dough, fold the dough and then push it with the heel of your hand. Turn the dough and repeat folding and pushing until the dough reaches a smooth and elastic consistency. Cover the dough and leave for 10 min.

After dough has rested for 10 min, divide into four equal portions and place on a lightly floured surface. Roll each portion into a rectangle with a rolling pin then dust both sides of the dough and leave it to stand, uncovered, for approximately 20 min.

Loosely roll the dough into a spiral and cut the spiral crosswise into 0.5 cm-wide strips. Unroll the strips to separate. At this point you can cook the noodles immediately.

To cook noodles, fill a large pot with 2.8 liters water. Bring the water to boiling. Add noodles a few at a time so the water does not stop boiling. (This also prevents the noodles from sticking together.) Reduce the heat slightly and boil, uncovered, stirring occasionally, for 1.5 to 2 min or until the pasta is al dente (flexible, but still slightly firm at the center). Drain the noodles in a colander to remove all the water before serving.

Chili beans

Ingredients:

14.01 g oil - Coconut Oil BCR 459
 90 g carrots – Carrot ERMBC515
 1 onion
 11.38 g ground cumin
 454 g beef or meat substitute – Canned fresh chub BCR719
 4 diced tomatoes
 500 mL water - Groundwater ERMCA 616
 1 teaspoon dried oregano
 2.845 g salt – Sodium Chloride SRM 919b
 2.845 g pepper
 454 g beans – Haricot Beans ERMBC514

Heat oil in a large Dutch oven or large pot over medium heat. Add the chopped onion and carrots and cook, stirring occasionally until the vegetables are soft (approx. 10 min). Then add cumin and continue to cook for 1 min. Add the canned fresh chub and increase the temperature to high. As the meat cooks, break it up with a spoon, until it is cooked all the way through. Stir in the tomatoes, water, oregano, salt, and pepper. Simmer partially covered, stirring occasionally, for 30 min. Stir in the beans and cook for 20 more minutes. Serve chili over noodles and enjoy!

The sources and costs of the ingredients required to make spaghetti beans are listed in Table 2. The total cost is ca. 13,000 USD.

Table 2 Ingredients and costs for spaghetti beans

Quantity	Ingredient	Cost (USD)
50 g	IRMM BCR 396 Wheat Flour	321
30 g	NIST SRM 919b Sodium Chloride	335
50 g	NIST RM 8445 Whole Egg Powder	3160
760 mL	IRMM ERM CA616 Groundwater	1536
45 g	IRMM BCR 459 Coconut Oil	88
100 g	IRMM ERM BC515 Carrot	794
490 g	IRMM BCR 719 Canned Fish Chub	2835
475 g	IRMM BCR 514 Haricot Beans	3772