



particles IN food



Think About

How could you define states of matter using familiar food examples?



Investigate and Create

Create a **diagram** of one of the recipes shared on the following pages to show your understanding of **particle movement** and how matter changes.

Pick from the following processes to include in your diagram. You will find one or more of these processes in the recipes. You may have to read the directions carefully to find evidence of the processes!

- ◆ Melting
- ◆ Freezing
- ◆ Boiling or vaporization
- ◆ Evaporation
- ◆ Condensation

What are the processes that change food matter? Go to www.projectagriculture.ca/elementary to find the carousel slide with this guiding question in the **food MATTERS** topic. Use the information in the carousel slide and the **Food Changes Learning Source** to help you complete these learning tasks.

A **phase change** happens when a substance changes from one state of matter to another. Can you identify the phase changes that happen in each recipe?

SUPER-BERRY ICE CREAM

Ingredients

1 1/2 cup (375 ml) unsweetened frozen mixed berries

1/2 frozen banana

1 cup (250 ml) plain Greek yogurt

1 tbsp (15 ml) honey

1 tsp (5 ml) vanilla

Directions

Place all ingredients in a blender and blend until smooth. The mixture will be very thick. Enjoy right away, or place in the freezer until ready to eat. For a fun variation, put the "ice cream" between your favourite cookies for a fun version of an ice cream sandwich.



CRITTER FRITTERS

Ingredients

3 cups (750 ml) frozen peas, divided

3 eggs

1 green onion, roughly chopped

2 Tbsp (30 ml) fresh parsley, chopped

1 cup (250 ml) chickpea (garbanzo bean) flour

1 tsp (5 ml) baking powder

1/3 cup (75 ml) ricotta cheese

1/2 cup (125 ml) hemp hearts

2 Tbsp (30 ml) canola oil



Directions

1. Steam frozen peas for 2 minutes in a covered steamer. Drain and set aside.
2. In a food processor, add 1 1/2 cups (375 ml) steamed peas, eggs, green onion, parsley, chickpea flour and baking powder. Pulse to combine.
3. Transfer mixture to a medium bowl and gently fold in remaining 1 1/2 cups (375 ml) peas, ricotta cheese and hemp hearts.
4. Lightly coat a cast-iron skillet with canola oil on medium heat. Drop dollops of batter into skillet. Gently flatten with a spatula. Cook fritter for 2 to 3 minutes per side or until golden and fluffy.

SPICED FRENCH TOAST

Ingredients

French Toast

- 6 eggs
- 1 1/2 cups (375 ml) milk
- 2 tbsp granulated sugar
- 2 tsp (10 ml) vanilla
- 2 tbsp (30 ml) vegetable oil, divided
- 10 slices (3/4-inch/2cm thick) French loaf or egg bread
- 1 1/2 tsp (7.5 ml) ground cinnamon
- 1/2 tsp (2.5 ml) ground cardamom
- 1/4 tsp (1.25 ml) ground nutmeg
- 1/4 tsp (1.25 ml) ground ginger
- 1/8 tsp (.75 ml) ground cloves

Maple Syrup Apples

- 1 tbsp (5 ml) butter or margarine
- 4 cups peeled, sliced apples such as Golden Delicious or McIntosh (1/4 inch (1 cm) thick slices)
- 1/2 cup (125 ml) pure maple syrup



Directions

1. In a large bowl, beat together eggs, milk, sugar and vanilla. Beat in Spice Mixture until well combined.
2. Heat 1 tbsp (15 ml) of the oil in a large non-stick skillet over medium heat; brush to spread evenly. Dip bread, 2 slices at a time in the egg mixture. Place in skillet. Cook about 2 minutes then flip and cook until golden brown, about 1 minute. Remove from skillet to a large plate; cover with foil to keep warm. Serve with warm Maple Syrup Apples.
3. Maple Syrup Apples: In a large non-stick skillet, melt butter over medium-high heat. Add apples; stir to lightly coat with butter. Reduce heat to medium-low, cover and cook for 3 minutes. Remove cover; cook for 2 minutes to evaporate liquid, stirring occasionally.
4. Stir in maple syrup. Increase heat to medium-high. Cook for about 2 minutes or until apples are tender, stirring occasionally. May be made ahead, covered and refrigerated up to 3 days.

AIRFRYER SWEDISH TURKEY MEATBALLS

Ingredients

2 tbsp (30 ml) olive oil
1/2 chopped onion
1/2 red bell pepper cut into small dice
3 button mushrooms, diced
454 g. extra-lean ground turkey
1/4 cup (60 ml) of chopped parsley
1 egg
1/2 cup (125 ml) of Panko breadcrumbs
2 cloves of garlic, chopped
1 tsp (5 ml) Dijon mustard
1/4 tsp (1.25 ml) paprika
1/4 tsp (1.25 ml) onion powder
1/4 tsp (1.25 ml) nutmeg
1/4 tsp (1.25 ml) allspice
1/2 tsp (2.5 ml) Sriracha sauce
1/2 tsp (2.5 ml) Worcestershire sauce
Salt and pepper to taste

For the sauce

2 tbsp (30 ml) butter
2 tbsp (30 ml) flour
2 cups (500 ml) vegetable stock
1 tsp (5 ml) Dijon mustard
1 tbsp (15 ml) reduced salt soy sauce
1 tsp (5 ml) Sriracha sauce
1 tbsp (15 ml) Worcestershire sauce
1/2 cup (125 ml) 15 percent cooking cream
Freshly ground pepper, to taste

Directions

For the meatballs

1. In a skillet over medium heat, heat the oil and cook the onion, bell pepper and mushrooms for 3 to 4 minutes.
2. Transfer the vegetables to a large bowl.
3. Add all meatball ingredients to bowl and mix.
4. Form 16 meatballs.
5. Spray a little oil in the basket of the air fryer.
6. Place the meatballs in the basket.
7. Cook for 17 minutes at 390°F. making sure to stir the basket several times.

For the sauce

1. In a pot over medium heat, melt butter.
2. Add the flour and stir for 2 minutes.
3. Add the vegetable stock and whisk.
4. Add mustard, soy sauce, Worcestershire sauce and cream.
5. Season with pepper and bring to a boil.
6. Add meatballs and mix.





Experiment

How does milk mix with other substances? What can this experiment show you about the movement of particles in substances?

WHAT TO USE

- ◆ Whole milk (3.25%)
- ◆ Skim milk
- ◆ Coffee cream (18%) or half-and half cream (10%)
- ◆ Three shallow bowls
- ◆ Red, green, yellow and blue food colouring
- ◆ Eye dropper
- ◆ Cotton swabs or toothpicks
- ◆ Liquid dish detergent



WHAT TO DO

1. Pour an equal amount of each type of milk (whole, skim, cream) into each bowl. Wait for the milk or cream to stop moving.
2. Add one drop of each of the four food colourings, one at a time, to each bowl. The different colours will help you see how the food colouring mixes with the milk and cream.
3. Observe what happens. Record your observations using the charts on the following page and respond to the questions.

Type of Milk	My Observations of the Results

How did each type of milk or cream react to the food colouring? Why do you think the milk and cream reacted this way?

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WHAT TO DO NEXT

- Now dip a cotton swab or toothpick into the dish detergent. Touch the swab or toothpick into the middle of the bowl of milk. Keep adding more dish detergent with the swab.
- Observe what happens. Record your observations.

Describe what happened when the dish detergent was added to each type of milk or cream. Explain the reactions you observed.

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Why do you think there was a difference between the way milk and cream reacted with the food colouring and dish detergent?

Substance	My Observations of the Results

Challenge yourself!
Repeat this experiment with one or two other liquids. Record your observations. Watch for similarities and differences.

Why do you think there were differences and/or similarities between the way the milk and cream and the substances you selected reacted?
