

## 2019 科普快遞科學演示比賽 – 演示計劃書 (樣本)

### SciPOP Science Demonstration Contest 2019 – Demonstration Proposal (Sample)

以下內容只作參考 The contents below are for reference only.

#### 甲部 Part A

題目 Title	(中文) 分子美食 (English) Molecular Gastronomy
目標 Aim	讓觀眾瞭解分子料理背後的科學原理及廚房內的科學 Let the audience understand the science behind molecular gastronomy and the science in the kitchen
內容簡介 Introduction	<p>(中文, 約 300 字)</p> <p>所有生物必須吸收養分作「燃料」以維生；對人來說，我們要吃東西。然而，食物不單止於維持生命，自遠古以來，人類熱切用一連串精確步驟(烹調方法)來處理食物，做出種種美味佳餚。所以，全球不同地區都會發展出五花八門的食譜菜式和不斷推陳出新。甚至有人認為，食物對人來說是「民以食為天」。</p> <p>近年興起的分子料理，廚師會使用有別於傳統的烹調方法去做出美味的佳餚，甚至會用到攝氏零下 196 度的液態氮來製作雪糕，但是背後的科學原理你又知道多少呢？這個科學示範會展示化學如何應用於烹調方法，也會向你一一解釋食物的安全。一起來參與這個非一般的烹調之旅，嚐嚐另類的滋味。</p> <p>(English, around 200 words)</p> <p>Every living organism constantly has to take in nutrients as “fuel” for living. In our case, we eat. Since our ancestors in ancient past, with our endeavour we handle food in a series of sophisticated process (cooking) to make food taste delicious, which is far beyond merely for eating to survive. Therefore, cooking recipes for various cuisines were unceasingly created by men regardless their races. Food means vitally important for us.</p> <p>Nowadays, a new cooking method, the molecular gastronomy, emerged which is different from the traditional ones. Chef may even use liquid nitrogen of 196 degree Celsius below zero to make ice cream. Did you know the mechanism of molecular gastronomy? This demonstration will adopt Chemistry to an innovative cooking method and bring to our attention the relevant food safety. Come and explore if this non-traditional cooking cuisine tastes good for you.</p>

<p>示範大綱 Demonstration Outline</p>	<ol style="list-style-type: none"> <li>1. 果汁魚子 Juice Roe 將已混合海藻酸鈉的橙汁加入鈣鹽溶液中，讓海藻酸鈉跟鈣鹽發生化學反應，製成假魚子。 Sodium alginate is firstly mixed in orange juice and then added to calcium salt solution. This allows the sodium alginate to react with calcium salt to form fake roe.</li> <li>2. 螢光意粉 Florescent Spaghetti 將大菜加入湯力水中，再製成意粉狀，將它放在紫外光燈下，湯力水中的奎寧會令它會發出螢光。 Mix agar in tonic water, and make it into spaghetti-like noodles. When placed under UV light, the quinine in tonic water will cause it to fluoresce.</li> <li>3. 液態氮雪糕 Liquid Nitrogen Ice Cream 使用液態氮將牛奶、淡奶等材料冷卻成雪糕。 Using liquid nitrogen to freeze ingredients including milk, evaporated milk, etc. to make ice cream.</li> </ol>
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## 乙部 Part B

### 示範 1 Demonstration 1: 果汁魚子 Juice Roe

<p>使用道具/儀器/ 化學品 Props/ Instruments/ Chemicals Used</p>	<ol style="list-style-type: none"> <li>1. 海藻酸鈉 Sodium Alginate</li> <li>2. 鈣鹽 Calcium Salt</li> <li>3. 玻璃碗 Glass Bowl</li> <li>4. 攪拌機 Blender</li> <li>5. 針筒 Syringe</li> </ol>
<p>涉及科學概念 Science Concepts Involved</p>	<ol style="list-style-type: none"> <li>1. 海藻酸鈉與鈣鹽溶液之間的化學反應，最後產生海藻酸鈣。 The chemical reaction between sodium alginate and calcium salt solution to form calcium alginate.</li> </ol>
<p>示範流程 Demonstration Process</p>	<ol style="list-style-type: none"> <li>1. 將少量海藻酸鈉溶於橙汁中，再用攪拌機將它們攪均。 Dissolve some sodium alginate in orange juice and mix well with a blender.</li> <li>2. 將少量鈣鹽溶於水中。 Dissolve some calcium salt in water.</li> <li>3. 用針筒抽起部份橙汁，並滴於鈣鹽溶液內，當橙汁接觸到鈣鹽溶液時，化學反應會即時發生，每滴橙汁外面會被海藻酸鈣包住，形成魚子狀顆粒。 Draw some orange juice into a syringe and add it dropwise into the calcium salt solution. When the juice comes in contact with the calcium salt solution, a chemical reaction will happen immediately and each drop will be encapsulated by calcium alginate to form a roe-like granule.</li> </ol>

## 示範 2 Demonstration 2: 螢光意粉 Florescent Spaghetti

使用道具/儀器/ 化學品 Props/ Instruments/ Chemicals Used	<ol style="list-style-type: none"> <li>1. 大菜 Agar</li> <li>2. 湯力水 Tonic Water</li> <li>3. 幼膠管 Slim hose</li> <li>4. 針筒 Syringe</li> <li>5. 玻璃碗 Glass Bowl</li> <li>6. 螢光燈 Florescent Lamp</li> <li>7. 雪櫃 Refrigerator</li> </ol>
涉及科學概念 Science Concepts Involved	<ol style="list-style-type: none"> <li>1. 在紫外光的照射下，湯力水內的奎寧分子因受到激發，當中的受激電子回到基態時將所吸收的能量以可見光的形態釋放出來。 Under exposure to UV light, the quinine molecules in tonic water are excited. When the excited electrons return to the ground state, the absorbed energy is released in the form of visible light.</li> </ol>
示範流程 Demonstration Process	<ol style="list-style-type: none"> <li>1. 將大菜混入湯力水中並將它們攪均。 Add agar into tonic water and mix well.</li> <li>2. 用針筒將它們注入幼膠管中。 Inject the mixture into the hose by using a syringe.</li> <li>3. 將膠管放在雪櫃內冷卻。 Chill the hose in the refrigerator.</li> <li>4. 從膠管中將意粉狀的湯力水取出並放入玻璃碗內。 Remove tonic water in the form of spaghetti-like noodles from the hose and place it in a glass bowl.</li> <li>5. 關上房內燈光，用螢光燈從下照向碗內的「意粉」，並觀察有何反應。 Turn off the room lights, use a fluorescent lamp to shine it on the “spaghetti” in the bowl from below and observe what has happened.</li> </ol>

## 示範 3 Demonstration 3: 液態氮雪糕 Liquid Nitrogen Ice Cream

使用道具/儀器/ 化學品 Props/ Instruments/ Chemicals Used	<ol style="list-style-type: none"> <li>1. 金屬碗 Metal Bowl</li> <li>2. 湯匙 Spoon</li> <li>3. 牛奶 Milk</li> <li>4. 淡奶 Evaporated Milk</li> <li>5. 調味料 Flavoring</li> <li>6. 食用色素 Food Colouring</li> <li>7. 液態氮 Liquid Nitrogen</li> <li>8. 手套 Gloves</li> </ol>
涉及科學概念 Science Concepts Involved	<ol style="list-style-type: none"> <li>1. 鹽溶解於水是吸熱反應。 Dissolving table salt in water is an endothermic reaction.</li> <li>2. 液態氮吸收食材的熱變回氮氣，同時將食材冷卻。 Liquid nitrogen absorbs heat from the ingredients and evaporates; the ingredients are frozen at the same time.</li> </ol>

<p>示範流程 Demonstration Process</p>	<ol style="list-style-type: none"><li>1. 解釋發明雪櫃前，人們如何能夠製造雪糕 – 於冰加鹽降溫(吸熱反應)從而將食材冷卻變成雪糕。 Explain how people make ice cream before refrigerators were invented – add salt into ice to lower the temperature (endothermic reaction) so that the ingredients are frozen to become ice cream.</li><li>2. 將牛奶、淡奶、調味料及食用色素加入金屬碗內。 Put milk, evaporated milk, flavoring, food colouring into the metal bowl.</li><li>3. 於金屬碗一邊加入液態氮，一邊用湯匙攪拌。 Add liquid nitrogen into the metal bowl, and stir with a spoon.</li><li>4. 向觀眾展示雪糕及解釋金屬碗內的液態氮去了哪裡。 Show the ice cream to the audience, and explain where the liquid nitrogen has gone. (Evaporation)</li></ol>
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