

Chemistry in our Lives: Workshop on Cosmetics 生活中的化學：美容品的製作

Instructions for students 學生操作指南

Today you are *cosmetic designers*. 今天你是美容品的設計者

Activities 活動

Cosmetic line 美容產品系列

A cosmetics producer wants to market a new cosmetic '*line*'. A cosmetic line has different products that look and smell more or less the same. 美容品製造者想要銷售一個新的美容產品系列，一個美容產品系列是看起來和聞起來味道相似的不同數個產品。

Production team 生產小組

You work in teams. Each team has all chemicals needed available to produce a line with *bath salts*, a *hair gel* and a *shampoo* (instructions on the next page). Think of an original name for your line. The name can be for all products in the line. You also may name the products individually. 你們以團隊的方式進行。每一組都有製作美容品：澡鹽、髮膠和洗髮精的系列（操作指南在下一頁），所需要的化學物質。你需要為你的系列產品個別命名。

Each team produces all cosmetics in the line. 每一個團隊都要做出三種產品。

Marketing team

After finishing the team designs a *television commercial* to market the line. The commercial lasts less than 60 seconds (maximum). Each team member has a role.

完成後需要以 *電視廣告* 的方式銷售這個系列產品，最多只有 60 秒的時間，每一個組員都要有一個角色。

Competition 競賽

All teams perform their commercials. 所有組別將表演他們的廣告

Jury 裁判團

The jury judges 裁判團評審

- the outlook and quality of the products individually; 個別產品的外觀與品質
- the cohesion in the line; 系列產品的凝聚力
- the quality and originality of the labels; 標語的品質與原創性
- the originality of the TV commercial. 電視廣告的原創性

Prize 獎品

The winning team will get a prize! 獲勝者將獲得獎品



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Bath salts 澡鹽

- Put in a clean glass or bowl salt crystals (the quantity you require). 將適量的結晶鹽放入乾淨的玻璃容器中
- Mix with one or two drops of perfume. 與 1-2 滴的香水混合
- Add one drop (liquid) or one tiny pinch (powder) of a matching food colour. 加入 1 滴或一點點粉末的適當混合的食用染料
- Mix well and put your bath salts in a jar. 均勻混合後將你/妳的澡鹽放入空瓶子中
- Think about a name for your bath salts. 想一下標語的名字
- Write the name on a label. 將名字寫在標籤紙上
- Decorate the label. 裝飾標籤
- Put your label on the jar. 貼標籤於瓶子上



Hair gel 髮膠

- Put water in a clean glass or bowl. 將水放入乾淨的玻璃容器或碗中
- Add half a teaspoon of gel polymer. 加入半茶匙的凝膠聚合物
- Stir carefully with a spoon to dissolve the polymer. 小心地用湯匙輕輕攪拌聚合物
- Get rid of the lumps by pressing the lumps against the glass to get a smooth gel. 將團狀的聚合物往玻璃壁壓，以除去團狀物而獲得平滑的凝膠。
- Try not to include air. Air will make your gel cloudy or even foamy. 避免空氣跑進去，空氣會讓你的凝膠混濁，甚至起泡。
- Add one drop (liquid) or pinch (powder) of food colour. 加入一滴（溶液）或一小撮（粉末）的食用染料
- Add one drop of perfume. 加入一滴的香水
- Put your gel in a jar. 將你的凝膠置入寬口的瓶中
- Think about a name for your hair gel. 為你的髮膠想一個名字
- Write the name on a label. 將名字寫在標籤上
- Write the latest date for use (two weeks from now) on the label. 在標籤上標明使用的期限（從現在算起的兩週後）
- Decorate the label. 裝飾你的標籤
- Put your label on the jar. 將你的標籤黏在瓶子上

Shampoo 洗髮精

- Mix in a clean glass or bowl equal quantities detergent solution and water. 將等量的洗潔劑溶液和水混和在一個乾淨的玻璃容器或碗中
- Add a small portion of kitchen salt. Stir carefully with a spoon to dissolve the salt. Continue to add more small portions of salt until the shampoo has the right

thickness. 加入少量的食鹽，輕輕地用湯匙攪拌以溶解這些食鹽。繼續放入少量的食鹽直到洗髮精有一定的黏稠度。

- Try not to include air, air will make your shampoo cloudy or even look like a foam. If your shampoo turns out cloudy, be patient, it will have cleared itself after a few hours. 盡量不要讓空氣跑進去，空氣會讓你的洗髮精混濁，甚至看起來像泡沫。如果你的洗髮精已經變混濁，有耐心的等待數小時後，就會再度澄淨。
- Add one or more drops of perfume and one drop of a matching food colour. 加入一滴或數滴的香水以及相搭配的一滴食用染料。
- Put your shampoo in a jar or bottle. 將你的洗髮精置入寬口瓶或瓶子。
- Think about a name for your shampoo. 為你的洗髮精想一個名字
- Write the name on a label. 將名字寫在標籤上
- Write the latest date for use (two weeks from now) on the label. 在標籤上標明使用的期限（從現在算起的兩週後）
- Decorate the label. 裝飾你的標籤
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Teachers Guide: working in your own school

教師指南：在你所屬的學校從事此活動

Teachers Guide General 教師的一般性指南

Equipment for every student or pair of students: 每位或每對學生所需要的設備

- thick glass or glass bowl. Use glass, so the students and the teachers can see what they are doing; 厚玻璃容器或玻璃碗。使用玻璃，讓學生與教師皆能看到正在從事的事情。
- one teaspoon; 一個茶匙
- jars or small bottles for the different products. Most students can bring old jars and bottles from home. Let them clean the jar with kitchen paper. Little plastic cases from 35-mm films will also do. 可以裝不同產品的寬口瓶或小瓶子。大多數學生可以從家裡待舊的瓶子來使用。讓他們先用廚房用紙將瓶子擦乾淨。小的 35-mm 的膠捲瓶子也可以用。

Equipment in the classroom: 教室內的設備

- labels to stick on the jars or bottles; 黏在瓶子上的標籤紙
- felt pens in different colours; 不同顏色的麥克筆
- washing up facility with warm water supply. As all products are water soluble, washing up isn't a problem; 用溫水清洗所有的工具。因為所有的產品都是水溶性的，所以清洗乾淨並不是問題。
- tea cloths, kitchen paper or toilet roll. 抹布、廚房用紙或廁所用紙。

Order of work 工作的次序性

Let the pupils work in the right order: bath salts, hair gel and shampoo. The procedures get more complicated from the first to the last product. 讓學生照順序進行：澡鹽、髮膠和洗髮精。從第一個到最後一個產品的步驟是越來越複雜的。

For all recipes use 進行的訣竅

- ordinary *tap water*. Never use distilled or demineralised water, they contain too many microbes, that will quickly spoil the products; 用一般的水龍頭水。不要使用蒸餾過或去礦物質的水，因為它們含有較多的微生物，會使產品快速腐壞。

- *water soluble food colours, often with E-numbers.* Yellow, orange, red, purple, blue and green will do. 水溶性的食用染料，通常有編號。黃色、橘色、紅色、紫色、藍色及綠色都可以。
- you can either use the colour as a solid (only a tiny pinch needed) or dissolve a little colour (=dye) in water. Put the solution in a film case. Dispense the liquid with a dropper or a syringe without a needle; 你可以使用固態的染料（只需要一小撮），或溶解於水的染料。用滴管或沒有針頭的注射器發放染料。
- *perfume*, any leftovers, that smell nicely, will do. Dispense the perfume in the same way as the food colour. 香水，任何剩下的都行，只要聞起來味道不錯都可以。如同發放染料的方式發放。

Preparation 準備

Always try your ingredients before the workshop starts. The quality and composition can vary. It is very disappointing if the products don't look right. 一定要在活動之前先試做。數量和組成可以有差異。若產品看起來怪怪的，將是令人失望的。

Warning 警告

There is no preservative in the products. Consequently they don't last very long. Unskilled use of preservatives is too dangerous, as all preservatives are strong microbe killers. Let students write the last date allowed for use, on the label on the products. Advise students to keep their products at home in the fridge. 這些產品不含防腐劑。因此無法長久保存。因為未順鍊而使用防腐劑是危險的，因為所有的防腐劑都是很強的殺微生物製品。讓學生在產品標籤上註明使用期限。建議學生保存他們的產品在家中的冰箱。

Teachers Guide Bath salts 製作澡鹽的教師指南

Apart from sea salt crystals, which are quite expensive, you can use salt for regenerating the ion exchanger in dish washers. Crystals should not be too big. 除了海鹽的結晶之外，它比較昂貴，你可以從碗盤清潔劑進行離子交換而再製。結晶體不可太大。

Commercial bath salts sometimes contain soda ($\text{Na}_2\text{CO}_3 \cdot n\text{H}_2\text{O}$). Soda crystals tend to be too big, in that case the powdery soda will be better. The third possible ingredient is *bicarbonate of soda* (=baking powder: NaHCO_3). 一般澡鹽的商品含有蘇打($\text{Na}_2\text{CO}_3 \cdot n\text{H}_2\text{O}$)。蘇打的結晶通常較大，這樣來看粉狀的蘇打較適合。第三種選擇是重碳酸鹽的蘇打(烘焙的粉： NaHCO_3)。

Advantages and disadvantages of the raw materials 這些原料的好處與壞處

All salt is ordinary kitchen salt (NaCl). Kitchen salt dissolves slowly in the bath, but it adsorbs colour and perfume beautifully. The bigger the crystals, the slower the process. 所以的言是一般廚房用的食鹽。食鹽在洗澡時溶解較慢，但它會吸顏色且呈色豔麗。越大的結晶溶解過程越慢。

Soda, either powder or crystals, dissolves better. Dissolved soda softens the water. If too much soda is added to the water, it produces an alkaline (basic) solution, which feels soapy. The precipitate of the soda with the calcium salts ($\Rightarrow \text{CaCO}_3$) in hard water can stick to the wall of the bath. 蘇打，不論是粉末或是結晶，皆有較好的溶解度。溶解的蘇打使水變柔軟。假如加太多蘇打在水中，將產生鹼性水溶液，感覺像泡沫。使用硬水所產生含有鈣鹽($\Rightarrow \text{CaCO}_3$)的蘇打沉澱會黏在浴缸的壁上。

Bicarbonate of soda does not make the water as alkaline as soda. It has all other properties mentioned with soda. 重碳酸鹽的蘇打不會使水變成鹼性。它有所有蘇打所呈現的其他特性。

If you have glass jars to put the bath salts in, you may consider producing different layers with different colours. Students can co-operate and share their colours. They may be able to produce the colours of your national flag. Put, before closing the jar, enough cotton wool on top to prevent the different colours from mixing.

如果你有玻璃瓶子可以放澡鹽，你可以考慮將不同的顏色分層放置。學生之間可以合作分享不同的顏色。他們也可以產生自己國家國旗的顏色。在關蓋子之前，放置厚的棉花以防止顏色混在一起。

Teachers Guide Hair gel 製作髮膠的教師指南

The water soluble *gel polymer Hostacerin PN 73* (chemical name: copolymer of acrylamide and acrylic acid) is a neutral polymer which quickly dissolves in water. A slight problem are the lumps, although they can be quite easily crushed with a spoon against the side of the bowl, just as you do with cooking sauces. 水溶性的凝膠聚合物 *Hostacerin PN 73* (化學名稱：丙烯酸與異量分子聚合物和丙烯酸) 是一種中性的聚合物，會快速溶於水中。只有要解決團塊的小問題會發生，但它可以很快地用湯匙往玻璃容器壁上壓而壓碎，就像你在煮醬汁一樣。

Buy the polymer from a chemical supplier. The price is quite high, but you only need 0,5 gram per student. 跟化學公司買聚合物。價錢很貴，不過每位學生只需要 0.5 克。

Other gel polymers will do, but they usually need neutralising after dissolving. 其他凝膠也可以做，不過在溶解後需要中性化的過程。

Teachers Guide Shampoo 製作洗髮精的教師指南

The detergent solution is 27% *sodium lauryl ether sulphate* (sometimes called sodium laureth sulphate). You buy it from chemical suppliers (try e.g. Cognis: www.cognis.com for

addresses, representation in Taiwan. In the Netherlands they are quite willing to help schools for free, also for other raw materials) or shampoo manufacturers, who might give it to you for free or suppliers for school chemicals. The Texapon N 28 we use today was a gift from Cognis Taiwan). 清潔劑溶液為 27%的 *sodium lauryl ether sulphate* (有時稱作 *sodium laureth sulphate*)。可以從化學公司買到 (例如: Cognis: www.cognis.com, 上面有台灣代理商的地址。在荷蘭他們很樂意免費提供於教學使用, 其他原料也是) 或從洗髮精製造商購買, 他們可能也會免費提供或提供學校化學藥品。我們今天使用的 Texapon N 28 是由台灣科寧 (Cognis) 免費提供。

This detergent is the widely used ingredient for shampoos, because it is cheap, skin friendly and easily thickened with kitchen salt. 清潔劑是廣泛使用於洗髮精的成分, 因為它很便宜, 對皮膚無害, 以及容易與食鹽產生黏稠度。

The salt should be added in very small portions, one at a time and should be dissolved completely before the next portion is added, otherwise the shampoo will get too thick. Then you can still sell it as a shower gel! After adding too much salt your shampoo will collapse into a watery product. 將只需要添加一點點的食鹽, 一次加一點, 等完全溶解後再加一點, 不然洗髮精會太黏稠。然後你可能仍然是在販售洗髮膠! 在加過量的食鹽後, 你的洗髮精會崩塌而變成水狀的產品。