

# 112 年 明誠雙語小學 科學園遊會 執行計畫

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**關鍵字：**靜電 Static electricity、摩擦 rub、漂浮 float、水母 Jellyfish  
尼龍繩 Nylon rope、羊毛衣 wool cloth、正電荷 positive charge、  
負電荷 negative charge、氣球 balloon、塑膠湯匙 plastic spoon、  
棉紙 cotton paper

## 壹、什麼是靜電？What is static electricity？

我們生活周遭的事物，包括我們人體本身都帶有「正、負兩極」的電荷，這些電在一般情況下數量相等，也就是說正電和負電是一樣多的，但如果正電、負電的數量不一樣的時候，會發生什麼事？答案就是「靜電」產生！

靜電產生的原因有：

- 一、接觸帶電：當不同的兩個物體相互碰撞、接觸時，其中一方的負電將會移動到另一方。
- 二、摩擦帶電：兩個物體彼此相互摩擦而產生靜電的現象稱為摩擦帶電。  
例如：脫衣服時因為衣服與身體，或衣服與衣服之間摩擦造成負電移動所致。
- 三、剝離帶電：相互接觸的兩個物體分離（剝離）時產生靜電的現象稱為剝離帶電。  
例如：纏繞於紙筒上的保鮮膜被剝離時會產生靜電。

因此所謂的靜電，就是物體因為接觸、摩擦或是脫離，導致物體上的正負電跑來跑去，形成不平衡的狀態，自然就產生電啦！

Nearly all electric charge in the universe is carried by protons and electrons. Protons are said to have a charge of +1 electron unit, while electrons have a charge of -1, although these signs are completely arbitrary. Because protons are generally confined to atomic nuclei, which are in turn imbedded inside atoms, they are not nearly as free to move as are electrons. Therefore, when we talk about electric current, we nearly always mean the flow of electrons, and when we talk about static electricity, we generally mean an imbalance between negative and positive charges in objects. When two objects are rubbed together to create static electricity, one object gives up electrons and becomes more positively charged while the other material collects electrons and becomes more negatively charged.

## 貳、靜電小活動 Static electricity activities

### 活動一：飄浮水母(Float Jellyfish)

材料：

尼龍繩、長型氣球、手壓打氣筒、毛料的布(如:純羊毛衣)

尼龍水母製作方法：

一、取一段尼龍繩(約 30 公分)，在中間打結。

Take a part of nylon rope about 30 cm and tie a knot in the middle.

二、將尼龍繩的兩端，依紋路撕開，越細越好。

Tear a nylon rope from both sides, as thin as possible.

三、用毛料的布摩擦尼龍繩 30 秒備用。

Use wool cloth to rub a nylon rope for 30 seconds.

四、取一長型氣球摩擦產生靜電。

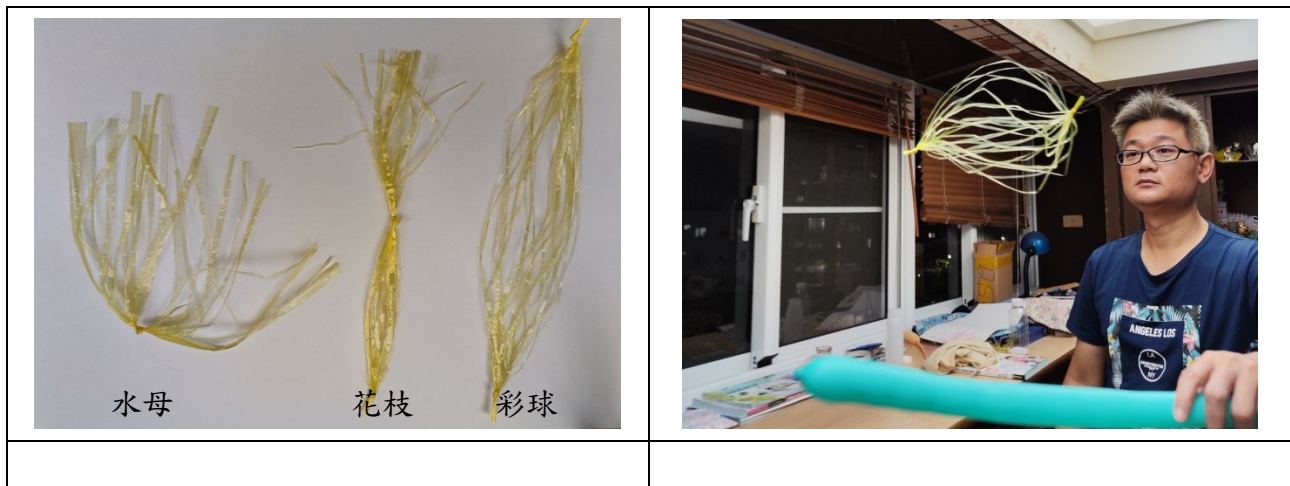
Rubbed balloon to produce static electricity.

五、將摩擦後的尼龍繩往上拋，並利用氣球使之飄浮在空中。

Throw a nylon rope up and use the rubbed balloon to make it float in the air.

闖關方法：

闖關者須利用摩擦產生靜電的原理，將尼龍繩製作成水母狀，讓氣球與自制靜電水母(或其他造型)帶相同電荷，因排斥而飄浮於空中 10 秒，或讓它移動至指定位置，即可過關。



原理：

撕開的每一小條尼龍繩因摩擦而帶負電，彼此之間因排斥而呈放射狀，而長型氣球也因摩擦而帶相同電荷(負電)，故可利用氣球讓尼龍繩因同性相斥而漂浮於空中，甚至移動至其他地方。

注意事項

1. 環境中的濕度會影響靜電的轉移，濕度越低實驗越容易成功。
2. 毛料的布(如羊毛圍巾)更容易產生靜電。

## 主題 2：誰是吸力大師 Who can be the winner of attractive force?

準備材料：塑膠湯匙、色棉紙、不織布或乾抹布。

比賽規則：

一、用湯匙背面摩擦色棉紙。

Use the back side of plastic spoon to rub cotton paper.

二、利用靜電將色棉紙吸起來，放到旁邊小盤子裡。

Use static electricity to attract cotton paper and put it on the plate.

三、限時一分鐘，看最後誰的小盤子裡的色棉紙片最多就贏囉！

After one minute, the most cotton papers on the plate is the winner.



## 參、如何消除靜電？How to Remove Static Electricity

靜電之所以產生，就是電荷數量不平衡的關係，因此我們可以使用一些「外力」來平衡正負電的數量。

Static electricity is the build up of an electrical charge on the surface of an object, which results from unequal positive and negative charges between two objects. While static electricity may seem unavoidable and relentless, especially during the dry winter months, eliminating static electricity is a lot easier than you would think. Once you understand how static electricity is created and transferred, there are steps you can take to reduce the initial static electricity, and control how it transfers to you, reducing the electric shocks every time you touch something.

一、增加空氣的濕度，因為有濕氣的環境或物品不易產生靜電

**Use a humidifier:** Static electricity is more active when the air is dry, especially in the winter months when people heat their houses, further reducing humidity in the air. Increase the humidity in your house and workplace by using a humidifier. The moisture in the air can help reduce static charge from building up.

二、保持皮膚濕潤

**Keep your skin moisturized:** Rub lotion on yourself when you get out of the shower and before getting dressed, or rub it on your hands intermittently throughout the day.

三、選穿棉質的衣服

**Change your clothes:** Switch from wearing synthetic fibers (polyester, nylon) to wearing natural fibers (cotton), which are low static materials.