

BASIC SCIENCE SERIES

自然科学初级读物

5

# HEAT

# 热

吴永礼 译



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科学普及出版社

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## 出 版 说 明

当前，在实现四个现代化的新长征途中，广大青少年正在努力学习现代科学文化知识，为祖国的社会主义建设事业，增长才干，积蓄力量。编译出版《自然科学初级读物》的目的，就是为初学自然科学和英语的读者，提供一套浅近而有趣的参考书籍。

全套读物共有16个选题，细目见各书封底。英语部分采自FEP INTERNATIONAL PRIVATE LIMITED出版的BASIC SCIENCE SERIES（修订版）。

为了便于阅读，对全书重新作了编排，绘制了插图，并附了参考译文。书中还配有相当数量的简单实验，使读者通过实验，加深理解有关科学内容。

由于编者水平所限，错误不当之处在所难免，请批评指正。

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自然科学初级读物 — 第 5 册

# HEAT

# 热

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董元骥 校  
冯力莎 插图

一九八〇年七月十二日



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## INTRODUCTION

Can you imagine how cold the Earth would be if there were no Sun? The Sun is the Earth's main source of heat. Only a little of the Sun's heat reaches the Earth. However, this is enough for life to exist on Earth. All living things need warmth in order to live. The heat from the Sun provides us with this warmth.

Man gets warmth from the sun and the food he eats. Man also makes his own heat. When he is cold he makes a fire to warm himself. He makes clothes to cover himself. He uses heat to cook his food and to light his house.



## 引言

如果没有太阳，你能想象地球会有多冷吗？太阳是地球的主要热源。只有很小一部分太阳热射到地球上。然而，这些热量足够使生命生存在地球上。所有生物为了生存都需要温暖。太阳热给我们提供了这种温暖。

人从太阳及所吃的食物中得到温暖。人也自有取热的办法。人感到冷时就生火取暖，做衣服穿。人利用热烹调食物，照明住所。

## OUR BODIES CONTAIN HEAT

How can we show that our bodies contain heat? Open your mouth wide and breathe on your hands. Is the air from your body warm or cold?

### 我们的身体含有热量

我们怎么能证明身体里含有热量呢？请你张大嘴朝手上呵口气。从你身体里呼出来的气是热的还是冷的？

## WHAT GIVES HEAT?

1. The **sun** gives us heat. Touch a tin that has been in the sun for some time. It feels hot. Place the tin inside the house. Touch the tin after some time. It feels cold.

Use a magnifying glass to focus sunlight on a piece of white paper. What happens to the piece of paper at the position where the sunlight is focused? It becomes hot, starts to turn brown and soon bursts into flame. Thus the heat from the sun makes the paper burn.

2. Man can make heat by burning wood, coal and gas. Wood, coal and gas are called **fuels**. Man burns fuels to keep himself warm. He also burns fuels in machines to make them work. A motor-car runs by burning fuel. An aeroplane flies by burning fuel.







**Heat is produced by burning wood.**

热是可由燃烧木柴而产生

## 什么东西产生热

一、太阳给我们热量。你可以摸一摸在太阳底下晒了一阵的铁罐，铁罐摸上去是热的。把铁罐放到屋子里去，过一阵子再去摸一摸，铁罐摸起来是冷的。

用放大镜把太阳光聚焦于一张白纸上。这张纸上，太阳光聚焦的地方会发生什么现象？纸热了，开始变成棕色，一会儿就冒火苗了。太阳热就是这样使纸片燃烧的。

二、人可以用燃烧木柴、煤和煤气的办法产生热量。木柴、煤和煤气称为燃料。人燃烧燃料取暖，人还在机器中燃烧燃料使机器工作。汽车要烧燃料才能跑，飞机要烧燃料才能飞。



3. **Electricity** also gives heat. Man uses electricity to cook his food and to work his machines. How many things in your house and school are worked by electricity? Name them. How many of these things give out heat?

It is easy to find out whether electricity gives heat or not. Put your hand near a lighted bulb. What do you feel? Touch a radio which has been switched on for some time. What do you feel?

4. Heat can be made by **rubbing** two things together. Rub the palms of your hands together. What do you feel? Take your ruler and rub it up and down the edge of a table. Rub the ruler many times. Then put the ruler against your hand. You will feel that it is hot.

三、电也能产生热。人用电烹调食物，开动机器。在你家里和你学校里，有多少东西是用电来工作的？请你说出它们的名字来。这些东西中有多少能发出热量？

要确定电是否产生热量很容易。把手靠近点看的电灯泡，你有什么感觉？用手摸一摸已经开了一些时间的收音机，你有什么感觉？

四、两件东西在一起摩擦能产生热。把手心对在一起摩擦，你有什么感觉？拿一把尺子在桌子边上来回摩擦。尺子摩擦多次后再把它贴在手上，你会感到尺子是热的

## HOW DO WE MEASURE HEAT?

We can measure the length and the width of this book. We can also measure our height and our weight.

Do you know that hotness can be measured too? We can measure the hotness of our bodies. We can tell if we are sick by measuring the hotness of our bodies.

### Things to Do

Take three basins. Fill the first basin with water which is as hot as you are able to bear with your hands. In the second basin mix hot water with cold water. This is **lukewarm** water. Fill the third basin with cold water from the tap.

### 我们怎样测量热

我们能测量这本书的长度和宽度。我们也能测量身高和体重。

你知道热度也能测量吗？我们能测量体温。通过测量体温可以知道人是否病了。

### 动手做

取三个盆子。第一个盆里盛上手能受得了的热水。在第二个盆子里，将热水和冷水搀和在一起，这叫温水。第三个盆里盛上自来水龙头的冷水。

Place the basins on the table as shown in the picture. Put your right hand in the hot water. Put your left hand in the cold water. You will find that your right hand feels hot and your left hand feels cold. After twenty seconds move both your hands into the lukewarm water. What do you feel? Your left hand feels warm and your right hand feels cold. But both hands are in the same basin of water! You cannot really tell if a thing is hot or cold by feeling it.

将三个盆子如图所示放在桌上。把右手放在热水里，把左手放在冷水里。你会发现右手感到热，左手感到冷。二十秒钟后把双手都放进温水里，你有什么感觉？你的左手感到温暖，而右手觉得冷。但是你的双手是放在同一盆水里呀！如果是一件物体，你摸摸它，就无法准确地判断出它究竟是热的还是冷的。



**We use a doctor's thermometer to measure the heat of our body.**

我们用体温表测量身体的热度



doctor's thermometer 医用温度计



We use a ruler to measure length and breadth. To measure hotness we use a **thermometer**.

You can see a thermometer in the picture. This is a doctor's thermometer. The boy keeps his mouth closed over the thermometer until it reaches the temperature of his body.

Hotness or coldness is called **temperature**. If the boy is sick and his body is very hot, we say that his temperature is 'high'. If the day is cold we say that the temperature is 'low'. Why do we say 'high' temperature and 'low' temperature?

我们用尺子测量长度和宽度。为了测量热度，我们使用温度计。

在图中你会看到一个温度计，这是体温表。这个孩子闭着嘴含住体温表，等它达到他的体温。

热度或冷度称为温度。如果这个孩子病了，他的身体很热，我们说他的体温“高”；如果天冷，我们说温度“低”。为什么我们说温度“高”、温度“低”呢？

Look carefully at the picture of the room thermometer. It is made of a hollow glass tube or stem, with a hollow glass bulb at the base. In the bulb there is a liquid called **mercury**. The thermometer is fixed to a wooden scale which like your ruler is marked with lines.

Heat makes the mercury rise in the hollow glass stem. The hotter it is, the higher this mercury will rise. Therefore we say the temperature is 'high'. When it is cold the mercury in the stem will sink. So we say the temperature is 'low'.

Look at the picture of the room thermometer again. How high has the mercury risen in the stem? By reading the scale we know how hot the room is.

We measure length with a ruler. We can measure length in two different ways — in centimetres and in inches.

We measure temperature with a thermometer, in **degrees Celsius**. 'C' stands for Celsius. Some thermometers use a different scale — the **Fahrenheit scale**. The picture shows a thermometer with both Celsius and Fahrenheit scales.

仔细观察一下寒暑表图。寒暑表是用空心玻璃管或空心玻璃柱制成的，底部有一个空心玻璃球。玻璃球里盛着一种液体，叫水银。寒暑表固定在标有刻度的木板上，这刻度象尺子一样，是用线条标出的。

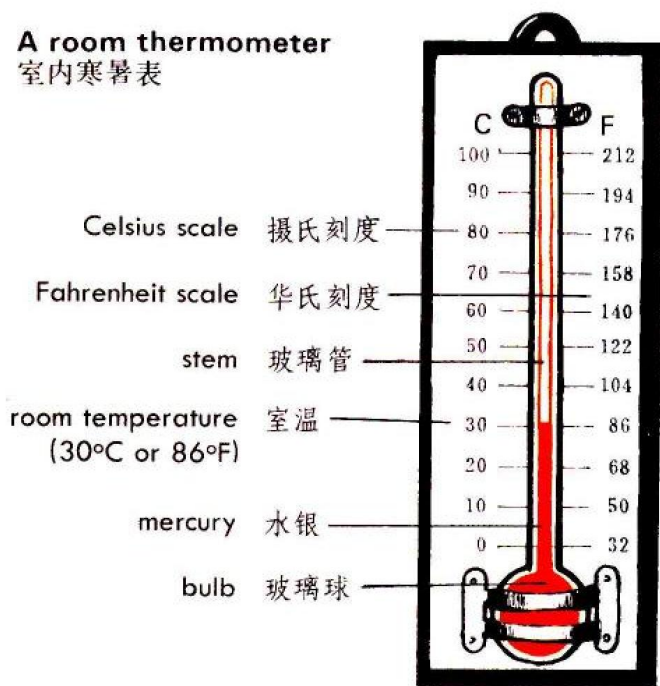
热使水银在空心玻璃柱里上升。天越热，这水银就上升得越高，因此，我们说温度“高”。天冷时，玻璃管内的水银就下降，因此，我们说温度“低”。

再看一看寒暑表图。水银在管内升得多高了？只要看一看刻度，我们就知道房间有多热。

我们用直尺测量长度。我们可以用两种不同的方法测量长度——厘米和英寸。

我们用摄氏温度的温度计来测量温度，“C”代表摄氏。有的温度计采用另一种刻度——华氏刻度。图中所示的温度计有华氏和摄氏两种刻度。

**A room thermometer**  
室内寒暑表



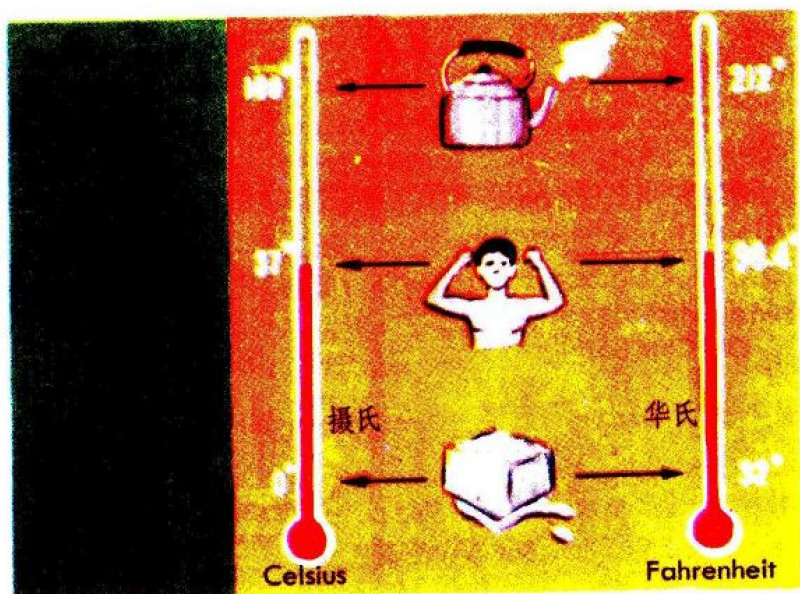


You will find that the Celsius scale rises from  $0^{\circ}$  to  $100^{\circ}$ . On the Celsius scale,  $0^{\circ}$  shows the temperature at which water freezes, that is, turns into ice.  $100^{\circ}$  shows the temperature at which water boils.

The Fahrenheit scale rises from  $32^{\circ}$  to  $212^{\circ}$ . On the Fahrenheit scale,  $32^{\circ}$  shows the temperature at which water freezes and  $212^{\circ}$  shows the temperature at which water boils.

你会发现，摄氏刻度是从  $0^{\circ}$  到  $100^{\circ}$ 。在摄氏刻度上， $0^{\circ}$  表示水冻结，即水结冰的温度， $100^{\circ}$  表示水沸腾的温度。

华氏刻度是从  $32^{\circ}$  到  $212^{\circ}$ 。在华氏刻度上， $32^{\circ}$  表示水冻结的温度， $212^{\circ}$  表示水沸腾的温度。



## EXPANSION AND CONTRACTION

Expansion means to become bigger and therefore to take up more space. Contraction means to become smaller and therefore to take up less space.

### Things to Do

Fill a small bottle with water. Colour the water by adding a drop or two of ink and shake the bottle. Get a cork which will fit the mouth of the bottle tightly. Make a hole through the cork. Push a tube through the hole in the cork. You can use the plastic tube of a ball-point pen. Cap the bottle with the cork.

### 膨 胀 和 收 缩

膨胀就是变大，因而占据较大的空间。收缩就是缩小，因而占据较小的空间。

### 动 手 做

将一个小瓶装满水。滴入一、二滴墨水，使水染上颜色，然后摇动瓶子。找一个能紧紧塞住瓶口的软木塞。在软木塞上钻一个孔，将一根玻璃管插入软木塞的孔中。可用圆珠笔的塑料管。用软木塞塞住瓶口。

Put your bottle in a pot of hot water. What happens? Mark on the tube the point to which the water has risen. Now place the bottle in ice-cold water. What happens?

The water in the bottle expands when the bottle is placed in a pot of hot water. Therefore the water rises in the tube, thus occupying more space. When the bottle of water is placed in a pot of ice-cold water, the water in the bottle contracts. This causes the water level in the tube to drop, since the water now occupies less space.

将瓶子放入一罐热水中，会发生什么现象？在管上把水上升处标以记号。然后将瓶子放入冰冷的水中，会发生什么现象？

瓶子放入一罐热水中时，瓶中的水膨胀。于是水在管内上升，从而占据了较大的空间。这瓶水放入一罐冰冷的水中时，瓶中的水收缩。既然现在水占据的空间小了，这就引起管内的水面下降。