

## **MATERIALS AND HEAT**

### **KEY IDEAS**

- Heating can cause solid materials to melt or become softer
- Heating can change liquids into gases
- Cooling can change gases into liquids and liquids into solids
- Different materials change state at different temperatures

### **EXAMPLE QUESTIONS**

- What solid materials have you seen change when they were heated?
- What liquid materials have you seen change when they were cooled?
- Do you think that all materials can be made to melt with heat?

### **HEATING AND COOLING CAN CHANGE MATERIALS**

- Heating and cooling affects materials, sometimes causing them to change states.
- It can also affect their properties (for example, the electrical conductivity of metals).

### **MATERIALS CAN CHANGE AT DIFFERENT TEMPERATURES**

- Some materials change with just slight heating or cooling.
- Water normally changes into ice at 0°C and into steam at 100°C.
- Other materials change only in extreme hot or cold. (Steel melts at about 1500°C).

### **HEATING CAN CAUSE SOLID MATERIALS TO MELT OR BECOME SOFTER**

- Solid materials can change into liquids when heated.
- Butter changes into a liquid with only a small rise in temperature, for example.
- As some solids become heated, they become more pliable and can change shape more easily.
- Examples of these changes are steel and glass, both of which become more bendable when heated to their melting temperatures.

## **HEATING CAN CHANGE LIQUIDS INTO GASES**

- Liquids change into gases when heated, but different liquids change at different temperatures.

## **COOLING CAN CHANGE GASES INTO LIQUIDS AND LIQUIDS INTO SOLIDS**

- Cooling has the opposite effect on materials to that of heating.
- With cooling, gases can change into liquids and liquids into solids.

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