

Why a Metal Spoon Warms Up When Stirring Soup

Name _____

Date _____

Read the text carefully and answer every question clearly.

When a metal spoon is placed in hot soup, the immersed end warms first. The soup is at a higher temperature than the spoon, so energy passes from the soup to the metal. This energy in transfer because of a temperature difference is called heat; the energy held by either object is internal energy, not “stored heat”. As the spoon gains internal energy, its temperature rises. Net transfer from soup to spoon continues while the soup beside it remains hotter.

The warming of the handle is mainly caused by conduction. Energy passes through the metal from hotter regions to neighbouring cooler ones. In a metal, mobile electrons and vibrating particles transfer energy efficiently, giving metals high thermal conductivity. Warming is therefore not confined to the bowl of the spoon: it travels along the handle, even though the handle never entered the soup.

Stirring can speed up the process. As the spoon moves, it replaces soup that has cooled slightly beside the metal with warmer soup from elsewhere and mixes layers of different temperature. This movement of liquid is forced convection. Motion alone is not sufficient: stirring cold soup would not make the spoon hot, and heating caused by friction is negligible here. The temperature difference causes the transfer; stirring changes its rate and distribution.

A wooden spoon behaves differently because wood has much lower thermal conductivity. Its immersed end can warm while its handle stays cooler for longer. How warm any handle becomes therefore depends on its material, the soup’s temperature, the immersed depth and the time.

Comprehension questions

1. What does the passage define as heat, and what term does it use for energy held by an object?

2. How does stirring increase the rate at which the metal spoon warms, and what is this movement of liquid called?

Reflection questions

1. If the metal spoon were left still in the soup, how would the rate of warming probably change, and which claim in the passage supports your inference?

Opinion questions

1. The passage states that a wooden spoon's handle stays cooler for longer. Which material would you prefer for stirring hot soup, and why?
