Heat Transfer

Conduction, Convection and Radiation

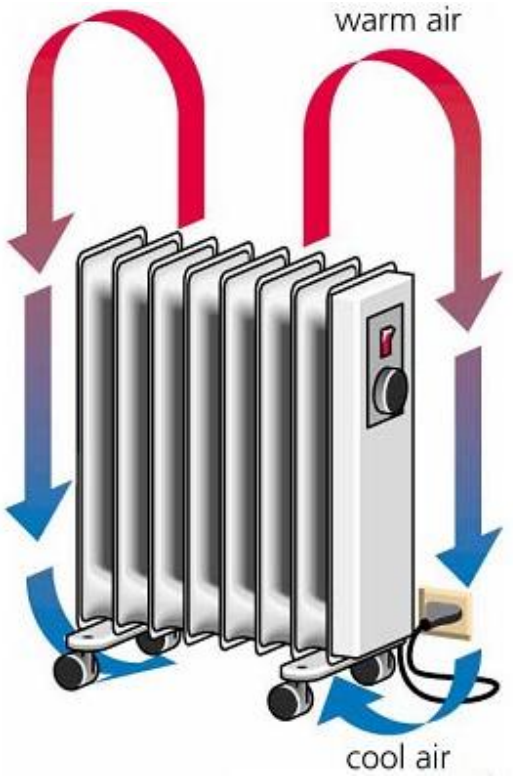
Conduction

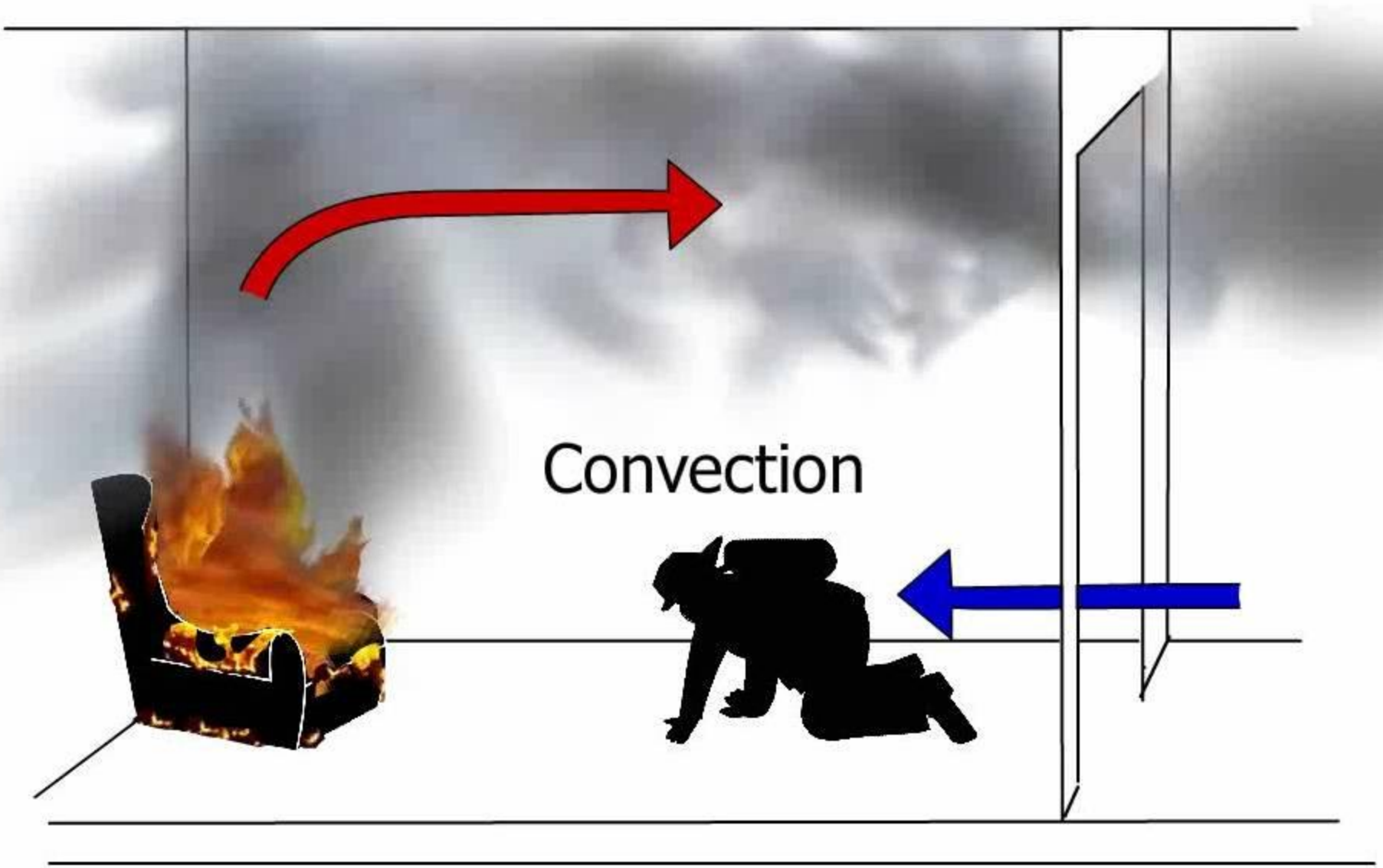
- Heat transferred by particles colliding into one another, such as in a metal.
- Transfer of energy by touch
- Not an effective transfer in a gas.
- Primarily solids

Convection

- Heat transferred by the circulation of a fluid (or gas), such as in a heating system at home; important near the surface of the Sun.

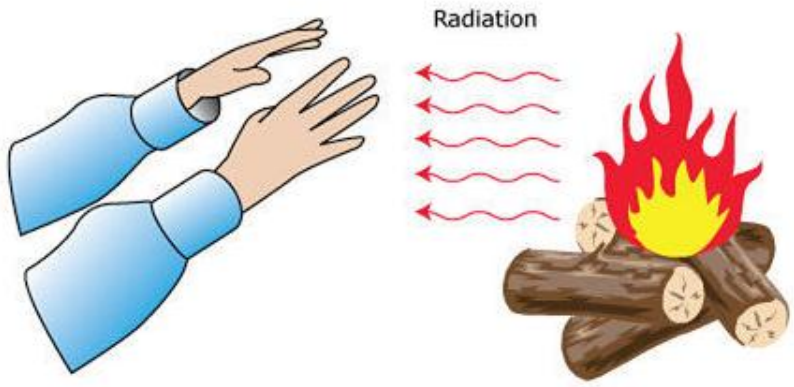
- Hot air rises cool air falls




Convection

Radiation

- Heat transferred by the flow of electromagnetic radiation, like heat felt from the campfire.
- The only type of heat transfer that can happen in a vacuum.
- Heat transfer through waves



Heat Transfer

- **CONDUCTION:** the transfer of energy through matter by *direct contact* of particles.

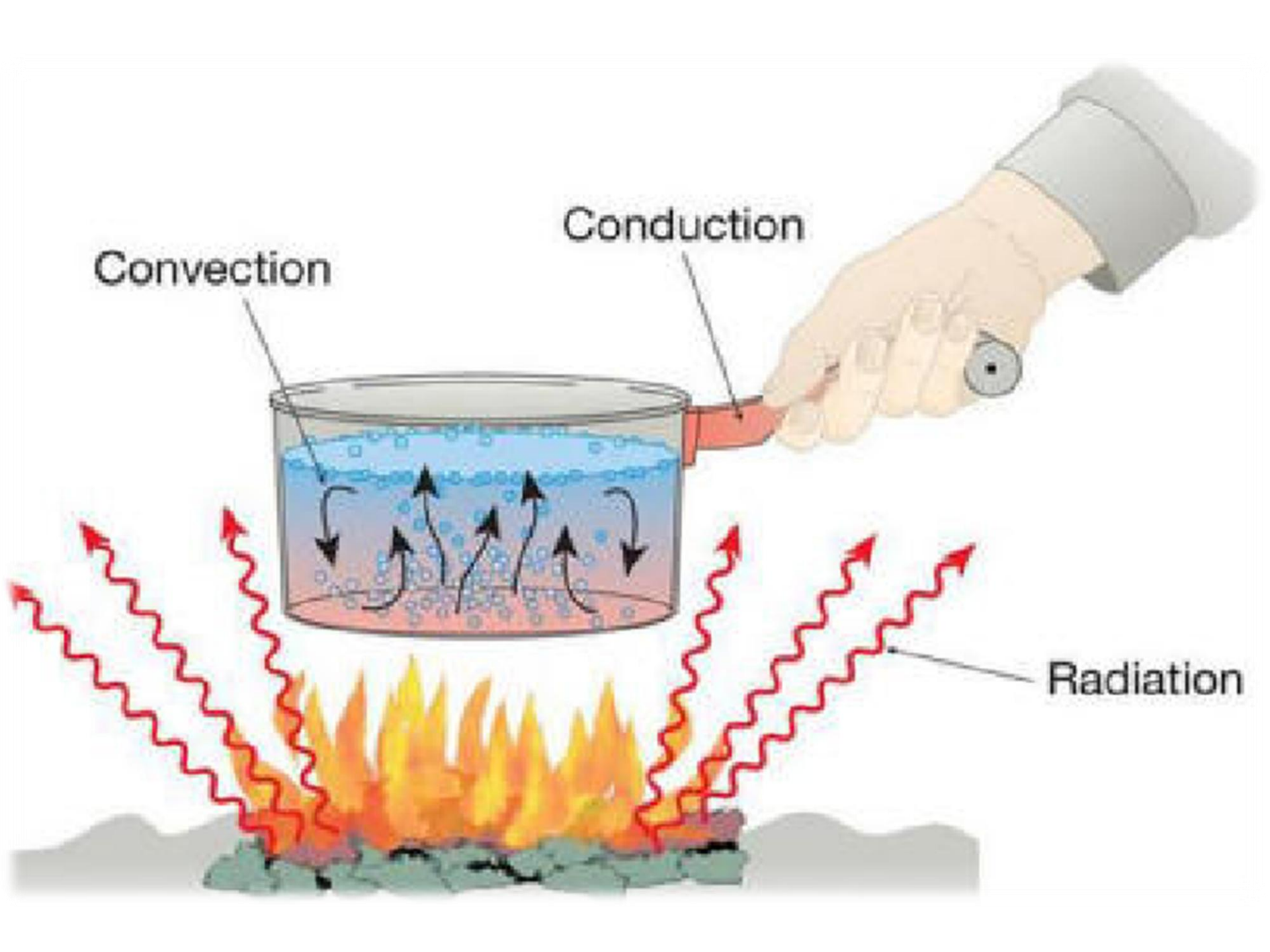
This can happen in solids, liquids and gases.

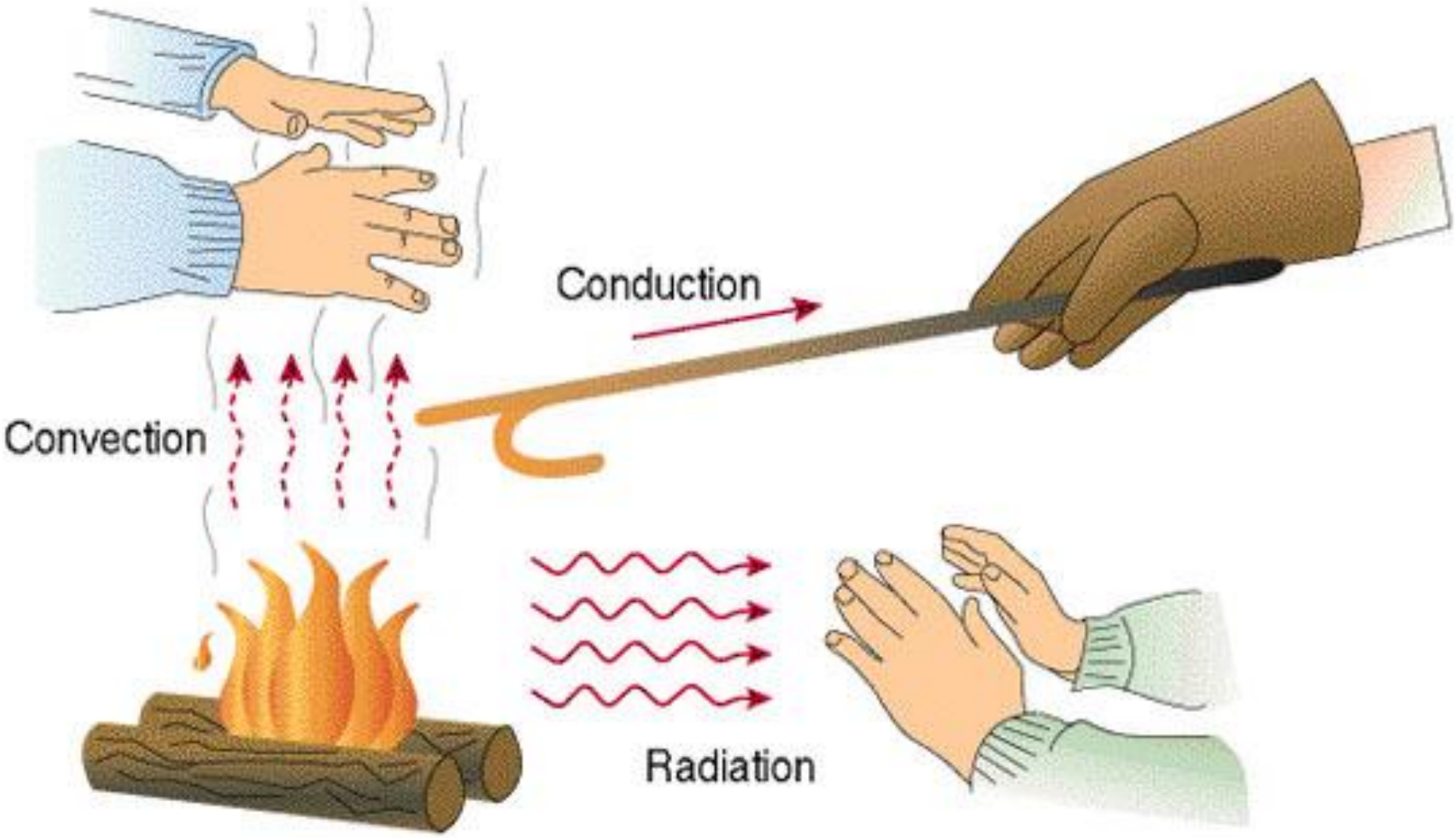
- **CONVECTION:** the transfer of energy because of the movement of *bulk masses* of particles.

This can happen only in liquids and gases - not in solids.

- **RADIATION:** the transfer of energy by *electromagnetic waves.*

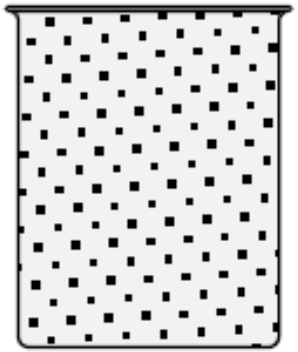
Energy can move by radiation in air like the heat from your electric stove top, or in the vacuum of space the way the Sun heats the Earth. In radiation, the energy does not have to transfer through mass (particles).


Conduction
Convection
Radiation


Conduction
Convection
Radiation

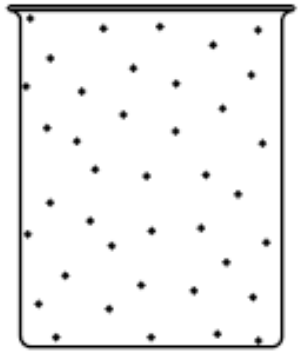
68 In which container is the substance unable to transfer heat by convection?

F



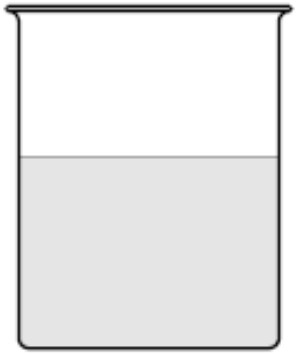
Chlorine

H



Air

G



Water

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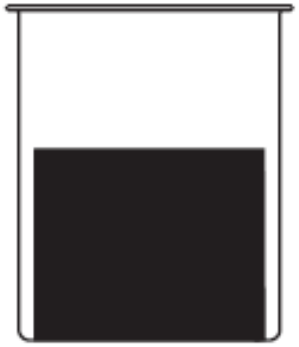
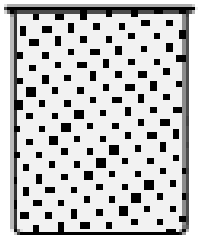


Aluminum

Convection

In which container is the substance unable to transfer heat by convection?

F



Chlorine

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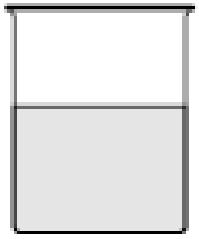

Water

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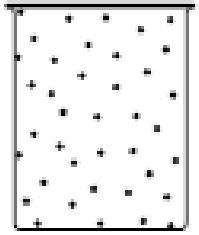

Air

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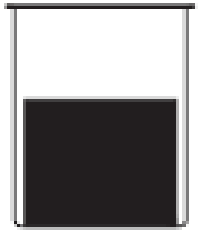

Aluminum

Radiation

The moon's surface becomes hot during the long lunar day because the sun transfers heat to the moon. This heat transfer is accomplished almost entirely through the process of —

F convection
G refraction
H conduction
J radiation