



## 5.6 Heat transfer: radiation

**Aim:** To demonstrate the transfer of energy by radiation.

### Equipment:

- Rotor blades in a vacuum glass;
- 2 plates, 4 cm × 4 cm, one painted black and one painted white
- 2 thermometers
- Small radiant heater
- one side of the blades should be black and one side silvered

### Demonstration 1

- Place the rotor equipment in the sun-light or on an overhead projector.
- Watch it rotate.

### Explanation

As the sunlight hits the surfaces of the rotor blades, they absorb the light which causes the emission of electrons from the surfaces. The black surfaces absorb more light than the silvered surfaces. In other words, the silvered surfaces reflect more light than the black. Due to the conservation of momentum the blades recoil as the electrons are emitted thereby causing the rotor to rotate.

### Demonstration 2

- Attach a thermometer to each of the plates.
- Secure the two plates vertically with the thermometers pointing away from each other. Place the radiant heater between the plates, making sure that it is equidistant from each of the plates.
- Note the temperature rise on both plates.

### Explanation

The black surface absorbs the light more efficiently than the white surface. The black painted plate will heat up more quickly than the white painted plate.

### Applications

To keep objects cooler in radiative heat, paint them white or silver to reflect the heat. For example, white houses in hot countries, fire-fighters' suits, satellite electronics.

To heat objects up in radiative heat, paint them black to absorb the heat. For example, solar panels are always dark in colour.

