



Experiment 17 (demonstration)

Date:

Aim: To investigate the photoelectric effect.

Investigative question:

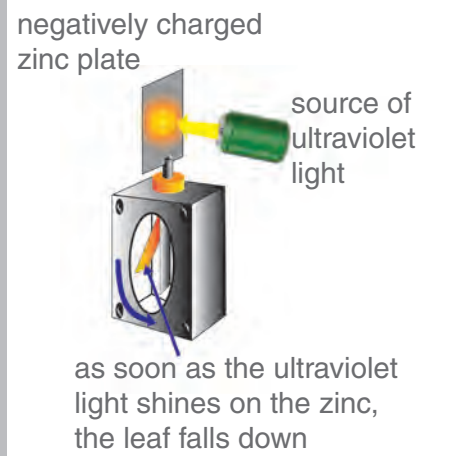
Hypothesis:

Variables:

Independent variable (Which is changed.)	Dependent variable (Which is measured.)	Controlled variable(s) (Which remain(s) controlled.)

Apparatus:

- Aluminium cold drink can
- Fine sandpaper
- 15 cm thin wire (wire hanger)
- Ten 10 cm × 1 cm foil strips or Christmas decorations
- Adhesive tape
- Polystyrene cup
- Short PVC pipe
- Dry woollen cloth
- UV lamp (you could borrow one from a DJ).
- Ordinary light bulb (a bed lamp should be sufficient).
- If an electroscope is available, the same experiment can be done with the same steps.



Method:

1. Use the sandpaper to lightly sand the side of the can pointing up. The paint should only just be removed.
2. Carefully cut two semicircles out of the edge of the cup so the can will not roll off when placed on top.
3. Fix the strips of foil or Christmas decorations to the thin wire with adhesive tape. Ensure the foil is in contact with the wire.
4. Now push the wire through the opening in the can. Tape down the wire so it will not fall out, but is still making contact with the can.



- 5 Set up the apparatus as follows:
- 5.1 Rub the PVC pipe with the woollen cloth to charge it negatively.
- 5.2 Touch the strips of foil with the pipe to charge them negatively.
- 5.3 Use your finger and discharge the can by lightly touching it.
- 5.4 Rub the PVC pipe again and touch the foil strips again.
- 5.5 Shine the light of the UV lamp on the can where it was sanded down.



Quick facts

- Charging by contact: When two charged objects touch and are separated, it will have the same charge, which is smaller than the original charge.
- Charging by induction: After charging by induction the uncharged object obtains the opposite charge to that of the charged object and is equal in magnitude to the charged object.

Answer the following questions:

1. Why is it necessary to sand the can lightly?

2. What happens to the foil strips if you touch it with the PVC pipe?

3. Explain your observation.

4. What do you observe when the can is irradiated with the UV light?

5. Explain your observation.



6. The foil strips are now **positively charged** by means of induction. If you irradiate the can with the UV light now, what do you observe?

7. Explain your observation.

8. It is very important not to look directly into the UV light. Explain why it is bad for your eyes.

Repeat the experiment with negatively charged foil strips, but shine the light of an ordinary light bulb on the can.

9. What do you observe?

10. Explain your observation.

11. Do you think your observation will change if you use a light bulb with a greater brightness, e.g. 100 W?

12. Explain your answer.
