

Light Up Bag and Wiggling Spots (Reflection)

Materials

Sealed plastic bag containing air

Sealed plastic bag containing water only (all air is squeezed out)

Sealed plastic bag containing dilute water/cornstarch solution only (all air is squeezed out)

Sealed plastic bag containing dilute water/cornstarch solution (on bottom) and air (on top)

White paper on stand (to project spots onto)

Red laser pointer (< 5 mW)

Caution: Avoid direct eye exposure. Do not look or stare directly into the laser beam.

Note: Ziplock bags will form good seals and prevent leakage.

Instructions

1. Lay the bag of air on a countertop next to upright paper.
2. Aim laser at an angle from above the bag so that the laser spot shows up on the bag and another one shines onto the paper. You will see a third spot on the floor of the bag.
3. The angle of the laser needs to be broad enough to get the spot on the paper (a large angle with respect to the perpendicular of the bag surface), but not too broad so you no longer have a spot on the top surface of the bag (missing the top surface of the bag). The angle of the laser can't be too steep, or a spot will be too high to fall on the paper.
4. Why do we see a spot on the top surface of the bag when we can't see the laser in the air arriving at the bag ?
5. Why do we see a spot on the floor of the bag?
6. Where is the spot on the paper coming from? Push the bag gently next to the spot on the top surface of the bag while holding the laser steady. Now do you know?

7. Change the angle of the laser to further confirm the effect of the reflection angle and the surface where the reflection is coming from.
8. Set the bag of air aside. Lay the bag containing only water on a countertop next to upright paper.
9. Repeat step 2 with the water-only bag.
10. Set the bag of only water aside. Lay the bag containing only water/cornstarch solution on a countertop next to upright paper.
11. Repeat step 2 with the water/cornstarch bag.
12. Why do we see the laser beam in the water/cornstarch solution and not in the water-only bag?
13. Set the bag containing only water/cornstarch aside. Lay the bag containing both air and water/cornstarch solution on a countertop next to upright paper. Let the air/solution interface be horizontal with the countertop.
14. Repeat step 2 with the bag containing both air and water/cornstarch. This time, how many spots do you see on or in the bag? How many spots do you see on the paper?
15. Once you have the spots on the paper and without moving the laser, gently push the spot on the top surface of the bag to see how it affects the different spots on the paper. Then, gently tap the liquid and watch what happens to the spots. Where are each of the spots on the paper coming from?
16. See if you can find an angle of shining the light into the air/dilute cornstarch solution that makes the bag look like it is lighting up? Why does the bag with water seem to light up more at some angles and not at others? Does this happen to the bag filled with air? To the bag filled only with water or only with the dilute cornstarch solution?