

DEMONSTRATING THE PHENOMENON OF OSMOSIS

Why is diarrhea the major symptom of lactose intolerance?

Phase 1: PowerPoint presentation by two students to demonstrate :

- osmosis occurring when water is absorbed in the intestine
- what happens in the case of lactose intolerance
- the statistical significance of a study completed in Paris.

Phase 2: Experiments

1. Demonstration of osmosis using the Dutrochet osmometer

① Preparation of the osmometer :

Fix osmometer to support

Fill osmometer completely with a 300g/l sugar solution (hypertonic medium)

Seal lower end using cellophane

Ensure water-tight using Parafilm and rubber bands.

② Reinstall osmometer, the neck at the top and the flask at the bottom (see photo).

③ Complete filling of the osmometer by topping up level using a fine pipette, eliminating all air bubbles.

④ Use a marker to mark the level of sugar water on the neck of the osmometer: this is the baseline level.

⑤ Immerse fully the flask of the osmometer in a beaker containing distilled water (hypotonic medium)

⑥ After 30-40 mins, an increase in the level of sugar water in the osmometer is observable. Water (hypotonic medium) has diffused through the cellophane membrane to mix with the sugar water (hypertonic medium). This is the phenomenon of osmosis.

2. Demonstration of osmosis using a potato

① Cut three french fries of identical size from a potato and measure precisely.

② Immerse each of the french fries in a different solution :

- No.1: Distilled water (hypotonic)

- No.2: NaCl solution of 9g/L (isotonic)

- No.3: NaCl solution at 40g/L (hypertonic)

③ After 15-20 min, remove the french fries from the water and measure to the nearest mm using a ruler

Results :

- French fry No. 1 has lengthened and hardened due to the take-up of water

- French fry No. 2 shows no change, either in length or appearance : there was no exchange of water

- French fry No. 3 has reduced in volume and softened due to a loss of water.

Conclusion : Water always diffuses from a hypotonic to a hypertonic medium. This phenomenon is known as osmosis.



