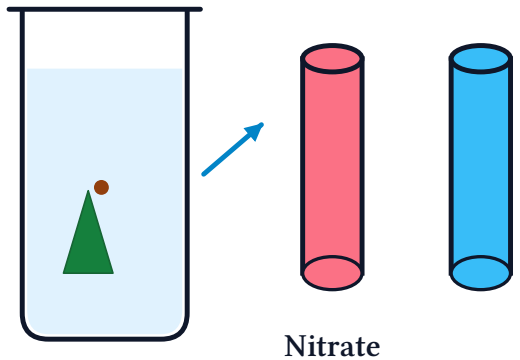
Biology 20

Unit A: Energy and matter in the biosphere

Water as solvent and carrier

The slough holds more than water

- A clear slough sample still carries dissolved nitrate and phosphate from the fields around it.
- Those ions are invisible until a test changes colour.



Read the WHMIS label before you open a kit

Polar water holds the ions

- A hydrogen bond joins the hydrogen of one water molecule to the oxygen of another.
- Polarity lets water surround positive and negative ions.
- That solvent action moves nutrients through soil, organisms, and rivers.

Key terms

hydrogen bond

The attraction from a hydrogen atom of one water molecule to the oxygen atom of a neighbour.

universal solvent

Water dissolves many ions and polar molecules because the molecule itself is polar.

cohesion

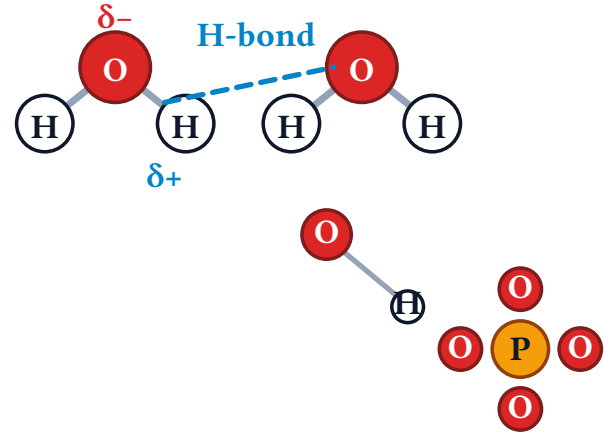
Water molecules staying together through hydrogen bonds, which supports flow in soil and in xylem.

nutrient runoff

Dissolved nitrate, phosphate, or metal ions carried by water from land into a river or slough.

Cycles move in solution

- Hydrogen bonds keep water liquid across the temperatures of Alberta seasons.
- Dissolved nitrate and phosphate are the travelling forms in the nitrogen and phosphorus cycles.
- Heavy metals dissolved in water can pass from algae into the animals that eat them.



That H faces a phosphate oxygen

Opposite charges pull the molecules together

Units and labels in a test

- Record pH and the nutrient with the kit’s unit, such as mg/L.
- Match a high nitrate reading to fertilizer or sewage before you name a fix.

Water use and return

- Households, farms, mines, and processing plants remove large volumes.
- Return flow can carry heat, nutrients, or metals back to the river.



Bonds and budgets

- Explain hydrogen bonds and why water dissolves nitrate.
- Interpret a high phosphate reading and a large industrial withdrawal.

Regions balance these flows

- The next lesson compares productivity and gas balance across whole regions.
- Water and nutrients are two of the limits you will use.

Image credits

Quintin Soloviev, Bassano Dam (Alberta), CC BY 4.0