Inorganic Ions and Their Roles

Four inorganic ions, each with a specific role linked to its properties.

ION → ROLE

H^+	the higher the H^+ concentration, the lower the pH
Fe^{2+}	in the haem group of haemoglobin; binds oxygen
Na^+	co-transport of glucose and amino acids
PO_4^{3-}	part of DNA (backbone) and of ATP

Key terms

inorganic ion	dissolved in the cytoplasm and body fluids; each type has a specific role that depends on its properties, such as charge.
hydrogen ion	the concentration of hydrogen ions determines pH: higher concentration, lower pH, more acidic.
pH	decided by the concentration of hydrogen ions; a change can alter the shape of an enzyme's active site.
haemoglobin	the red pigment in red blood cells; each haem group holds an iron ion where oxygen binds.
co-transport	a carrier protein moves a sodium ion into the cell down its gradient and brings glucose or an amino acid in too.
phosphate ions	components of DNA, forming part of the backbone of each strand, and of ATP.

I can...

- ☐ Inorganic ions occur in solution in cytoplasm and body fluids at varying concentrations
- ☐ Each ion has a specific role
- ☐ Roles: hydrogen ions and pH; iron ions in haemoglobin; sodium ions in co-transport; phosphate ions in DNA and ATP

EXAM TRAP

It is the concentration of hydrogen ions that determines pH; hydrogen ions are not "the pH". Do not mix up roles: iron with haemoglobin, sodium with co-transport.

4 marks: what earns them

1. Hydrogen ions: the higher the concentration of hydrogen ions, the lower the pH (they determine pH)
   Not: hydrogen ions are the pH; hydrogen ions make it alkaline
2. Iron ions are a component of haemoglobin (in the haem group) and bind oxygen
   Not: iron makes blood red (alone); iron is oxygen
3. Sodium ions are involved in co-transport of glucose / amino acids (into cells, across the membrane)
   Not: sodium ions absorb water (alone); sodium carries glucose in the blood
4. Phosphate ions are components of DNA and of ATP
   Not: phosphate is a nucleotide base; phosphate is an enzyme

Remember

Hydrogen, pH. Iron, haemoglobin.
Sodium, co-transport.
Phosphate, DNA and ATP.

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