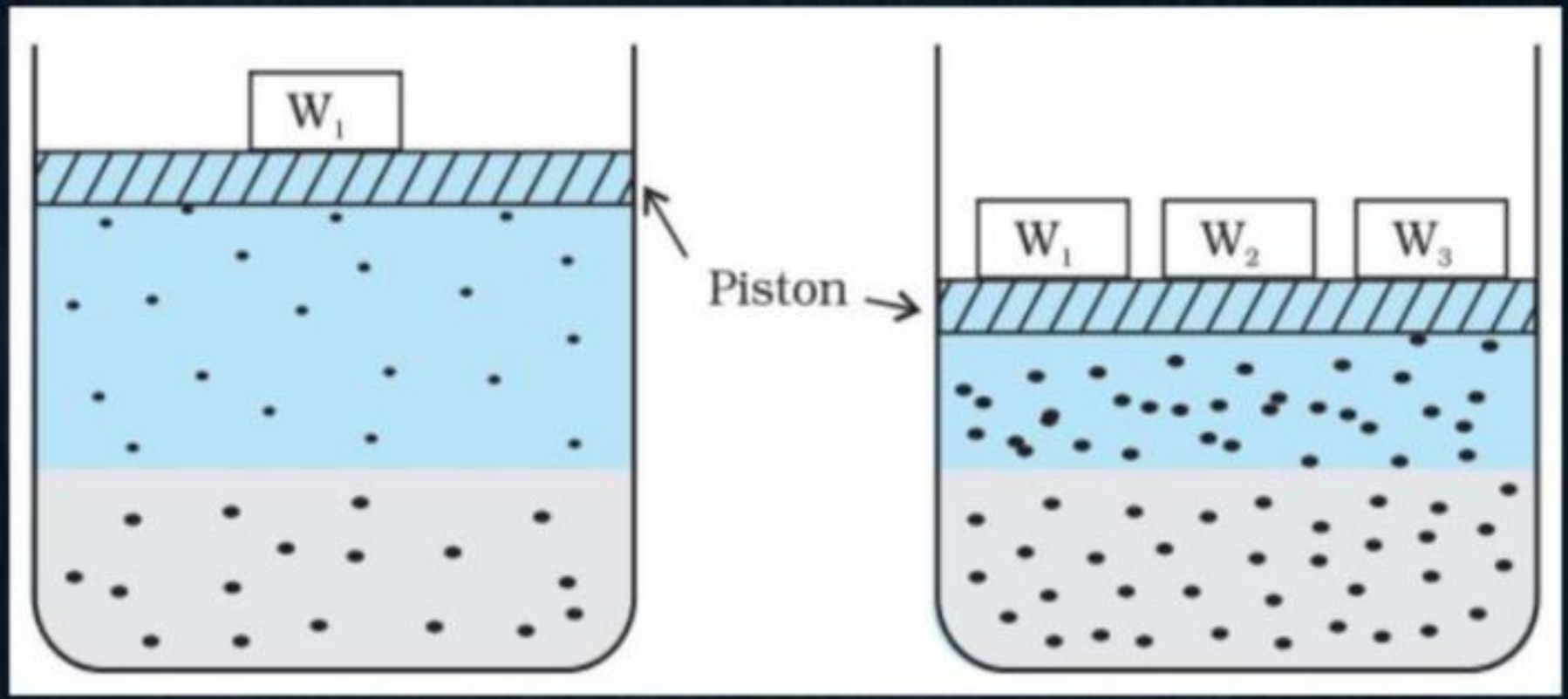
Today's Goal

Henry's Law And Practice Session

Henry’s Law

Solubility of Gas in Liquid

1. Many gases dissolve in water. Oxygen dissolves only to a small extent in water.
2. It is this dissolved oxygen which sustains all aquatic life.
3. On the other hand, hydrogen chloride gas (HCl) is highly soluble in water.
4. Solubility of gases in liquids is greatly affected by pressure and temperature.
5. The solubility of gases increase with increase of pressure


W1
Piston
W1
W2
W3

Henry's Law

1. At a constant temperature, the solubility of a gas in a liquid is directly proportional to the partial pressure of the gas present above the surface of liquid or solution.
2. # If we use the mole fraction of a gas in the solution as a measure of its solubility.
   The mole fraction of gas in the solution is proportional to the partial pressure of the gas over the solution.
3. # The most commonly used form of Henry's law states that
   "The partial pressure of the gas in vapour phase (p) is proportional to the mole fraction of the gas (x) in the solution."

Henry's Law constant

1. Different gases have different K_H values at the same temperature
2. This suggests that K_H is a function of the nature of the gas.
3. Higher the value of K_H at a given pressure, the lower is the solubility of the gas in the liquid.
4. K_H values increases with increase of temperature indication that the solubility of gases increases with decrease of temperature.
5. That's why aquatic species are more comfortable in cold waters rather than in warm water.

Q

1. Henry's Law constant for CO_2 in water is 1.67×10^8 Pa at 298K. Calculate the quantity of CO_2 in 500 ml of soda water when packed under 2.5 atm CO_2 pressure at 298 K.

A 1.8 gm

B 20 gm

C 2.76 gm

D 300 gm

Q

2. H_2S, a toxic gas with rotten egg like smell, is used for the qualitative analysis. If the solubility of H_2S in water at STP is 0.195 m, Calculate Henry's law constant?

A. 27 atm

B. 285 atm

C. 400 atm

D. 327 atm

Q

3. If N_2 gas is bubbled through water at 293 K, how many millimoles of N_2 gas would dissolve in 1 litre of water? Assume that N_2 exert a partial pressure of 0.987 bar. Given that Henry's law constant for N_2 at 293 K is 76.48 kbar.

A 0.93

B 0.17

C 0.71

D N.O.T

Q

According to Henry's law the solubility of a gas in a given volume of liquid increases with increase in :

Temperature

Pressure

Both

None of these

Q

Incorrect option is

A. K_H is constant for a given gas-solvent system

B. Higher the value of K_H lower the solubility

C. K_H has temperature dependence

D. K_H decreases with increase of temperature

HomeWork

All Questions Practice from previous slides
NCERT Textbook – Intext and Back Exercise
DPP Solve