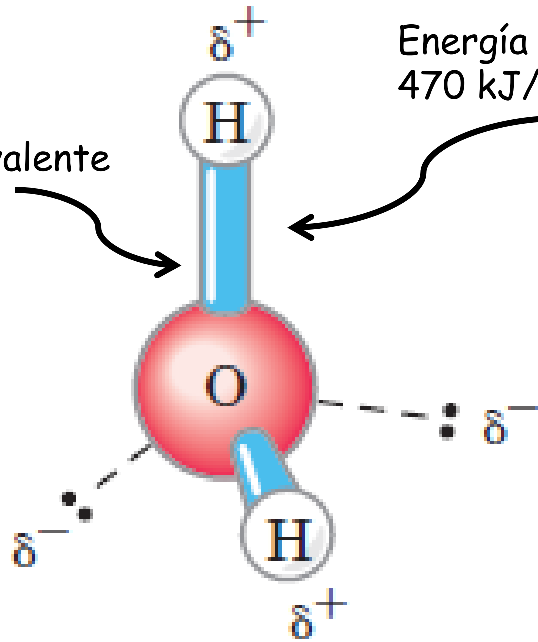
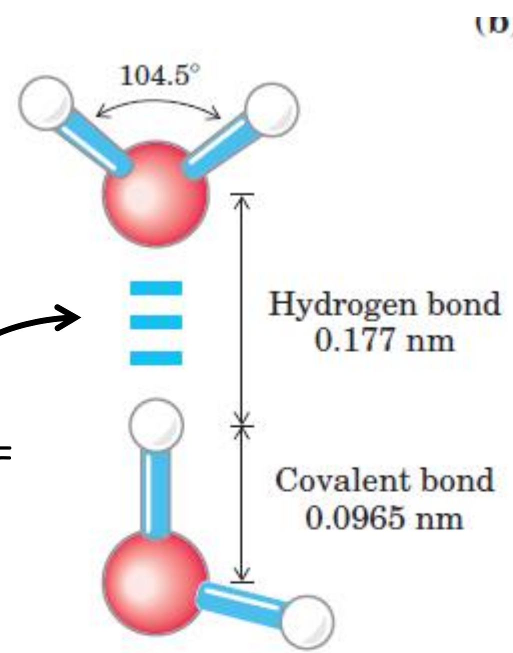

AGUA

Enlace covalente

Energía de disociación =
470 kJ/mol





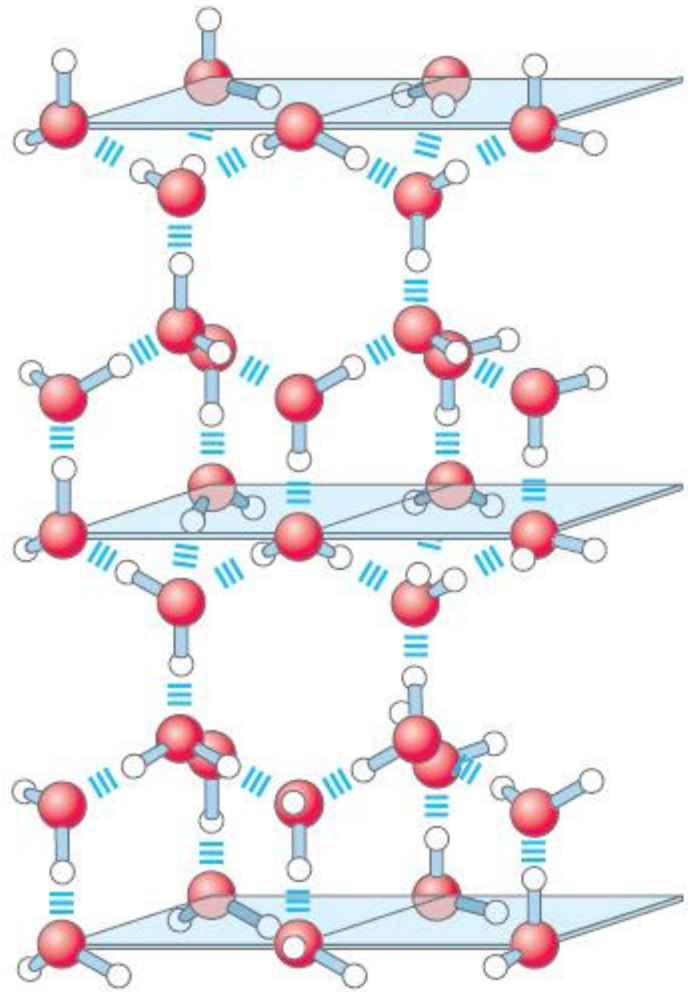
Energía de disociación =
23 kJ/mol

TABLE 2-1 Melting Point, Boiling Point, and Heat of Vaporization of Some Common Solvents

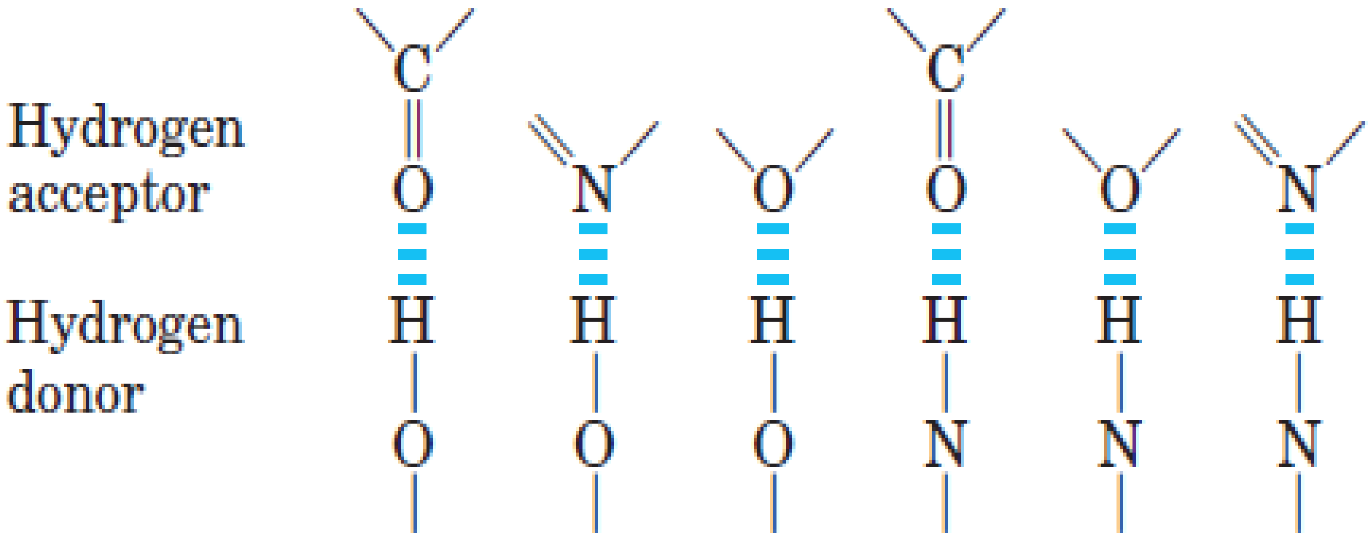
	Melting point (°C)	*Boiling point (°C)*	*Heat of vaporization (J/g)**
Water	0	100	2,260
Methanol (CH_3OH)	−98	65	1,100
Ethanol (CH_3CH_2OH)	−117	78	854
Propanol ($CH_3CH_2CH_2OH$)	−127	97	687
Butanol ($CH_3(CH_2)_2CH_2OH$)	−90	117	590
Acetone (CH_3COCH_3)	−95	56	523
Hexane ($CH_3(CH_2)_4CH_3$)	−98	69	423
Benzene (C_6H_6)	6	80	394
Butane ($CH_3(CH_2)_2CH_3$)	−135	−0.5	381
Chloroform ($CHCl_3$)	−63	61	247

*The heat energy required to convert 1.0 g of a liquid at its boiling point, at atmospheric pressure, into its gaseous state at the same temperature. It is a direct measure of the energy required to overcome attractive forces between molecules in the liquid phase.

Estructura de las moléculas de agua en estado sólido (hielo)

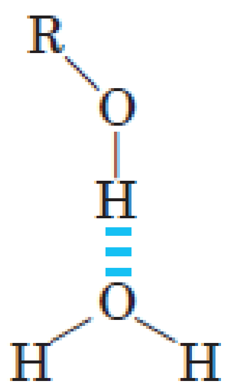


Puentes de H en sistemas biológicos

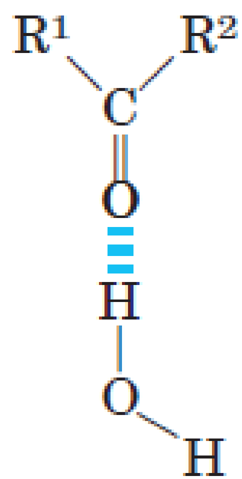


Otros puentes de H de importancia biológica

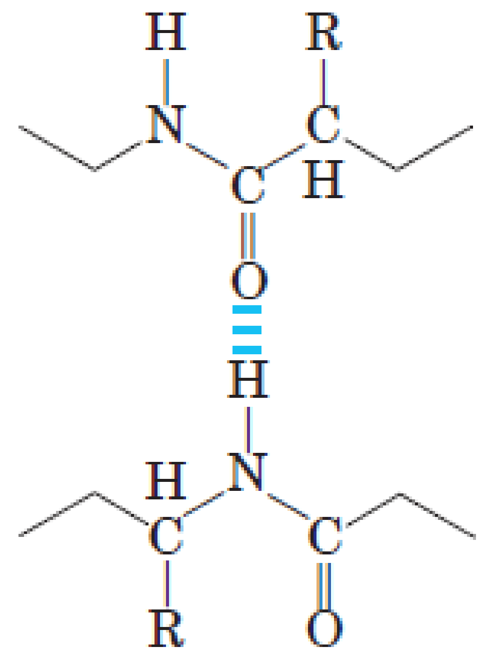
Between the hydroxyl group of an alcohol and water



Between the carbonyl group of a ketone and water



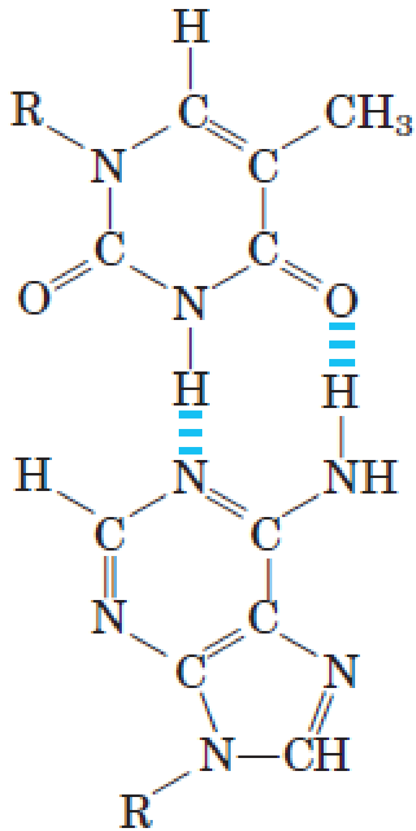
Between peptide groups in polypeptides



Between

Otros puentes de H………

Between
complementary
bases of DNA



Thymine

Adenine

Agua como solvente => cte. dieléctrica (ε) alta (78.5)

(permite disociar la > de comp. polares)

TABLE 2-2 Some Examples of Polar, Nonpolar, and Amphipathic Biomolecules (Shown as Ionic Forms at pH 7)

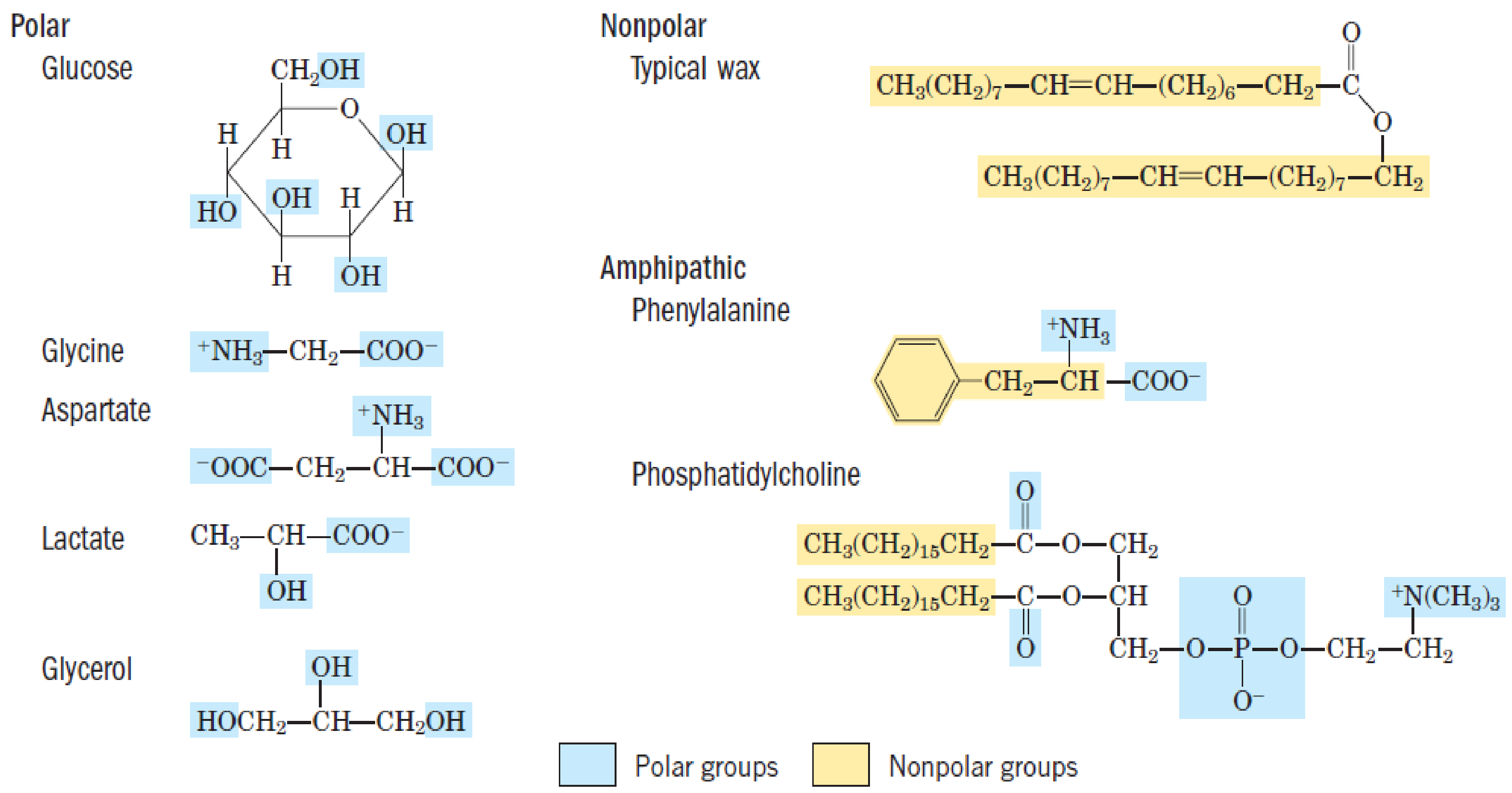
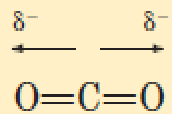
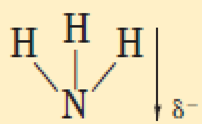
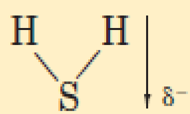


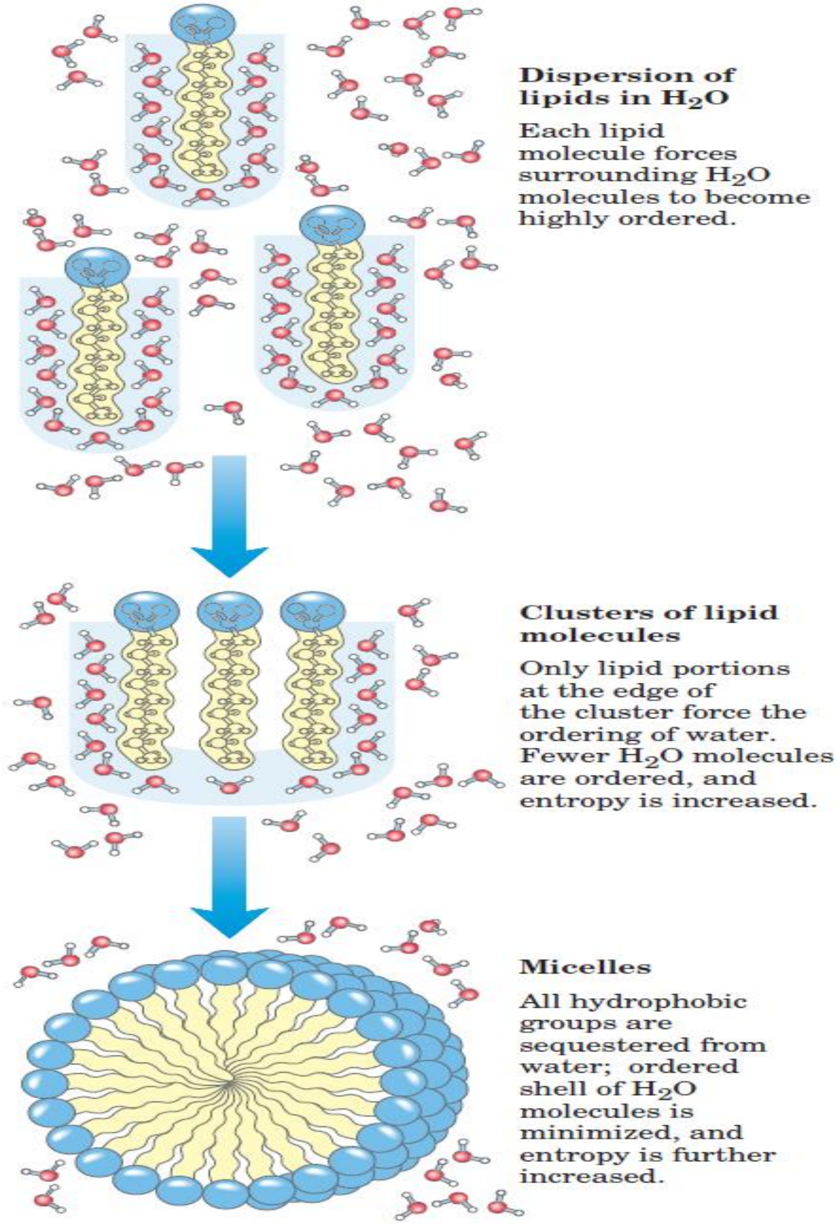
TABLE 2-3 Solubilities of Some Gases in Water

Gas	*Structure**	*Polarity*	*Solubility in water (g/L)*[†]
Nitrogen	N≡N	Nonpolar	0.018 (40 °C)
Oxygen	O═O	Nonpolar	0.035 (50 °C)
Carbon dioxide		Nonpolar	0.97 (45 °C)
Ammonia		Polar	900 (10 °C)
Hydrogen sulfide		Polar	1,860 (40 °C)

*The arrows represent electric dipoles; there is a partial negative charge (δ^-) at the head of the arrow, a partial positive charge (δ^+; not shown here) at the tail.

[†]Note that polar molecules dissolve far better even at low temperatures than do nonpolar molecules at relatively high temperatures.

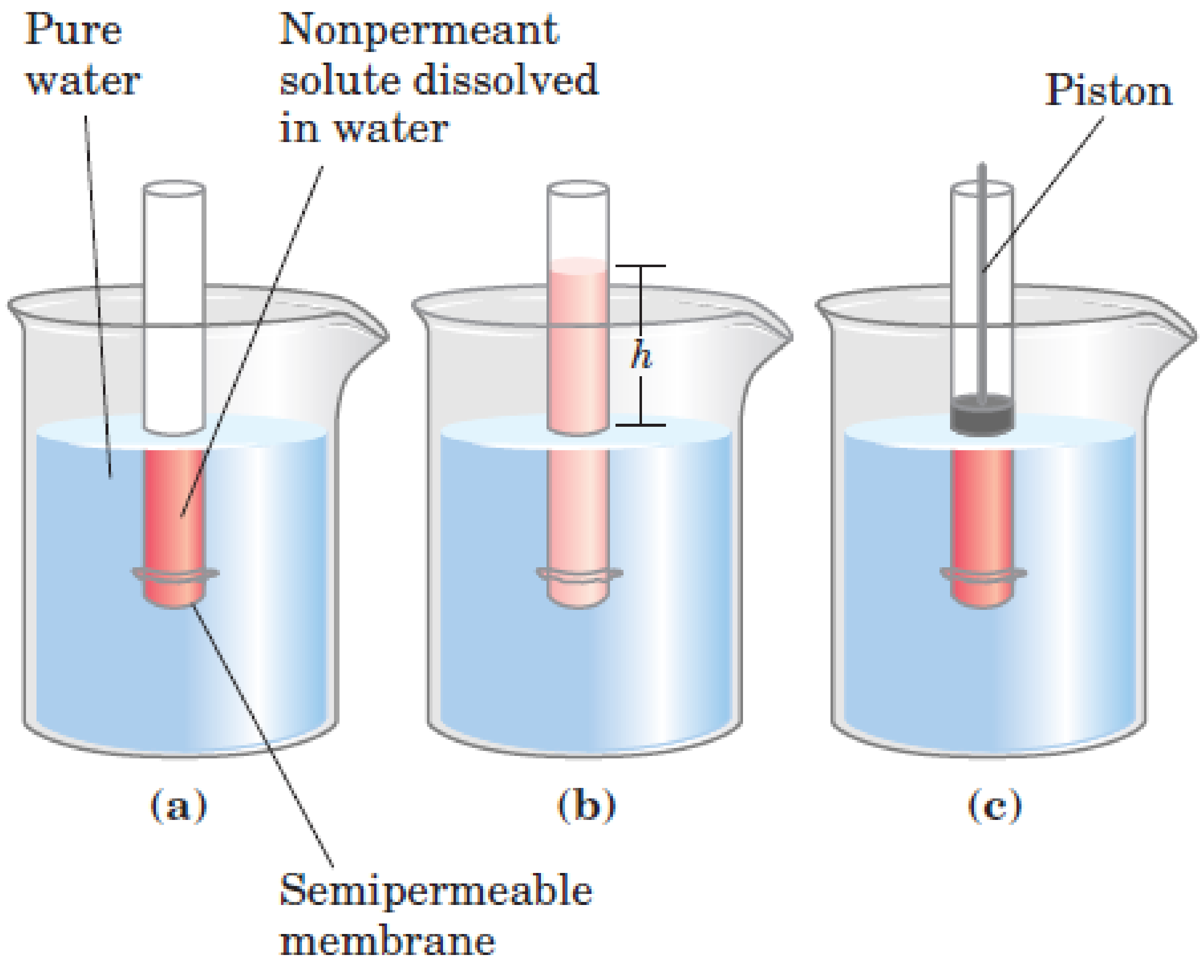
Conpuestos anfipáticos en agua



(b)

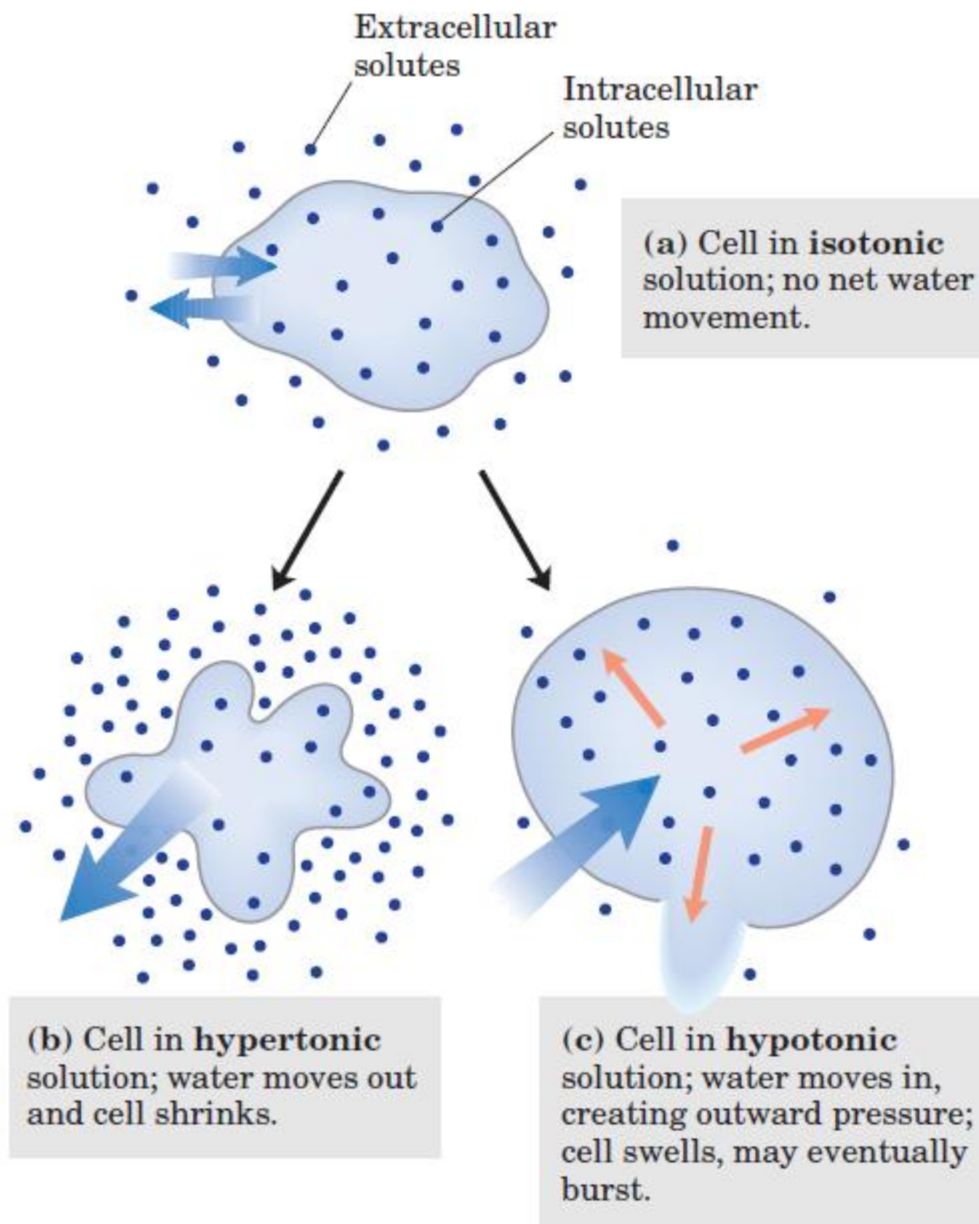
OSMOSIS

Movimiento del agua a través de una membrana semipermeable, dirijido por diferencias de presión osmótica



medición de la presión osmótica

Efecto de la osmolaridad extracelular en el movimeinto del agua a través de la membrana plasmática



Ionización del Agua

$$H_2O \rightleftharpoons H^+ + OH^-$$

$$K_{eq} = \frac{[H^+][OH^-]}{[H_2O]}$$

A 25 C, la $[H_2O]$ es de 55.5 M porque 1000g/18.15 g/mol

Por lo tanto:

$$K_{eq} = \frac{[H^+][OH^-]}{55.5\ \mathrm{M}},$$

$$(55.5\ \text{M})(K_{eq}) = [H^+][OH^-] = K_w$$

Donde Kw = producto iónico del agua

La [H] y [OH] es 1 X10^{-7} (pH neutro),
por lo que:

$$Kw = 1 \times 10^{-14}$$

Como en agua pura existen las mismas [H] y [OH]:

[H] = 1 X 10^{-7}
[OH] = 1 X 10^{-7}

Se dice que el pH es neutro ó pH = 7

Entonces Kw define la escala de pH

pH

Sörensen .- notación conveniente para definir la [H]

$$pH = -\log [H]$$

Ej. El pH de una sol. de HCl 0.01 M es:

$$pH = -\log[0.01] \quad \text{ó} \quad pH = -\log[10^{-2}]$$

$$= \mathbf{2}$$

TABLE 2-6 The pH Scale

$[H^+]$ (M)	pH	$[OH^-]$ (M)	pOH*
10^{0} (1)	0	10^{-14}	14
10^{-1}	1	10^{-13}	13
10^{-2}	2	10^{-12}	12
10^{-3}	3	10^{-11}	11
10^{-4}	4	10^{-10}	10
10^{-5}	5	10^{-9}	9
10^{-6}	6	10^{-8}	8
10^{-7}	7	10^{-7}	7
10^{-8}	8	10^{-6}	6
10^{-9}	9	10^{-5}	5
10^{-10}	10	10^{-4}	4
10^{-11}	11	10^{-3}	3
10^{-12}	12	10^{-2}	2
10^{-13}	13	10^{-1}	1
10^{-14}	14	10^{0} (1)	0