- Calculate the osmotic pressure of a 0.25 M aqueous solution of sucrose, $C_{12}H_{22}O_{11}$, at 37 °C

2

Answer:

- Calculate the osmotic pressure of a 0.25 M aqueous solution of sucrose, $C_{12}H_{22}O_{11}$, at 37 °C.

2

Answer:

Marks 4

- A saline solution used for intravenous injections contains 900 mg of sodium chloride in 100 mL. What is the concentration of this sodium chloride solution?

Answer:

What is the osmotic pressure of this solution at 37 °C?

Answer:

Why is it better to use a saline solution rather than pure water when administering drugs intravenously?

- Calculate the osmotic pressure of a solution of 1.0 g of glucose ($C_6H_{12}O_6$) in 1500 mL of water at 37 °C.

4

Answer:

Explain why a drip for intravenous administration of fluids is made of a solution of NaCl at a particular concentration rather than pure water.

- The solubility of nitrogen in water at 25 °C and 1.0 atm is 0.018 g L^{-1}. What is its solubility at 0.50 atm and 25 °C?

1

Answer:

• In the spaces provided, explain the meanings of the following terms. You may use an equation or diagram where appropriate.	**Marks 4**
(a) hydrogen bonding	
(b) colligative properties	
(c) hypotonic solution	
(d) isoelectric point	

- The osmotic pressure of a solution containing 5.5 g L^{-1} of a polypeptide is 0.103 atm at 5 °C. Calculate the molar mass of the polypeptide.

2

Answer:

THE REMAINDER OF THIS PAGE IS FOR ROUGH WORKING ONLY.

- Henry's law describes the solubility of a gas in a liquid phase. What methods are possible to ensure a patient receives enough oxygen during surgery? Which method is the most practical? Explain.

3

- A saline solution used to administer drugs intravenously is prepared by dissolving 0.90 g NaCl in 100.0 mL water. What mass of glucose ($C_6H_{12}O_6$) is required to prepare a 100.0 mL solution with the same osmotic pressure?

2

Answer:

Marks 4

- Henry's law relates the solubility of a gas to its pressure. *i.e.* c = *k*p

  The Henry's law constant for $N_2(g)$ at 298 K is 6.8×10^{-4} mol L^{-1} atm^{-1}. A diver descends to a depth where the pressure is 5 atm. If the diver's body contains about 5 L of blood, calculate the maximum amount of nitrogen gas dissolved in the diver's blood at 1 atm and at 5 atm. (Assume solubility of nitrogen in water and blood to be the same.)

1 atm:	5 atm:

If all the gas dissolved at 5 atm were suddenly released, what volume would it occupy at 1 atm and 298 K?

	Answer:

Marks 5

- The concentration of a dissolved gas is related to its partial pressure by c = *k*p. What is the concentration of CO_2 dissolved in blood if the partial pressure of CO_2 in the lungs is 0.053 atm? The *k* for CO_2 is 0.034 mol L^{-1} atm^{-1}.

Answer:

Calculate the pH of blood if all of this CO_2 reacted to give H_2CO_3.
The K_a of H_2CO_3 is 4.5×10^{-7}.

Answer:

Hyperventilation results in a decrease in the partial pressure of CO_2 in the lungs. What effect will this have on the pH of the blood? Use a chemical equation to illustrate your answer.

The pH of blood is maintained around 7.4 by the H_2CO_3 / HCO_3^- buffer system. Explain how a buffer works, illustrating your answer with chemical equations.