

PC RAY GROUP

CHAPTER-2

SOLUTIONS

1. A sea driver was facing problems while deep into the water though he was carrying air tank along with. He was feeling discomfort and pain in breathing while ascending. He consulted a doctor who advised him to carry a tank containing a mixture of helium(11.7%), nitrogen(56.2%) and oxygen(32.1%) in place of air. On doing so, his problem was solved and he no longer felt this problem, Read the above narration and answer the following questions:

- a. Why was sea diver facing discomfort while breathing?
- b. How did doctor help him?
- c. What is the value associated with the advice given by the doctor?

Ans. (a) Deep down the sea, the pressure is high. While ascending the pressure gets reduced. As a result, the solubility of nitrogen in water decreases. It is released as bubbles and causes discomfort to the driver.

(b) The presence of helium reduces the concentration of nitrogen. Therefore, lesser bubbles are released and this causes less pain or discomfort to the sea diver.

(c) Doctor has diagnosed the problem correctly. Any discomfort in breathing is likely to affect the lungs and will be ultimately very harmful. Doctor has indeed done a valuable service to the sea driver.

2. A doctor advised a patient suffering from high blood pressure to take less quantity of the salt.

- a. What is the role of salt in increasing blood pressure?
- b. How does low intake of salt help in reducing the blood pressure?
- c. What is the value associated with this?

Ans.(a) The body fluid already contains Na^+ and Cl^- ions. Higher intake of the salt further increases their concentration as well as osmotic pressure. The blood pressure of the patient is also likely to increase. As a result, there is inflow of water in the cells which causes the retention of water in the tissue cells. This leads to swelling in the face, legs and also in the other parts of the body, this is called edema.

(b) Low intake of salt reduces the osmotic pressure as well as blood pressure of the patient.

(c) Persons suffering from high blood pressure or hypertension must be very careful about their diet. They should control intake of salt. This is even more necessary in cold climate where we perspire very little.

3. Scuba-divers must cope with high concentrations of dissolved gases while breathing air at high pressure underwater. Increased pressure increases the solubility of the atmospheric gases in blood. When the divers come to the surface, the pressure decreases. This releases dissolved gases and leads to formation of bubbles of nitrogen in blood. This blocks the capillaries and creates medical conditions known as bends, which are painful and dangerous to life. Oxygen level is less at higher altitudes.

(i) How can you save life of scuba divers?

(ii) Why are aquatic animals more comfortable in cold water rather than in warm water?

(iii) What is effect of temp? on solubility of gases?

(iv) The climbers to high altitude have low blood oxygen which makes them weak and unable to think clearly. What is the condition known as?

(v) How can we solve problem of Anoxia?

(vi) What is the shape of the graph if we plot mole fraction of O₂ gas in water versus partial pressure of oxygen?

Ans: (i) We can save their life by adding less soluble gases like He to O₂ in oxygen cylinder.

(ii) Aquatic animals are comfortable in cold water because of high content of dissolved oxygen in cold water.

(iii) As temperature increases, solubility of gases decreases.

(iv) This is because at higher altitudes, atmospheric pressure is low. This condition is known as Anoxia.

(v) We can avoid this problem by carrying cylinders of pure oxygen gas.

4. Two solutions having same osmotic pressure at a given temp. Are called isotonic solutions. The osmotic pressure associated with fluid inside blood cell is equivalent to that of 0.9 % (w/V).

(i) What precautions should be taken when saline is given intravenously to patients by doctors?

(ii) If saline has concentration more or less than 0.9%, what should be done and why?

(iii) What will happen to a hypertonic solution is injected to our body? What is the solution of this problem?

(iv) What will happen if hypotonic solution is injected to our body?

(v) What is meant by 0.9 % (w/V) saline solution?

Ans: (i) We should first confirm that the saline is isotonic to blood. i.e. 0.9 % (w/V)

(ii) It shouldn't be injected intravenously.

(iii) It will shrink blood cells by taking the water content of the cell out. We can either drink water or inject a hypotonic solution into blood.

(iv) If hypotonic solution is added, then the blood cells will oblate and burst.

(v) A solution which contains 0.9 g of solute in 100 ml of solution is referred to as 0.9% (w/V).

5. We have many types of water purifiers. Zero-B is based on disinfecting properties of iodine. UV purifier is based on killing bacteria by UV light. These R.O. purifiers are being used.

(i) What is the full form of R.O. purifier?

(ii) What is the function of porous membrane?

(iii) Which method of purification is more economical for countries using sea water, flash distillation or R.O. for getting potable water? Why?

(iv) What is the material used for making membrane?

(v) If none of the purifier is available, what is the best way of purifying water?

Ans: (i) Reverse Osmosis

(ii) Porous Membrane allows easy osmosis of water from region of low conc. of salt to high conc.

(iii) R.O. is a better substitute because in distillation process, a large amount of heat is required in the boiling process, whereas in R.O., only osmosis takes place.

(iv) Cellulose Acetate is used.

(v) We can purify water by Alum, or use the traditional method of purification where we pass water through layers of pebbles, sand, charcoal etc.