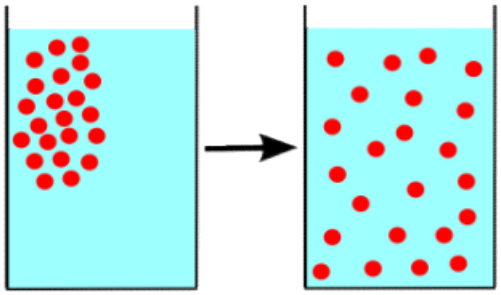
Name: Class:

Total Possible Marks: 27

Diffusion



1

1. Diffusion is the gradual movement of particles from areas of low concentration to areas of high concentration, is this true or false?

   * This is of course false, diffusion is the gradual movement of particles from areas of high concentration to areas of low concentration, the other way round involves a mechanism known as active transport

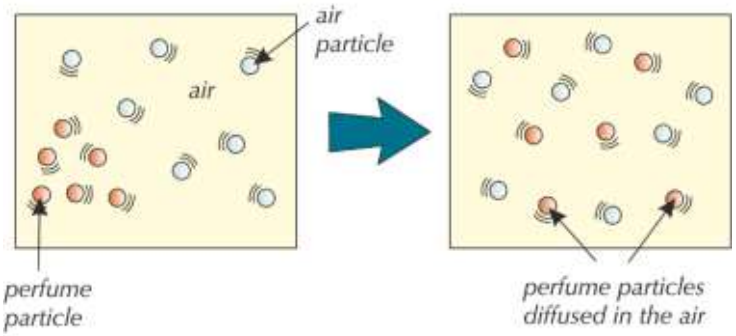
   (A) True

   (B) False

6

2. If a person releases an aerosol of air freshener in the corner of a room, people nearest to it, will smell it first. People on the far side of the room will smell it but it will be much later. Using your knowledge of diffusion (and in particular using the definition) and collision theory, draw and annotate a simple diagram or write a short paragraph explaining why this is.

   * When the aerosol is initially sprayed, the scent comes out of the nozzle in a highly concentrated form [1]. The particles making up the scent are very close together and occupy a small space, so there is a high concentration [1]. We know that the definition of diffusion is the movement of particles from an area of high concentration to an area of low concentration [1] therefore we can state that by diffusion the particles will spread out [1], eventually making it to the far side of the room. The particles diffuse and are also struck by other particles in the air by particulate collisions [1]. The effect of this is to knock the particles around and speed up the diffusion process. [1]



When the aerosol is initially sprayed, the scent comes out of the nozzle in a highly concentrated form. The particles making up the scent are very close together and occupy a small space, so there is a high concentration. We know that the definition of diffusion is the movement of particles from an area of high concentration to an area of low concentration therefore we can state that by diffusion the particles will spread out, eventually making it to the far side of the room. The particles diffuse and are also struck by other particles in the air by particulate collisions. The effect of this is to knock the particles around and speed up the diffusion process.

11

3. (a) Diffusion takes place across cell (b) membranes. Cell membranes (c) hold the cell together but they allow certain (d) dissolved substances to pass across them. Only very (e) small molecules can diffuse through cell membranes, such as (f) oxygen, (g) glucose, (h) amino acids and (i) water. Larger molecules like (j) starch and (k) proteins can't fit through the membrane.

Diffusion	water	dissolved	hold	glucose
membranes	small	starch	oxygen	proteins
amino				

1

4. Which of the molecules shown below can diffuse through the walls of the cell membrane?

A Glucose
B Water
C Protein
D Starch
E Amino acids
F Oxygen

1

5. When cells respire they produce carbon dioxide as a waste product. The carbon dioxide diffuses from the cells into the bloodstream so that it can then be removed from the body. Is carbon dioxide concentration greater in the bloodstream or inside the respiring cells, explain your answer.

* Allocate one mark for the correct choice, e.g. respiring cells, one mark if the definition of diffusion or an understanding of it is shown, and a third mark if the student has identified which environment would be the higher concentration and which would be the lower

The answer would be inside the respiring cells, because the carbon dioxide molecules must be diffusing from an area of higher concentration (which would be inside the respire in cells) to an area of lower concentration (the bloodstream)

2

6. You are in a nightclub, the DJ activates the smoke machine during a dance. The smoke machine is situated at the front of the stage.

1

A. Explain how the smoke reaches the people standing at the far end of the room.

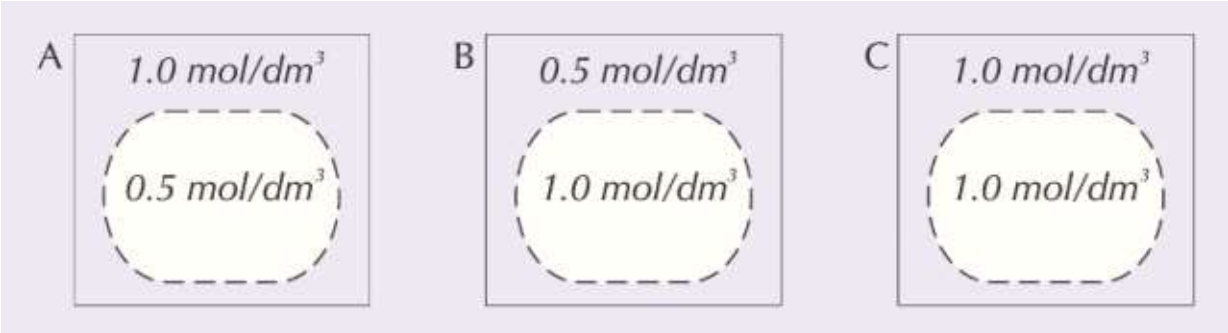
The smoke particles diffuse from where there is a higher concentration (near to the DJ) to where there is a lower concentration (at the far end of the room).

1

B. 5 minutes later the DJ activates smoke machine again. Explain how the rate of diffusion of the smoke is now different from the first time the DJ activated the machine.

The second activation will see a slower diffusion, and the reason for this is because there are already some smoke particles in the air from the first activation. As a result of this the concentration of smoke particles in the air is slightly higher than it was the first time round, so the concentration gradient that this machine has to overcome is slightly lower therefore the rate of diffusion would be slightly slower.

5 7.



The diagrams show 3 cells in different glucose solutions. The concentration of glucose inside and outside the cell is shown in each case.

1 A. Which diagram shows a situation where the net movement of glucose will be out of the cell, would it be A B or C?

The answer is B.

4 B. Explain, in a few lines, your choice for part a above.

Considering the definition of diffusion, the net movement of particles would be from an area of higher concentration to an area of lower concentration. Situation B is the only one where the concentration inside the cell is greater than the concentration outside of the cell and therefore is the only example where there would be a migration from inside the cell to outside.