

PROBLEM 1: THE SKAKOAN

Section A – Multiple Choice Questions (*Circle the correct answer*)

1. What gas do Skakoans breathe?
 - a. Oxygen
 - b. Carbon dioxide
 - c. Methane
 - d. Nitrogen
2. What is the primary component of natural gas?
 - a. Carbon dioxide
 - b. Methane
 - c. Oxygen
 - d. Nitrogen
3. How does the density of methane compare to that of air?
 - a. Methane is denser than air
 - b. Methane is less dense than air
 - c. Methane has the same density as air
 - d. Methane is not a gas
4. What is decompression sickness?
 - a. A disease caused by exposure to methane gas
 - b. A condition caused by rapid changes in pressure, particularly during ascent from depth
 - c. A condition caused by exposure to nitrogen gas
 - d. A type of asthma caused by exposure to environmental irritants
5. What is the role of enzymes in Skakoan breathing?
 - a. They break down methane into simpler molecules that can be utilized by Skakoan cells
 - b. They regulate the concentration of methane in the Skakoan environment
 - c. They protect Skakoans from other harmful gases that may be present on other planets
 - d. They have no role in Skakoan breathing
6. What is the purpose of pressure suits and gear for Skakoans?
 - a. To regulate the concentration of methane in their breathing environment
 - b. To protect them from other harmful gases that may be present on other planets
 - c. To maintain the proper pressure for Skakoan respiration
 - d. All of the above
7. Why is methane toxic to most other species?
 - a. It is a greenhouse gas that contributes to climate change
 - b. It is flammable and explosive
 - c. It does not contain the amount of oxygen needed to sustain human life
 - d. It is not toxic to most other species

8. What implications does the density of methane have for Skakoan breathing?
 - a. Without proper equipment, Skakoans would be unable to breathe and would suffer from decompression sickness
 - b. Methane is heavier than air, which means it can collect in low-lying areas and pose a risk of asphyxiation
 - c. Methane is less dense than air, which means Skakoans require special equipment to maintain the proper pressure for respiration
 - d. Methane has no implications for Skakoan breathing

9. What is the primary function of Skakoan respiration?
 - a. To produce energy for cellular processes
 - b. To regulate the concentration of methane in the Skakoan environment
 - c. To maintain the proper pressure for respiration
 - d. To protect Skakoans from other harmful gases that may be present on other planets

10. What risks are associated with exposure to methane gas in other environments?
 - a. Asphyxiation
 - b. Explosions
 - c. Prolonged exposure can cause health problems
 - d. All of the above

11. What is the significance of the Skakoan respiratory system?
 - a. It demonstrates the adaptability of living organisms in extreme environments
 - b. It suggests that methane-based life forms may exist on other planets
 - c. It highlights the importance of understanding the chemistry of an environment for the survival of living organisms
 - d. All of the above

12. What is the purpose of Skakoan pressure suits?
 - a. To regulate the concentration of methane in the Skakoan environment
 - b. To protect Skakoans from other harmful gases that may be present on other planets
 - c. To maintain the proper pressure for respiration
 - d. All of the above

13. Can other species adapt to breathe methane?
 - a. Yes, but only with extensive genetic modification
 - b. No, methane cannot sustain human respiration
 - c. It is unclear whether other species can adapt to breathe methane
 - d. Only species native to Skako can breathe methane

14. How might the study of Skakoan respiration inform our understanding of the evolution of life on other planets?
 - a. It suggests that methane-based life forms may exist on other planets
 - b. It highlights the importance of understanding the chemistry of an environment for the survival of living organisms
 - c. It demonstrates the adaptability of living organisms in extreme environments
 - d. All of the above

Section B – Structured Questions (*Write answer in space provided*)

1. If all Skakoans breathe methane, and some aliens cannot breathe methane, does it follow that some Skakoans cannot breathe the air on other planets?

2. If methane is lethal to most other species, and Skakoans can breathe methane, does it follow that Skakoans are immune to methane?

3. If Skakoans wear pressure suits to breathe methane, and pressure suits are not required for humans to breathe oxygen, does it follow that humans cannot survive on Skako?

4. If methane is abundant on Skako, and Skakoans can breathe methane, does it follow that Skakoans do not need to breathe oxygen?

5. If Skakoans have evolved to breathe methane, and methane is not commonly found on other planets, does it follow that Skakoans cannot survive on other planets?

6. How does the process of inhaling and exhaling differ between Skakoans and humans?

7. How do the respiratory systems of Skakoans and humans differ?

8. How does the composition of the atmosphere on Skako differ from that of Earth?

9. How do pressure suits allow Skakoans to breathe on other planets with different atmospheric conditions?

10. How do Skakoans adapt to the high concentration of methane in their environment?

11. How does exposure to methane affect human health compared to Skakoans?

12. How does the need to breathe oxygen limit human exploration of other planets compared to Skakoans?

13. How do Skakoans and humans differ in their ability to survive in extreme environments?

14. How does the study of Skakoan respiration inform our understanding of the evolution of life on different planets compared to human respiration?

15. How do Skakoans and humans differ in their respiratory rates?

16. How does the size and shape of Skakoan respiratory organs differ from those of humans?

17. How does the energy production process differ between Skakoans and humans due to differences in respiratory gases?

18. How does the use of pressure suits by Skakoans compare to the use of breathing apparatus by humans in extreme environments?

19. How do Skakoans and humans differ in their ability to tolerate changes in atmospheric conditions

20. How do Skakoans and humans differ in their susceptibility to respiratory diseases?

21. How might the concept of Skakoan breathing be applied to the design of respiratory systems for astronauts on long-term space missions?

22. How might the concept of Skakoan breathing be applied to the development of new technologies to reduce methane emissions from livestock farming?

23. How might the concept of Skakoan breathing be applied to the development of new treatments for respiratory diseases caused by exposure to hazardous gases?

24. How might the concept of Skakoan breathing be applied to the design of new habitats for human settlement on other planets?
