

Surface Tension Quiz Questions and Answers PDF

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What are the consequences of reduced surface tension in biological systems?

- Easier breathing in lungs ✓
- Increased capillary action
- Enhanced nutrient absorption
- Difficulty in forming stable droplets ✓

Reduced surface tension in biological systems can lead to impaired gas exchange in the lungs, decreased stability of cellular membranes, and altered fluid dynamics in tissues, potentially affecting overall physiological function.

What happens to the surface tension of a liquid as the temperature increases?

- It increases
- It remains constant
- It fluctuates randomly
- It decreases ✓

As the temperature of a liquid increases, its surface tension generally decreases. This is due to the increased kinetic energy of the molecules, which reduces the cohesive forces at the surface.

Which of the following factors can affect the surface tension of a liquid?

- Temperature ✓
- Atmospheric pressure
- Type of liquid ✓
- Impurities ✓

Surface tension of a liquid can be affected by factors such as temperature, the presence of surfactants, and impurities in the liquid. These factors can either increase or decrease the cohesive forces between liquid molecules, thereby altering surface tension.

Which of the following best describes the meniscus of water in a glass tube?

- Convex
- Flat
- Irregular
- Concave** ✓

The meniscus of water in a glass tube is concave due to the adhesive forces between the water molecules and the glass, which are stronger than the cohesive forces between the water molecules themselves.

Which of the following statements about surface tension are true?

- It is caused by adhesive forces.
- It allows liquids to form droplets.** ✓
- It is measured in pascals.
- It decreases with an increase in temperature.** ✓

Surface tension is a physical property of liquids that results from the cohesive forces between liquid molecules, leading to a minimized surface area. It is responsible for phenomena such as water droplets forming beads and insects walking on water.

What roles do cohesive and adhesive forces play in capillarity?

- Cohesive forces attract the liquid to the container walls.
- Cohesive forces help the liquid rise in the tube.
- Adhesive forces help the liquid rise in the tube.** ✓
- Adhesive forces attract the liquid to the container walls.** ✓

Cohesiveness allows liquid molecules to stick together, while adhesiveness enables them to adhere to solid surfaces, both of which are essential for capillarity, allowing liquids to rise in narrow spaces against gravity.

What effect do detergents have on the surface tension of water?

- Increase it
- No effect
- Neutralize it
- Decrease it** ✓

Detergents reduce the surface tension of water, allowing it to spread and penetrate surfaces more easily. This property enhances the cleaning ability of detergents by enabling them to interact with oils and dirt more effectively.

Which of the following is NOT a method to measure surface tension?

- Drop weight method
- Capillary rise method
- Thermometer** ✓
- Tensiometer

Surface tension can be measured using various methods such as the drop weight method, capillary rise method, and Wilhelmy plate method. However, methods like measuring temperature or volume are not used to measure surface tension directly.

Which of the following liquids is likely to have the highest surface tension?

- Ethanol
- Water
- Oliven oil
- Mercury** ✓

Liquids with strong intermolecular forces, such as water, typically exhibit higher surface tension compared to those with weaker forces. Therefore, among common liquids, water is likely to have the highest surface tension.

Which phenomenon allows small insects to walk on water?

- Capillarity
- Surface tension** ✓
- Buoyancy
- Viscosity

The phenomenon that allows small insects to walk on water is known as surface tension. This occurs due to the cohesive forces between water molecules, which create a 'skin' on the surface that can support lightweight objects.

Discuss the role of surface tension in the respiratory system, particularly in the alveoli.

Surface tension in the alveoli helps maintain their structure but must be reduced by surfactants to prevent collapse and allow for efficient gas exchange.

Why does mercury form a convex meniscus in a glass tube, unlike water?

Mercury's cohesive forces are stronger than its adhesive forces with glass, causing it to pull inward and form a convex meniscus.

How can surface tension be measured using the capillary rise method? Describe the process briefly.

The capillary rise method involves observing the height a liquid rises in a narrow tube due to surface tension, which is calculated using the height, tube radius, and liquid density.

What is surface tension primarily caused by?

- Adhesives forces
- Cohesives forces ✓
- Cohesives forces ✓

Magnetic forces

Surface tension is primarily caused by the cohesive forces between liquid molecules, which create a 'skin' effect at the surface. This phenomenon occurs due to the attraction between molecules, particularly in liquids like water.

Which unit is commonly used to measure surface tension?

Joules

Pascals

Watts

Newtons per meter ✓

Surface tension is commonly measured in units of force per unit length, typically expressed in dynes per centimeter (dyn/cm) or newtons per meter (N/m). These units reflect the amount of force acting along the surface of a liquid.

Explain how surface tension contributes to the formation of droplets on a leaf.

Surface tension causes the liquid molecules at the surface to be pulled together, forming a spherical shape that minimizes surface area, resulting in droplets.

Describe the relationship between surface tension and the contact angle of a liquid on a solid surface.

The contact angle is determined by the balance between cohesive forces within the liquid and adhesive forces between the liquid and the solid. High surface tension results in a larger contact

angle.

How does the presence of surfactants affect the surface tension of a liquid? Provide an example.

Surfactants reduce surface tension by disrupting the cohesive forces between liquid molecules. An example is soap in water.

In which of the following applications is surface tension a critical factor?

- Inkjet printing ✓
- Painting ✓
- Alveoli function in lungs ✓
- Cooking

Surface tension is a critical factor in applications such as the formation of droplets, the behavior of liquids in capillary tubes, and the ability of small insects to walk on water.

Which of the following liquids typically have lower surface tension than water?

- Oliven oil ✓
- Ethanol ✓
- Glycerin
- Mercury

Liquids such as alcohols (like ethanol) and organic solvents (like hexane) typically have lower surface tension than water due to their molecular structure and intermolecular forces.