BIOLOGY

Which is a trace metal:

1. Na
2. K
3. Ca
4. Zn
5. Cl

Concerning the phenomenon of osmosis:

1. H_2O crosses a semi-permeable membrane from the side with a greater solute concentration to that with lesser concentration.
2. If the two compartments have the same concentration, they are isotonic, and the phenomenon of osmosis will not occur.
3. The solution in the more dilute compartment is hypertonic.
4. The solution in the more concentrated compartment is hypotonic.
5. In plant cells, if the medium in which they are located is hypotonic, H_2O leaves, and the cells and vacuoles contract.

Collagen is a protein of type:

1. Reserve.
2. Active.
3. Structural.
4. Contractile.
5. Transporter.

Regarding nucleic acids:

1. The duplication of DNA into two equal copies is denominated *replication*.
2. The copying of a fragment of DNA into an RNA molecule is denominated *translation*.
3. The synthesis of a protein from RNA is denominated *transcription*.
4. mRNA transports amino acids to tRNA molecules.
5. tRNA reproduces the genetic message of a fragment of DNA.

Daltonism is linked to a gene on chromosome X. What percentage of the descendents of a normal man and a normal woman, but a carrier of the gene for daltonism, will have the illness?

1. 100%
2. 75%
3. 50%
4. 25%
5. 0%

The hypophysis is found in:

1. The cerebellum.
2. The spinal cord.
3. The encephalon.
4. The medulla (oblongata)
5. The peripheral nervous system.

Lysogeny can be defined as:

1. Cytopathic lysis
2. Lysis mediated by complement

3. Integrated latency
4. Partial lysis
5. Total lysis

What is the metabolic activity responsible for obtaining yogurt?

1. Fermentation
2. Aerobic respiration
3. Anaerobic respiration
4. Lithotrophy
5. Photosynthesis

The process of destruction of all forms of life is called:

1. Sterilization
2. Disinfection
3. Germination
4. Antisepsis
5. Autophagia

Which of the following hormones diminishes the concentration of glucose in blood?

1. Insulin
2. Glucagon
3. Estrogens
4. Testosterone
5. Progesterone

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CHEMISTRY

Which is true with regard to atomic magnitudes?

1. The atomic number (Z) indicates the number of electrons of an atom
2. The mass number (A) indicates the total number of protons and electrons of an atom
3. The number of neutrons of an atom is given by A-Z
4. An atomic mass unit (u or Da) is defined as the mass of an atom of carbon-12
5. The mass of an electron is 2000 times greater than that of a proton

Which of the chemical formulae does NOT correspond with the name given?

1. HCl hydrogen chloride
2. Ba_2O barium oxide
3. CaF_2 calcium fluoride
4. Na_2S sodium sulphide
5. Cu_2O copper oxide

What is the number of atoms present in a mol de ^{32}S?

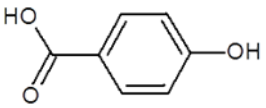
1. 12
2. 12.000
3. 6.023×10^{23}
4. 6.023
5. 14

With respect to an atom with the following parameters: Z=1, N=2, A=3, we can say that:

1. it is an isotope of hydrogen
2. its atomic number is 2

3. its mass number is 2
4. it is helium
5. Both 2 and 4 are true

Identify the functional groups in the following compound:



1. Aldehyde, hydroxyl and aromatic ring
2. Carboxyl, aromatic ring and hydroxyl
3. Amide and aldehyde
4. Ester and alcohol
5. Ketone and alcohol

Calculate the degree of ionization of a weak acid at a concentration of 0.2 M if its K_a is 2×10^{-7}:

1. 0.1%
2. 5%
3. 4×10^{-6}%
4. 0.001%
5. 100%

With regard to the action of a catalyst on a chemical reaction:

1. it does not modify the change in free energy of the reaction
2. it accelerates arrival at the equilibrium point
3. it diminishes the activation energy
4. all the previous answers are true
5. all the previous answers are false

Which of the following belongs to the alkali metal elements of the periodic table?

1. Fe
2. Li
3. Ca
4. C
5. Br

How many grams of glucose are required to prepare 500 ml of 0.2 M aqueous solution ?

1. 360 g
2. 18 g
3. 1.8 g
4. 5.55 g
5. 0.9 g

Lavoisier's Law is also known as:

1. The law of multiple proportions
2. The law of conservation of matter or mass
3. The law of chemical equilibrium
4. The law of ideal gases
5. The law of defined proportions

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PHYSICS

The ratio between the displacement vector between two positions and the interval of time that has passed is given the name:

1. Instantaneous velocity vector
2. Average speed
3. Average velocity vector
4. Average acceleration vector
5. Average position vector

Regarding normal acceleration (a_n) in circular movement, it is true to say that:

1. It is an extrinsic component of acceleration
2. Its value is always greater than zero
3. It will be positive if the magnitude of the velocity increases over time and negative if this decreases.
4. It is independent of the radius of curvature of the trajectory
5. It expresses the variation in magnitude of the velocity

In the phenomenon of wave reflection, it is true that:

1. The direction of incidence of the wave, the direction of departure and the normal to the surface of reflection are in distinct planes.
2. The angle of incidence and that of reflection are related by Snell's law.
3. It is observed when the wave hits an obstacle whose size is of the same order of magnitude as the wavelength.
4. The angle of incidence is equal to the angle of reflection
5. It only happens when the phenomenon of refraction does not occur

If the equation for a harmonic wave is: $y= 0.05 \sin \pi (4t-5x)$ where x and y are in metres and t, in seconds. The value of the wavelength is:

1. 0.4 m
2. 0.5 m
3. 2.5 m
4. 4.5 m
5. 1.5 m

If the effect of a force on a body is to do work that only depends on the initial point and the end point and not the route taken, then:

1. the body's velocity is zero
2. the body's velocity is constant
3. the movement undergone is accelerated
4. the body is subject to the action of a conservative force
5. the body's velocity slows down until it stops

If a body that moves in a gravitational field falls in height but does not dissipate energy, then we can say that in terms of energy:

1. potential increases, kinetic decreases, mechanical increases.

2. potential decreases, kinetic and mechanical increase.
3. potential increases, kinetic and mechanical decrease.
4. potential decreases, kinetic increases and mechanical is constant.
5. potential decreases, kinetic is constant and mechanical increases.

A magnetic force of 1 N acts to change the course of an electron in movement over the course of a half circumference of radius 1m. The work done is:

1. 1 J
2. 3.1416 J
3. 6.2832 J
4. 0J.
5. 2J.

A negative charge in movement penetrates a region of space where there is a magnetic field. The effect produced:

1. depends on the angle between the velocity and the field
2. is that the charge deviates and follows a circular trajectory
3. is that the charge changes in terms of the magnitude of its velocity
4. is nothing, the magnetic fields only act on magnets.
5. is that the charge follows a spiral trajectory.

Newton's third law refers to:

1. The property of bodies that opposes any change in their state of rest or movement
2. The fundamental law of dynamics
3. The conservation of the quantity of movement
4. The principle of action and reaction
5. The impulse produced by a force on a body over the time during which it is applied

The SI unit of electrical capacitance is the:

1. Volt
2. Newton
3. Ampere
4. Farad
5. Joule