CHEMISTRY

Analysis by mass of a certain compound shows that it contains 14 percent hydrogen and 86 percent carbon. Which of the following is the most informative statement that can properly be made about the compound on the basis of these data?

a) It is a hydrocarbon.
b) Its empirical formula is CH2.
c) Its molecular formula is C2H4.
d) Its molar mass is 28 g/mol.

The following compounds are classified as polysaccharides:

a) Cellulose b) Starch c) Lactose d) Glycogen

The maximun number of electrons that can exists in the 4th principal level is:

a) 8 b) 18 c) 32 d) 10

Perchloric acid is:

a) HClO b) HClO2 c) HClO3 d) HClO4

Select the correct statement:

a) an acid is a proton acceptor
b) a base is a proton acceptor
c) an acid is a proton donor
d) a base is a proton donor

Which disaccharide has the incorrect monosaccharide component listed by it:

a) Maltose – mannose and glucose
b) Lactose – galactose and glucose
c) Sucrose – fructose and glucose
d) Cellobiose – two glucoses

Aromatic compounds undergo halogenation by:

a) dehydrogenation b) hydration c) substutition d) oxidation

Co-enzymes:

a) are frequently derivatives of vitamins
b) are indispensable for function of some enzymes
c) are organic molecules
d) are ions of transitive metals

1 mole is

a) the number of particles
b) b) 1 g of nuclide 12C
c) c) defined by Avogadro constant
d) d) a weight unit
e)

Dissolving a compound in water:

a) ions get surrounded with hydration shell
b) molecules of nitrogen do not interact with molecules of water

c) inorganic salts dissociate to anions and cations
d) non-polar compounds cannot be dissolved at all

Physics
108 m2 equals
a) 102 km2 b) 109 dm2 c) 1012 cm2 d) 1013 mm

If p denotes the path, t – time, and g- gravity acceleration then the free fall velocity v is expressed by
a) v = p/t
b) v = gt2
c) v = gt
d) v = gt2 /2

If g- denotes the gravity acceleration and m – the mass then the weight G can be expressed by equation
a)G = mg b) G = m/g c) G = g/m d) G = mg2

The unit of the weight of a body is
a) N b) N.m–2 c) N.m–1 d) N.m

The intensity of an electric field may be expressed in the following units
a) V.m b) V -1 .m c) V.m-1 d) V -1 .m-1

If W denotes the work and Q the charge, then the electric potential φe can be expressed by the relation
a) φe = W/Q2 b) φe = W/Q c) φe = WQ d) φ e = Q/W

Two identical capacitors, each of the capacitance 100 pF are in a series connection. The resulting capacitance is
a) 50 pF b) 200 pF c) 2 pF d) 10 pF

Temperature of the triple point of water equals
a) 273,16 °C b) –273,16 °C c) 273,16 K d) –273,16 K

The unit of surface tension is
a) N.m-1 b) N.m–2 c) N.m2 d) N.m

The latent heat of fusion is expressed in
a) J. kg–1 b)J.mol–1 c)J. kg–1 . K–1 d)J. K–1

BIOLOGY
Phenotype:
a) results from genome-environment interaction
b) of all members of F1 generation is identical (assuming cross AA x aa)
c) of all members of F2 generation is not identical
d) means a set of all genes of an organism

Mother has blood group A, her child 0. Possible fathers´ blood groups are:
a) A b) B c) 0 d) AB

Down syndrome:
a) results from the presence of an extra chromosome 21
b) affected people have usually 47 chromosomes
c) is caused by trisomy of the 21th chromosome
d) its frequency in newborns increases with the age of their mothers

Adenine pairs during the transcription with:
a) cytosine b) thymine c) guanine d) uracil

Plasmids:
a) are small circular molecules of RNA
b) can´t be found in bacteria
c) are replicated independently of the bacterial chromosome
d) could contain genes for resistance to antibiotics

Positive phototropism is observed in:
a) roots b) leaves c) stalks d) flowers

Following classes of antibodies are elevated in allergy:
a) IgM b) IgA c) IgG d) IgE

The lifetime of human red blood cells is approximately:
a) 1 year b) 24 hours c) 3-5 days d) none of the options is correct

Color blindness is:
a) X-linked trait
b) more frequent in females
c) found in males with fathers with color blindness
d) found more frequently in males

Individuals with phenylketonuria (PKU):
a) cannot metabolize phenylalanine
b) have high levels of phenylalanine in their blood serum
c) excrete low amounts of phenylpyruvate
d) cannot metabolize tyrosine