Faculty of Medicine, Masaryk University, Brno
BIOLOGY Admission Exam

KİMYA

1) What is the formula of iron(II) disulfite?
a) Fe(HSO3)2
b) FeS2O5
c) Fe2S2O3
d) FeS2O4
e) no answer is correct

2) Calculate the number of nitrogen atoms in 0.4 mol of urea.
a) 2.40 × 1022
b) 2.81 × 1023
c) 3.10 × 1020
d) 4.81 × 1023
e) no answer is correct

3) Calculate the mass fraction of oxygen in alanine (Mr (alanine) = 89).
a) 0.36 b) 0.18 c) 0.44 d) 0.52 e) no answer is correct

4) Calculate the relative molecular mass of a compound, if 7.46 dm3 of the compound in the gaseous state (t = 0 °C, p = 101.3 kPa) has the mass of 24.73 g.
a) 74.25 b) 6.18 c) 7.46 d) 98.9 e) no answer is correct

5) Select the electron configuration of phosphorus:
a) [He]3s2 3p5 b) [Ne]3s2 3p4 c) [Ar]3s2 3p5 d) [Ne]3s2 3p3 e) no answer is correct

6) Which pair of elements is most likely to form a covalently bonded compound?
a) Mg and Cl b) K and O c) N and O d) Fe and Br e) no answer is correct

7) Which of the following elements is lying in the third period of the periodic table?
a) P b) He c) Li d) O e) no answer is correct

8) Select the most electronegative element among the following:
a) Al b) Br c) S d) C e) N

9) 4.2 g of FeCl3 were obtained by evaporating of 100 mL of FeCl3 solution. What was the molar concentration of the solution? Mr(FeCl3) = 162.

a) 2.6 mol/L

b) 0.26 mol/L

c) 4.2 mol/L

d) 0.026 mol/L

e) no answer is correct

10) 200 g of a 10 % sucrose solution was diluted by addition of 100 g of water. What is the new concentration?

a) 7.1 % b) 5.0 % c) 6.7 % d) 3.6 % e) no answer is correct

11) The molar concentration of a NaOH solution is 14.3 mol.L-1 . Density of the solution is 1.43 g/mL and Mr(NaOH) = 40 g/mol. What is the mass percentage of NaOH in the solution?
a) 12% b) 50% c) 40% d) 19.6 % e) no answer is correct

12) What volume of a calcium chloride solution (c= 0.5 mol.L-1) contains 40 mmol of Clions?

a) 60 mL b) 70 mL c) 80 mL d) 20 mL e) no answer is correct

13) Select a compound whose aqueous solution will have slightly acidic pH.

a) CH3OH b) Na2S c) K2SO3 d) NH4Cl e) no answer is correct

14) 450 mL of a urea solution with a concentration c= 0.8 mol.L-1 was mixed with 900 mL of a urea solution with concentration 0.6 mol.L-1 . What is the new concentration?

a) 0.51 mol.L-1 b) 0.67 mol.L-1 c) 0.49 mol.L-1 d) 0.56 mol.L-1 e) no answer is correct

15) A solution of NaOH (pH = 11.0) was diluted by the same amount of water. What is pH of the new solution?

a) 5.5 b) 11.3 c) 10.7 d) 10.5 e) no answer is correct

16) Calculate pH of a solution containing 10 mg Ca(OH)2 in 200 mL of water. Mr Ca(OH)2 = 74. a) 2.75 b) 13.95 c) 11.11 d) 10.95 e) no answer is correct

17) Which of the following species DOES NOT behave as an acid in aqueous solution according to the Brønsted–Lowry theory: a) H-CH=O b) HF c) HS- d) NH4 + e) no answer is correct

18) Calculate the volume of 0.2 mol.L-1 NaOH needed to neutralize 1.44 g of HCl (Mr(HCl) = 36).

a) 0.5 L b) 200 mL c) 40 mL d) 100 mL e) no answer is correct

19. Magnesium displaces lead ions from a solution of lead(II) sulfate. Which statement about this reaction is true?

a) lead(II) ions are oxidized

b) magnesium atoms are oxidized

c) lead(II) ions lose electrons

d) magnesium atoms gain electrons

e) no answer is correct

20) The content of calcium in human body is approximately:

a) 10 g b) 300 g c) 500 g d) 1000 g e) no answer is correct

21) Select a compound with the molecular formula of C4O3H6.

a) 3-hydroxybutyric acid

b) succinic acid

c) methyl propionate

d) acetic anhydride

e) no answer is correct

23) The compound R-CH2-CO-NH2 is:

a) amine b) amide c) hemiacetal d) amino acid e) no answer is correct

24) Select the correct statement:

a) ketones are easily oxidized to carboxylic acids

b) ketones can be reduced to secondary alcohols

c) aldehydes are oxidized to hemiacetals

d) aldehydes are hydrogenated to ketones

e) no answer is correct

25) The compound R-CH2-CO-NH-CH2-R is formed in a reaction between:

a) alcohol and amine

b) aldehyde and amine

c) carboxylic acid and amine

d) two molecules of amines

e) no answer is correct

26) Select the correct statement:

a) ammonium is more basic than ammonia

b) aniline is more basic than ammonia

c) ethylamine is more basic than ammonia

d) aromatic amines are more basic than aliphatic amines

e) no answer is correct

27) Determine the relation between α-D-glucopyranose and β-D-glucopyranose:

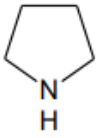
a) conformers b) anomers c) tautomers d) enantiomers e) no answer is correct

28) Select the product of the hydrogenation of fumaric acid:

a) succinic acid b) maleic acid c) malic acid d) malonic acid e) no answer is correct

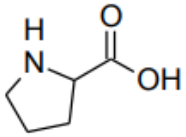
29) Reaction of R-CH=O and R-OH will produce:

a) ether b) ester c) hemiacetal d) anhydride e) no answer is correct



30) Select a name for the heterocycle depicted.
a) imidazole b) pyrrolidine c) purine d) pyrimidine e) no answer is correct

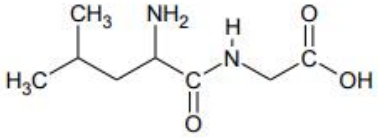
31) Select the correct name of the amino acid depicted:
a) methionine b) lysine c) proline d) tryptophan e) no answer is correct



32) Select the amino acid containing three nitrogen atoms in its structure.

a) arginine b) histidine c) lysine d) tryptophan e) no answer is correct

33) Select the correct name of dipeptide depicted:
a) histidyl-aspartate b) glycyl-valine
c) leucyl-glycine d) valyl-serine e) no answer is correct



34) Which of the following fatty acids cannot be synthesized in human body?
a) palmitic acid b) oleic acid c) stearic acid d) linolenic acid e) no answer is correct
35) How many chiral atoms are in an acyclic structure of 2-deoxy-D-ribose?
a) 2 b) 3 c) 1 d) 5 e) no answer is correct
36) Select the correct combination of an enzyme and its effect:
a) pepsin – cleavage of a glycoside bond
b) lipase – cleavage of an amide bond
c) amylase – cleavage of an ester bond
d) trypsin – cleavage of a peptide bond
e) no answer is correct

37) Select the vitamin needed for blood coagulation:
a) phylloquinone (vitamin K)
b) retinol (vitamin A)
c) tocopherol (vitamin E)
d) niacin (vitamin B3)
e) no answer is correct
38) Select products that will be formed by a cleavage of the ester bond in AMP:

a) adenine, ribose, and phosphate

b) adenosine, phosphate

c) adenosylphosphate, ribose

d) adenine, ribosylphosphate

e) no answer is correct

39) Select the correct statement about dsDNA (double stranded DNA):

a) strands in dsDNA are arranged in a parallel way

b) dsDNA contains the same number of thymine and adenine molecules

c) nucleotides in both strands of dsDNA are held by hydrophobic bonds between bases

d) H-bonds are made between adenine and guanine

e) no answer is correct

40) What metabolic pathway can reduce molecular dioxygen to water?

a) citric acid cycle

b) glycolysis

c) electron transport chain

d) any reaction catalyzed by hydratase

e) no answer is correct