

CHEMISTRY

Instruction: You are offered the test items with one correct answer from four proposed ones.

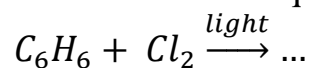
- All of following have covalent bonds EXCEPT
 - CsF
 - H_2S
 - HCl
 - CCl_4
- Alkali metal one of following elements
 - hydrogen
 - sodium
 - calcium
 - selenium
- Specify the salt formed by interaction strong base and strong acid
 - KCl
 - Na_3PO_4
 - ZnS
 - Na_2SO_3
- The strongest electrolyte is
 - PbS
 - $BaSO_4$
 - $Ca(OH)_2$
 - $NaNO_3$
- The most reactive metallic elements are found in
 - the lower right corner of the periodic chart
 - the upper right corner of the periodic chart
 - the upper left corner of the periodic chart
 - the lower left corner of the periodic chart
- For the Haber process: $N_2 + 3H_2 \leftrightarrow 2NH_3 + Q$
Which of following statements concerning the reaction equilibrium is/ are true?
 - The reaction to the right will increase when pressure is increased.
 - The reaction to the right will decrease when the temperature is increased.
 - The reaction to the right will decrease when NH_3 is removed from the chamber.
 - I only
 - II only
 - II and III only
 - I and II only

7. The change in the reduction properties of metals in subgroup IIA (from Be to Ba)
- A) goes a maximum
 - B) increases
 - C) not change
 - D) decreases
8. The precipitate and it's molecular mass formed when carbon dioxide is bubbled into limewater are
- A) MgO , 40
 - B) $CaCO_3$, 100
 - C) $CaCl_2$, 111
 - D) H_2CO_3 , 62
9. Metals which do not react with HNO_3
- A) Au, Pt
 - B) Au, Fe
 - C) Au, Al
 - D) Pt, Fe
10. The oxidation state of sulfur in oleum is
- A) +6
 - B) +5
 - C) -2
 - D) +4
11. The name of alloy contains Cu and Zn is
- A) steel
 - B) brass
 - C) bronze
 - D) melchior
12. The oxidation numbers of iron in compounds FeO , Fe_2O_3 correspondingly are
- A) +3 and +2
 - B) +2 and +5
 - C) +2 and +4
 - D) +2 and +3
13. Name the hydrocarbon $CH_3 - CH(C_2H_5) - C(CH_3)_2 - CH_3$
- A) 2,2,3-trimethylpentane
 - B) 2,2,3,3-tetramethylbutane
 - C) 2-ethyl-3,3-dimethylbutane
 - D) 2,3,3-trimethylpentane

14. Slight oxidation of a primary alcohol gives

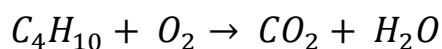
- A) an organic acid
- B) an aldehyde
- C) an ether
- D) a ketone

15. The sum of whole-number coefficients in this equation are



- A) 3
- B) 6
- C) 5
- D) 4

16. What are the simplest whole-number coefficients that balance this equation?



- A) 2,13,8,5
- B) 1,6,1,5
- C) 3,10,16,20
- D) 2,13,8,10

17. $2SO_{2(g)} + O_{2(g)} \leftrightarrow 2SO_{3(g)} + Q$, the equilibrium shifts to the side of products, if

- A) increase activation energy, increase pressure
- B) increase pressure, decrease temperature
- C) decrease concentration, increase temperature
- D) decrease temperature, increase activation energy

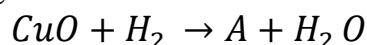
18. Number of isomers of butane is/are

- A) 2
- B) 3
- C) 4
- D) 0

19. The name of a compound of 85.7% carbon and 14.3% hydrogen with a true mass is 56

- A) propane
- B) ethane
- C) pentene
- D) butene

20. Determine the same configuration of the A substances



- A) ... $3s^2 3d^{10} 4s^1$
- B) ... $3s^2 3d^5 4s^2$
- C) ... $3s^2 3d^9 4s^2$
- D) ... $3s^2 3d^{10} 4s^0$

21. When 4.4g of an alkane is burnt completely 6.72L of CO_2 is produced at STP. Molecular formula of this alkane

- A) C_3H_8
- B) C_5H_{12}
- C) C_4H_{10}
- D) C_2H_6

22. A 28 g sample of iron reacts with 200 g of 14.6% HCl solution by mass, in order to produce iron (II) chloride and hydrogen gas. What is the percentage of iron in the sample?

- A) 74%
- B) 80%
- C) 86%
- D) 70%

23. Strontium hydroxide is sparingly soluble in water. Student used 25 mL of this solution, added a few drops of methyl orange indicator, and then titrated it with 0.100 mol/L hydrochloric acid from burette. Student needed to add 32.8 mL of the acid to neutralize of alkali. Concentration of alkali is (mol/L)

- A) $6.56 \cdot 10^{-2}$
- B) $1.64 \cdot 10^{-3}$
- C) $8.2 \cdot 10^{-4}$
- D) $8.2 \cdot 10^{-3}$

24. The name of a compound and it's isomer if of 85.7% carbon and 14.3% hydrogen with a true mass is 70

- A) butene and 2-methylpropene
- B) propane and 2-methylbut-2-ene
- C) ethane and 2-methylbutane
- D) pentene and 2-methylbut-1-ene

25. Determine the mass of benzene that is obtained from the acetylene that takes up a volume of 6.72L at STP. The yield of the reaction is 85%

- A) 9.2g
- B) 8.8g
- C) 3.3g
- D) 6.6g

Instruction: You are offered the test items on the base of text with one correct answer from four proposed ones. Read the text attentively and do the items.

Carboxylic acid

It is a monobasic acid. The chain of its molecule is open. All this is characteristic of acids contained in oils, waxes, animal fats. That's why they are called fat. It can also be called methylacetic (propionic acid). It is an acrid, colorless liquid with a pungent odor, not poisonous, soluble in water.

The combination of this acid with methanol forms methylpropionate, a flavoring agent in the food industry. It can be part of some analgesic, anti-inflammatory drugs (for example, «Ibuprofen»).

26. The molar mass (g/mole) product, interactions of carboxylic acid with slaked lime

- A) 184
- B) 128
- C) 186
- D) 130

27. Acid molecular formula

- A) $C_2H_4O_2$
- B) $C_3H_6O_2$
- C) CH_2O_2
- D) $C_4H_8O_2$

28. Methylpropionate is formed by the interaction acid A with

- A) propanol
- B) methanol
- C) ethanol
- D) butanol

29. The mass of product in the reaction between propionic acid 37 g and 4.6 g ethanol

- A) 12.2
- B) 11.2
- C) 10.2
- D) 14.2

30. The amount of substance C for chain $C_6H_{12}O_6 \xrightarrow{\text{ферменты}} A \xrightarrow{C_3H_6O_2} B \xrightarrow{HOH} C$, if 90g of glucose taken with a product yield 75%

- A) 27.25
- B) 37.25
- C) 37.75
- D) 27.75

Instruction: You are offered test items to matching.

31. Match the flame tests of alkaline earth metals

A)	calcium	orange red
		pale green
		red
		blue
B)	barium	orange red
		pale green
		red
		blue

32. Match the chemical reactions with products of reactions (X, Y)

A)	$Ag + HNO_{3(conc)} \rightarrow AgNO_3 + H_2O + X$	nitrogen dioxide
		nitrogen monoxide
		amonium nitrate
		nitrogen
B)	$Cu + HNO_{3(dil)} \rightarrow Cu(NO_3)_2 + H_2O + Y$	nitrogen dioxide
		nitrogen monoxide
		amonium nitrate
		nitrogen

33. Match the electron configuration of elements with their highest oxides

A)	$3s^2 3p^4$	bromine heptaoxide
		sulfur trioxide
		selenium dioxide
		bromine monooxide
B)	$4s^2 4p^5$	bromine heptaoxide
		sulfur trioxide
		selenium dioxide
		bromine monooxide

34. Match the number of primary carbon atoms of substances X and Y

A)	$2,2 - \text{dimethyl} - 1$ $- \text{chloropropane}$ $\xrightarrow{+Na} X$	6
		8
		4
		10
B)	$2,3 - \text{dimethyl} - 2$ $- \text{chlorobutane} \xrightarrow{+Na} Y$	6
		8
		4
		10

35. Match the catalysts with chemical reaction

A)	$C_2H_4 + H_2 \rightarrow C_2H_6$	nickel
		mercury sulfate
		aluminium chloride
		carbon
B)	$C_2H_2 + H_2O \rightarrow CH_3COH$	nickel
		mercury sulfate
		aluminium chloride
		carbon

Instruction: You are offered the test items with one or more correct answers.

36. Alpha emission is associated with

- A) conversion of a proton to a neutron and proton
- B) decrease in mass number by 2 and atomic number by 1
- C) conversion of a proton to a neutron
- D) conversion of a neutron to a proton
- E) decrease in mass number by 4 and atomic number by 2
- F) emission of β rays, increase in mass number

37. Specify the salts formed by interaction strong base and weak acid

- A) ZnS
- B) Na₂S
- C) Na₃PO₄
- D) NaNO₃
- E) Al₂(SO₄)₄
- F) KCl

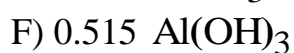
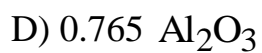
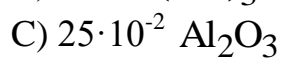
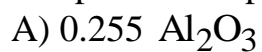
38. The statements that characterize the alkenes

- A) Molecules that contain nitrogen atoms connected to the carbon atom of a carbonyl group
- B) The double bond is shorter in bond length than the single bond
- C) They are weak bases due to the lone pair of electrons on their nitrogen atoms
- D) They contain carbon-carbon double bond
- E) They consist of one strong sigma bond and one weak pi bond
- F) They contain a carbonyl group with a second oxygen atom bonded to the carbon atom in the carbonyl group by a single bond

39. The isomer/isomers of C₄H₁₁N is/ are

- A) methylpropylamine
- B) trimethylamine
- C) dimethylpropylamine
- D) dimethylethylamine
- E) dibutylamine
- F) dimethylamine

40. 25 g 8% solution of aluminum chloride is added to 25 g 8% solution of sodium hydroxide. The precipitate is filtered and burn to. Determine the mass (g) and composition of precipitate



CHEMISTRY TEST IS COMPLETED