

CHEMISTRY

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

1. Find an electronic configuration for element which has 35 protons
 - A) $[\text{Ar}] 4s^2 3d^5$
 - B) $[\text{Ar}] 4s^2 3d^{10} 4p^5$
 - C) $[\text{Ar}] 4s^2 3d^{10} 4p^1$
 - D) $[\text{Ar}] 4s^2 3d^{10} 4p^4$
 - E) $[\text{Ar}] 4s^2 3d^{10} 4p^2$
2. Ionic bond is formed between
 - A) a metal and noble gases
 - B) a nonmetal and noble gases
 - C) a metal and a metal
 - D) a metal and a nonmetal
 - E) a nonmetal and a nonmetal
3. Arrange elements (S, O, Cl, F) in the increasing of electronegativity
 - A) $S < F < O < Cl$
 - B) $S < Cl < O < F$
 - C) $Cl < O < F < S$
 - D) $O < F < S < Cl$
 - E) $F < Cl < O < S$
4. Solution that has neutral medium
 - A) KNO_2
 - B) KCl
 - C) K_2CO_3
 - D) K_2S
 - E) K_2SO_3
5. The alkaline-earth metal with the biggest atomic radius is
 - A) magnesium
 - B) barium
 - C) zinc
 - D) beryllium
 - E) calcium
6. Elements of VA group are called
 - A) arsenic group
 - B) bismuth group
 - C) antimony group
 - D) nitrogen group
 - E) phosphorus group

7. The name of this hydrocarbon is



- A) hexane
 - B) benzene
 - C) aniline
 - D) cyclohexane
 - E) xylene
8. Ethylamine reacts with
- A) $NaOH$
 - B) H_2
 - C) HCl
 - D) CaH_2
 - E) K_2CO_3
9. The mass percentage of aluminum in aluminum hydroxide (%) is
- A) 34.6
 - B) 14.0
 - C) 61.5
 - D) 50.0
 - E) 25.0
10. How many grams of hydrogen is needed to form 90 g water
- A) 20
 - B) 36
 - C) 12
 - D) 10
 - E) 80
11. Ionic compounds are
- A) gas
 - B) ions
 - C) solid
 - D) liquid
 - E) plasma
12. What is(are) true statement(s) for halogen family
- I. The most active nonmetallic element in the Periodic Table is fluorine.
 - II. The normal physical state of halogens goes from a solid to a gaseous state as you go down the family.
 - III. The halogen elements become ions by the outermost **d** orbital.
- A) I only
 - B) I, II and III
 - C) I and II only
 - D) II only
 - E) III only

13. For the given reaction the kinetic equation is
 $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$
- A) Rate = $k[\text{H}_2\text{O}]^2$
 - B) Rate = $k[\text{H}_2]^2$
 - C) Rate = $k[\text{H}_2]^2 \cdot [\text{O}_2]$
 - D) Rate = $k[\text{H}_2] \cdot [\text{O}_2]/[\text{H}_2\text{O}]$
 - E) Rate = $k[\text{H}_2] \cdot [\text{O}_2]$
14. Aniline reacts with
- A) bromine water
 - B) sodium
 - C) methanol
 - D) sodium hydroxide
 - E) hydrochloric acid
15. How many times will the reaction rate increase when the temperature raises from 40°C to 80°C , if the temperature coefficient of the rate is 2.
- A) 2.5
 - B) 16
 - C) 4
 - D) 8
 - E) 10
16. 1.5 mole of an alkane weighs 171 g. Find the molecular formula of this compound
- A) C_8H_{18}
 - B) C_5H_{12}
 - C) C_7H_{16}
 - D) C_6H_{14}
 - E) C_4H_{10}
17. When hydrochloric acid reacts with magnesium metal, hydrogen gas and aqueous magnesium chloride are produced. The volume (in mL) of 5.0 M HCl is required to react completely with 4.8 g of magnesium is
- A) 80.0
 - B) 20.0
 - C) 10.0
 - D) 60.0
 - E) 40.0
18. Calculate the volume (cm^3) of CO_2 that can be obtained from 1.5 g of lime containing 90% CaCO_3 at STP
- A) 300.0
 - B) 30.24
 - C) 29.85
 - D) 302.4
 - E) 298.5

19. Calculate ΔH^{298} of the chemical reaction $Na_2O_{(s)} + H_2O_{(l)} \rightarrow 2NaOH_{(s)}$

Given the standart heats of formation of substances

	ΔH^{298} , kDj/mol
Na_2O_s	-416
H_2O_l	-286
$2NaOH_s$	- 427,8

A) -153.6

B) +153.6

C) -274.2

D) +274.2

E) -298.5

20. 35 mL 20% solution of potassium hydroxide (density=1,20 g/mL) is consumed for neutralization of 7.6 g mixture of formic and acetic acids. Determine the mass and mass percentage of acetic acid in mixture

A) 3 g, 39,5 %

B) 8 g, 44.8 %

C) 5 g, 55.6 %

D) 9 g, 24,2 %

E) 7 g, 15.5 %

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

Natural Gas

Natural gas is a fuel that's used to heat buildings, cook food, dry clothes, heat water, and even to produce electricity. It's sometimes called "gas" for short, but don't confuse it with the gasoline that runs your car. Gasoline is a liquid, while natural gas is a gas!

In fact, natural gas is really a mixture of gases that formed from the fossil remains of ancient plants and animals buried deep in the earth. The main ingredient of natural gas is methane.

Methane is odorless and colorless gas. So, why does natural gas smell? The gas companies add a chemical called mercaptan, which gives natural gas that funny sulfur-like or rotten egg odour.

Natural gas release a lot of heat and light when it burns, but doesn't produce smoke. That makes it a good fuel to use in houses. Today a lot of houses are heated by natural gas.

Natural gas is a popular fuel choice because it burns cleaner, hotter, and brighter than other fossil fuels like coal and oil. It's also safe. Because natural gas pipes are buried safely underground.

21. Generally, natural gas consists of ... gas

- A) acetylene
- B) methanol
- C) hydrogen
- D) methane
- E) ethylene

22. Physical state of gasoline

- A) plasm
- B) solid
- C) liquid
- D) gas
- E) crystal

23. 0.25 mole of an alkane weighs 28.5 g. Find the molecular formula of this compound

- A) C_8H_{18}
- B) C_5H_{12}
- C) C_7H_{16}
- D) C_6H_{14}
- E) C_4H_{10}

24. When 2.2 g of organic substance burned 3.36 L of carbon dioxide and 3.6 g of water were formed. Identify the formula of organic substance, if the relative density by air is 1.517
- A) C_4H_{10}
 - B) C_2H_6
 - C) C_3H_8
 - D) CH_4
 - E) C_5H_{12}
25. 11.2 L of mixture of CH_4 and C_2H_6 gases (at STP) weighs 12.2 g. The mole of each gas in the mixture is
- A) 0.2 mol CH_4 , 0.3 mol C_2H_6
 - B) 0.2 mol CH_4 , 0.1 mol C_2H_6
 - C) 0.1 mol CH_4 , 0.3 mol C_2H_6
 - D) 0.3 mol CH_4 , 0.1 mol C_2H_6
 - E) 0.3 mol CH_4 , 0.2 mol C_2H_6

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

26. The $\text{pH} < 7$ in solution
- A) $\text{Mg}(\text{NO}_3)_2$
 - B) AlCl_3
 - C) NaCl
 - D) AgNO_3
 - E) BaCl_2
 - F) LiNO_3
 - G) KCl
 - H) Na_2SO_4
27. An element of Periodic Table consists of 26 protons, 30 neutrons, 26 electrons. The name of this element and atomic mass are
- A) 82
 - B) 26
 - C) iron
 - D) cobalt
 - E) zinc
 - F) 25
 - G) manganese
 - H) 56
28. The false statement(s) for $^{30}_{15}\text{P}$, $^{31}_{15}\text{P}$ is (are)
- A) have equal numbers of neutrons
 - B) both are isotopes
 - C) have different atomic mass
 - D) have equal numbers of protons
 - E) have different atomic number
 - F) have equal numbers of electrons
 - G) both isobars
 - H) have equal numbers of levels
29. The compound(s) – a(the) member(s) of the ketone homologous series like acetone is(are)
- A) 1-propanol
 - B) 1,2,3-butanetriol
 - C) 1,2-propanediol
 - D) 2-butanol
 - E) butanone
 - F) propanal
 - G) ethanol
 - H) diethylketone

30. The statement(s) is(are) correct for nitrogen

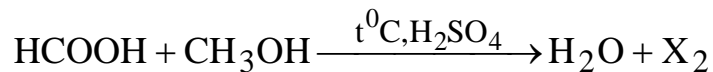
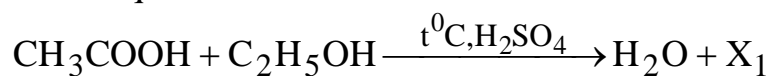
- A) triple bond
- B) covalent non polar bond
- C) solid
- D) gas
- E) liquid
- F) color
- G) covalent polar bond
- H) odour

31. What is (are) true for alkali metals?

- I. They are good conductors of electricity.
- II. They are solid and it is hard to cut with a knife.
- III. They react vigorously with water to give an alkaline solution and hydrogen.

- A) neither
- B) I only
- C) II and III only
- D) I, II, and III
- E) II only
- F) III only
- G) I and III only
- H) I and II only

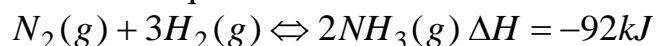
32. Given equations of reactions:



The difference of molecular masses of X_1, X_2 is

- A) 16
- B) 28
- C) 18
- D) 10
- E) 14
- F) 15
- G) 12
- H) 7

33. Given the equation of reaction:



The statement for this reaction is(are) correct

- A) decomposition
 - B) homogeneous
 - C) exothermical
 - D) heterogeneous
 - E) burning
 - F) endothermical
 - G) combination
 - H) replacement
34. The metal(s) is(are)
- A) neon
 - B) sulfur
 - C) sodium
 - D) boron
 - E) barium
 - F) manganese
 - G) oxygen
 - H) chlorine
35. An alcohol with a mass 7.4 grams contains 4.8 g of carbon, 1.0 g of hydrogen and 1.6 g of oxygen. Find molecular formula and number of isomers of the alcohol
- A) C_4H_9OH
 - B) C_3H_7OH
 - C) CH_3OH
 - D) 2
 - E) 3
 - F) 7
 - G) 1
 - H) C_2H_5OH

CHEMISTRY TEST IS COMPLETED