Somali Federal Ministry of Education, Culture & Higher Education

Form Four National Standardized Examinations.

MAY / JUNE 2021

CHEMISTRY EXAMINATION

TIME: 2 HOURS

Instructions: Answer all questions in the ANSWER BOOKLET

Section A (40 Marks, 2 marks each)

Choose the correct answer from the alternatives given in each question

1. Hydrocarbons are compounds that contain.....
   a) Carbon only b) Hydrogen only c) Oxygen d) Carbon and hydrogen

2. The simplest number of alkenes is known as .....
   a) Butane b) Ethane c) Ethene d) Propene

3. Which of the following groups has the most reactive non-metals .....
   a) Alkali metals b) alkaline metals c) halogens d) noble gas

4. The general formula of alkanes is.....
   a) C_nH_{2n+2} b) C_nH_{2n} c) C_nH_{2n+1} d) C_nH_{2n-1}

5. Phosphorous-32 has a half-life of 14.3 days. If a sample contains 8.0 mg of phosphoros-32 how many milligrams of phosphorous-32 remains after 42.9 days?
   a) 4 mg b) 6 mg c) 2.5 mg d) 1 mg

6. .....is the simplest form of cyclo alkanes
   a) Cyclo butane b) cyclo pentane c) cyclo propane d) cyclo hexane

7. According to the general formula of alkenes (C_nH_{2n}), the molecular formula of butane is

   a) C_4H_{10} b) C_4H_8 c) C_4H_{12} d) C_4H_6

8. The hydrophilic part of alcohol is called.....

   a) Alkyl part b) hydroxyl part c) hydrogen part d) carbon part

9. The structural formula of ketones is .....

   a) R-O-R b) R-C(=O)-R c) R-C(=O)-H d) R-C(=O)-O-R

10. If the number of protons and neutrons in a nucleus are 11, 12 respectively, the nuclear symbol would be:

    a) $^{12}_{11}X$ b) $^{11}_{12}X$ c) $^{23}_{11}X$ d) $^{23}_{12}X$

11. The balance nuclear equation for ($^{11}_{6}C$) that produces a protons is.....

    a) $^{11}_{6}C \rightarrow {}^{1}_{1}e + {}^{12}_{7}N$ b) $^{11}_{6}C \rightarrow {}^{0}_{1}e + {}^{11}_{5}B$ c) $^{11}_{6}C \rightarrow {}^{0}_{1}e + {}^{12}_{7}B$ d) $^{11}_{6}C \rightarrow {}^{0}_{1}e + {}^{11}_{7}B$

12. .....is the substance that speed up the rate of reaction.

    a) Reactants b) Products c) Catalyst d) Activation energy

13. Identify the structure of 2-methyl pentane from the below structures.

a) $CH_3-CH_2-CH_2-CH(CH_3)-CH_3$

b- $CH_3-CH(CH_3)-CH_3$

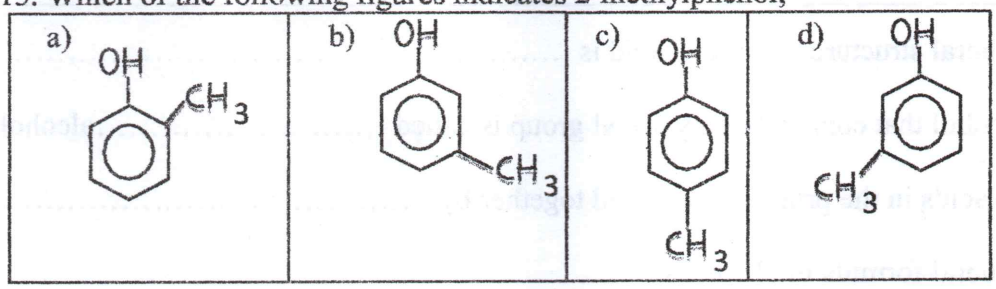
c- $CH_3-CH_2-CH_2-CH_2-CH_3$

d- $CH_3-C(CH_3)_2-CH_3$

14. Which of the following structures is saturated:

a. CH=CH3 b) CH=CH-CH3 c) CH3-CH3 d) CH3-CH2-C≡CH

15. Which of the following figures indicates 2-methylphenol;



16. The functional group that contains both aldehyde and ketone is known as.....

a) Aldehyde group b) ketone group c) carbonyl group d) amino group

17. When one large nucleus splits into two smaller nucleus, this nuclear reaction is known as

a) Fusion reaction b) fission reaction c) ionizing radiation d) alpha decay

18. Example of monosaccharide that contains five carbon (pentose) is.....

a) Erythrose b) ribose c) galactose d) cellulose

19. Which of the following is homogeneous chemical equilibrium

a) $CO_{2(g)} + C_{(s)} \rightleftharpoons 2CO_{(g)}$ b) $CaCO_{3(g)} \rightleftharpoons + CO_2$

c) $P_{4(s)} + 6Cl_{2(g)} \rightleftharpoons 4PCl_3$ d) $N_2 + O_2 \rightleftharpoons 2NO_{(g)}$

20. Le Chatelier's principle states that if one or more factors disturb equilibrium, the position of equilibrium will shift in order to .....the change.

a) Oxidize b) increase c) induce d) reduce

Section B (10 Marks, 1 mark each)

Fill in the empty blank with suitable word from the box below

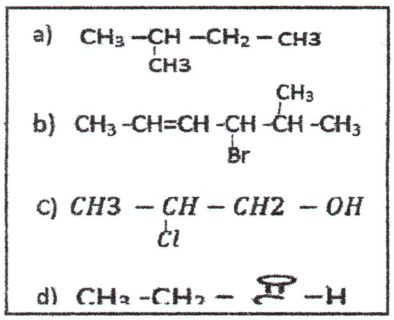
Isomers, Biomolecules, C_nH_{2n-2}, Dihydroxy, Peptide, R-COOH, Fatty, Chemical, Product, Alpha

1. The general structure of organic acid is .....
2. The alcohol that contain two hydroxyl group is called .....alcohol.
3. Amino acids in the proteins are joined together by .....bond
4. The general formula of alkyne is.....
5. The building unit of triglycerides is glycerol and .....acids
6. .....equilibrium is a state in which the rates of the forward and reverse reactions are equal.
7. The chemical constituents of the living system are called .....
8. The radioactive decay which carry positive charge is known as .....particles
9. In equilibrium constant expression, if the value of K_C is greater than one ($K_C > 1$), this reaction is said to be .....favoured.
10. .....are molecules with the same molecular formula but different structural formula.

Section C (50 marks): Answer all questions in the section

1. a) What does IUPAC stands for? (2 mark)

   b) Give IUPAC names to the following organic molecules: 4 marks)



2. Phenols are hydroxyl derivatives of benzene that have aromas smell, state three uses of phenols. (3 Marks)

3. Draw the possible structural formula for isomers of pentane using the following formula $(2^{n-4}+1)$. (3 marks)

4. Define:
   a. The term biochemistry? (2 mark)

   b. Briefly explain the major types of biochemistry. (5 marks)

5. Calculate the equilibrium constant (K_c), if the equilibrium concentrations are as follows:

   PCl_5 (g) ⇋ PCl_3 (g) + Cl_2 (g). $[PCl_5] = 0.0096M$, $[PCl_3] = 0.0247M$, and $[Cl_2] = 0.0247M$. (6 marks)

6. The half-life of polonium-210 is 138.4 days, how many milligrams (mg) of polonium-210 remain after 415.2 day if you start with 2.0 mg of polonium-210? (5 marks)

7. The rate of chemical reaction increases with increase in the presence of catalyst, explain. (5 marks)

8. Distinguish between ionizing and non-ionizing radiation. (5 marks)

9. A radioactive isotope of $^{38}_{19}\mathbf{K}$, emits a radioactive emission and changes into $^{38}_{18}\mathbf{Ar}$. Synthesize the balanced equation of this nuclear reaction (5 marks)

10. Show the electron configuration of fluorine ($_9$F) and chlorine ($_{17}$Cl) (5 marks)

END