Important Instructions:

1) Use a soft (#2) graphite pencil only in filling out the answer sheet. ***Make dark marks*** in the correct circles on your answer sheet.

2) Print your name in the boxes on the upper left of Side 1 and blacken the respective circle under each letter of your name. Fill in your *last name first.*

3) Enter the first letter of the test color in the last box of the name grid and blacken the corresponding circle under the letter. *This is a* ***White*** *test.*

4) You must enter a 10-digit identification code on your answer sheet as follows. If you have a 7-digit NAID number, the left-most digits will be 117 and should be followed by your NAID number. If you have a 6-digit NAID number, the left-most digits will be 1170 and should be followed by your NAID number. If you have an NAID number containing more than 7 digits, simply put enough zeros in front of your NAID number to make it 10 digits long. Now blacken the respective circle under each digit of this identification code.

   NOTE: Your exam score will be posted on the second floor of Ladd Hall according to the last five digits of this identification code.

5) ***Sign your name (do not print) in the upper left hand corner of the answer sheet.***

6) Answer each question by blackening the circle of the letter corresponding to the best or most correct answer to that question. *There is only one correct answer to each question.* If you blacken more than one circle for a question it will be scored as incorrect.

7) There should be 25 answers filled in when you are finished.

8) Turn in your answer sheet and be prepared to show a picture I. D. at the lecture hall door marked with the color of your test.

---

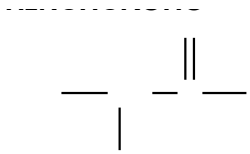
1. What is the molecular geometry around each carbon atom in the structure of ethylene?

   (a) linear (b) trigonal planar (c) trigonal pyramidal (d) tetrahedral

2. A nonpolar covalent bond will form between two _____ atoms of _____ electronegativity.

   (a) different, opposite
   (b) identical, different
   (c) different, different
   (d) similar, different
   (e) identical, equal

3. The following chemical formula is the general structure for:

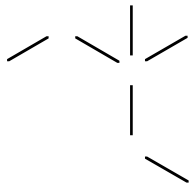


   (a) triglycerides (b) amino acids (c) esters (d) alcohols (e) nucleic acids

4. How many carbon atoms are in the structure for 3-methyl-1-butanol ?

(a) 6 (b) 5 (c) 10 (d) 7 (e) 4

Questions 5 and 6 refer to the hydrocarbon structure below:



5. What class of hydrocarbon does this molecule belong in?

(a) alkenes (b) ketones (c) alkynes (d) alkanes (e) aromatics

6. The correct name for this structure is:

(a) n-hexene
(b) 2-ethyl-2-methylbutane
(c) 3,3-dimethylpentane
(d) 2,2-ethylpropane
(e) benzene

7. An aqueous, neutral solution under equilibrium conditions has:

(a) $[H_3O^+] = [OH^-]$ (b) $[H_3O^+] > [OH^-]$ (c) $[H_3O^+] < [OH^-]$ (d) $[H_3O^+] \neq [OH^-]$

8. A disaccharide is composed of

(a) two individual units of polyhydroxyl aldehydes
(b) two individual units of fatty acids
(c) two individual units of nucleic acids
(d) two individual units of amino acids
(e) carbon and sulfur

9. Amino acids found in proteins contain:

(a) an amino group (b) a carboxyl group (c) a side chain (d) all of the above

In questions 10-14 match the general formula with the functional group name.

Functional Group	↓	General Formula
10. Alcohol		a. R-O-R (or R')
11. Thiol		b. RCOOR (or R')
12. Ether		c. RCOOH
13. Ester		d. R-O-H
14. Carboxylic Acid		e. R-S-H

15. What is the pH of a 0.10 M solution of NaOH? [Remember NaOH (aq) ➔ Na^+ (aq) + OH^- (aq)]

(a) 14 (b) 1 (c) 2 (d) 13 (e) 10

16. Proteins are a complex biomolecule that are composed of:

(a) carbohydrates (b) fats (c) nucleic acids (d) amino acids (e) butene molecules

17. A structural isomer of hexane is:

(a) 2-methylhexane (b) 2,2-dimethylbutane (c) 3-ethylpentane (d) 2,3-dimethylpentane

18. Two terms, atomic number Z and mass number A, represent the number of _____ and number of _____, respectively:

(a) nucleons, protons (b) electrons, nucleons (c) protons, neutrons (d) protons, nucleons

19. What is the molarity of a solution containing 450 grams of glucose ($C_6H_{12}O_6$ molar mass = 180 grams/mole) in 750 mL of water?

(a) 1.2 M (b) 0.60 M (c) 3.3 M (d) 6.6 M

20. A solution is defined as a homogeneous mixture consisting of one or more _____ and a(n) _____, respectively. The latter component is usually in excess.

(a) solutes, ionic salt (b) solvents, solute (c) solutes, solvent (d) molecules, solute

21. A shrewd, but tentative, initial explanation for a set of observations is best described as a:

(a) theory (b) experiment (c) hypothesis (d) scientific law (e) fact

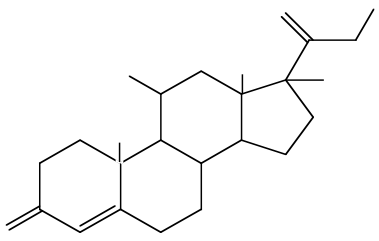
22. The double helix is a structural characteristic of molecules of:

(a) essential amino acids (b) polyethylene (c) fats (d) DNA (e) starch

23. In the modern periodic table, the chemical symbols of the elements are arranged by increasing numbers of

(a) electrons (b) neutrons (c) protons (d) protons and neutrons (e) mass

24. The chemical structure of hydrocortisone, an anti-inflammatory steroid used in medicinal skin creams, is given below. How many functional groups does it contain?



(a) 8 (b) 2 (c) 5 (d) 6 (e) 4

25. What is the coefficient for O_2 when the following equation is balanced using the smallest set of whole integers?

(a) 1 (b) 3 (c) 3.5 (d) 5 (e) 7