

July 29, 2002
Summer 2002

Chemistry 117
Exam 2

Name _____
NAID _____

Multiple Choice Questions

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 exam.**

4) You must enter a 10-digit identification code on your answer sheet as follows. The **left most digits** will be **117**, followed by the **7-digits of your NDSU NAID** number (the numbers before and after the dash). Next, blacken the respective circle under each digit of this identification code.

- 5) **Sign your name (do not print)** in the upper left hand corner of the answer sheet and the exam.
- 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 on the opscan when you are finished.
- 8) Be prepared to **show a picture I. D.** when you turn in your opscan sheet.

1. Which of the following responses correctly states two health-related effects that can result from the depletion of the ozone layer by chlorofluorocarbons?

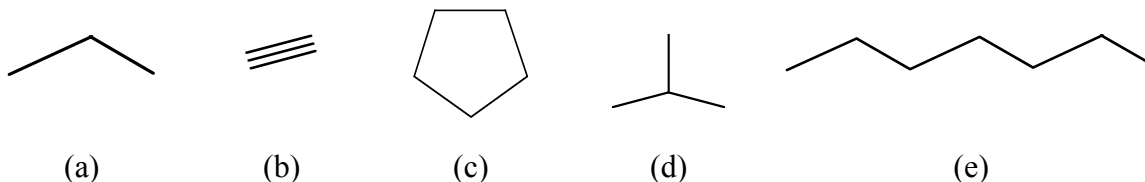
1. asthma 2. lung cancer 3. skin cancer 4. eye cataracts 5. emphysema

(a) 1 & 5 (b) 2 & 3 (c) 3 & 4 (d) 3 & 5 (e) 4 & 5

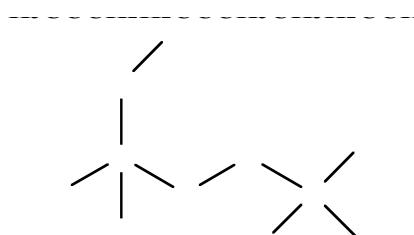
2. One of the scientists credited with the concept that acid-base behavior is based upon proton transfers was:

(a) Bronsted (b) Sorensen (c) Arrhenius (d) Wohler (e) Lewis

Questions 3-11 refer to the five molecules whose skeletal structures are shown below. Some answers may be used more than once



3. cyclopentane _____
4. alkyne _____
5. cycloaliphatic hydrocarbon _____
6. heptane _____
7. isobutane _____
8. C_5H_{10} _____
9. acetylene _____
10. propane _____
11. branched chain hydrocarbon _____
12. What is the correct IUPAC name for the structural formula of the following compound?

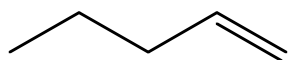


- (a) 2,5,5-trimethylheptane
 - (b) 2-ethyl-2,5-dimethylhexane
 - (c) 3,3,6-trimethylheptane
 - (d) 2,5-dimethyl-5-ethylhexane
 - (e) 3,3-dimethyl-5-isopropylpentane
13. The bicarbonate polyatomic, HCO_3^- , has the capacity to either accept or donate a proton (H^+) in an acid-base equilibrium reaction. The term that describes this ability is:

(a) autoionization
(b) amphoteric
(c) conjugation
(d) alkalosis
(e) tetrahedral
 14. The number of C atoms in the chemical formula of 5,6-dimethyl-2-heptene is:

(a) 5
(b) 7
(c) 9
(d) 11
(e) 8

15. All of the following are structural isomers of 1-pentene, C_5H_{10} , except:

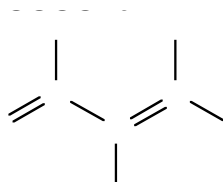


- (a) 2-pentene
- (b) 2-methyl-2-butene
- (c) cyclopentane
- (d) 3-methyl-1-butene
- (e) 1-methyl-cyclobutene

16. One type of buffered solution that resists changes in added acid or base is

- (a) $HC_2H_3O_2$, $NaC_2H_3O_2$ (b) $HClO_4$, NH_3 (c) HCl , $NaOH$ (d) H_2SO_4 , $NaOH$

17. Given the following Lewis structure,



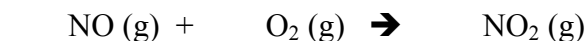
How many carbons have tetrahedral molecular geometry around them?

- (a) 0 (b) 1 (c) 2 (d) 4 (e) 5

18. What mass of a 25% glucose ($C_6H_{12}O_6$) solution contains 50.0 grams of glucose?

- (a) 25.0 g (b) 50.0 g (c) 100.0 g (d) 150.0 g (e) 200.0 g

19. How many moles of oxygen gas (O_2) must react with 1.00 moles of nitrogen monoxide gas (NO) given the following unbalanced chemical reaction?



- (a) 0.250 (b) 0.500 (c) 1.00 (d) 2.00 (e) 2.50

20. In the determination of a molecule's geometry, the VSEPR (valence-shell electron pair repulsion) model dictates that a central atom with 2 bonding and 2 nonbonding electron pairs around it will have a _____ molecular geometry.

- (a) angular or bent (b) trigonal planar (c) linear (d) tetrahedral

21. Which of the following hydrocarbon classes is termed “*saturated*” ?

- (a) alkanes (b) alkenes (c) alkynes (d) aromatics

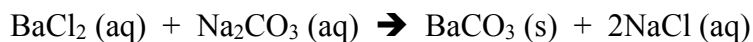
22. The expression $[\text{H}_3\text{O}^+][\text{OH}^-]$

- (a) is the equilibrium constant of water, K_w
(b) has a value of 1.0×10^{-14}
(c) is called the ion product constant of water
(d) all of the responses are correct

23. Which of the following is a general formula for an alkyne?

- (a) $\text{C}_n\text{H}_{2n-2}$ (b) $\text{C}_n\text{H}_{2n+2}$ (c) C_nH_{2n} (d) $\text{C}_n\text{H}_{2n-4}$

24. Which of the statements below correctly identifies why the following balanced chemical reaction proceeds to the right?



- (a) The formation of the soluble salt, NaCl, drives the reaction to the right.
(b) The formation of the insoluble salt, BaCO_3 , drives the reaction to the right.
(c) The reaction should not be proceeding to the right, it is written incorrect.
(d) No reaction occurs, all chemical species are soluble.

25. Which of the following alkane hydrocarbons has the highest boiling temperature?

- (a) pentane (b) methane (c) propane (d) butane (e) ethane