

## Orgo 1-Test 1

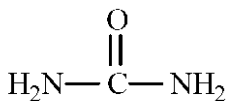
### Short Answer

1. Give the ground-state electron configuration for carbon (atomic number 6).
2. How many electrons does silicon have in its valence shell?

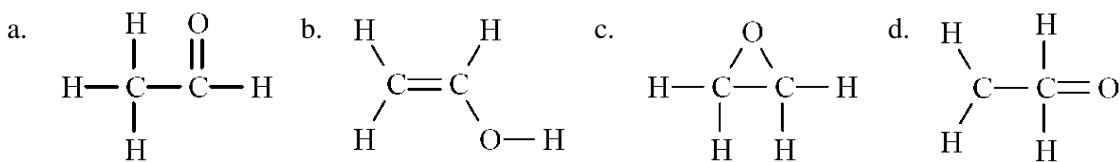
Write valid Lewis (electron-dot) structure for the formula below. Show all electrons as dots and show all non-bonding electrons.

3. CO<sub>2</sub> carbon dioxide

Consider the structure of urea, shown below, to answer the following question(s).

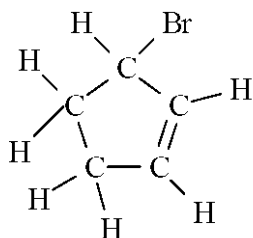


4. Fill in any non-bonding valence electrons that are missing from the line-bond structure.
5. The carbon atom in urea is:
  - a.  $sp^3$  hybridized
  - b.  $sp^2$  hybridized
  - c.  $sp$  hybridized
  - d. not hybridized
6. The predicted  $\text{NH}_2-\text{C}=\text{O}$  bond angle in urea is:
  - a.  $109.5^\circ$
  - b.  $120^\circ$
  - c.  $180^\circ$
  - d. not predictable
7. The molecular formula  $\text{C}_2\text{H}_4\text{O}$  can be converted into three-line bond (Kekulé) structures that are consistent with valence rules.



- a. Which one of the Kekulé structures is **not** consistent with valence rules?
- b. Explain why the structure you chose in part **a** is not consistent with valence rules.

8. Convert the following structure to a skeletal drawing and give its molecular formula.

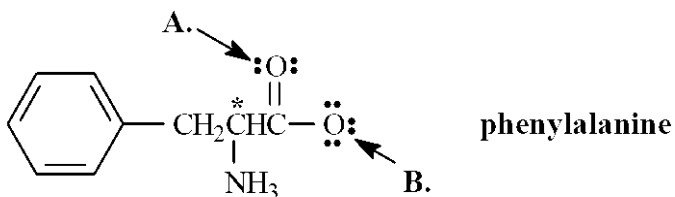


**3-bromo-1-cyclopentene**

Give the letter of the term that best matches the given definition.

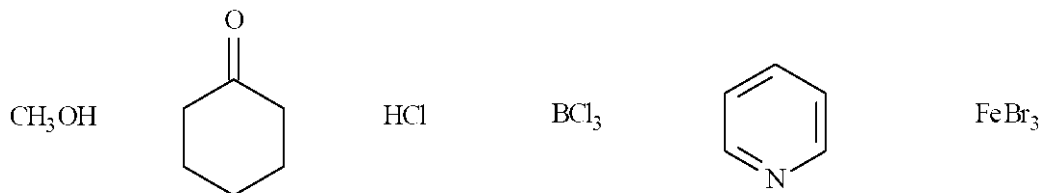
- |                        |                        |
|------------------------|------------------------|
| a. Brønsted-Lowry Acid | f. Ionic Bond          |
| b. Brønsted-Lowry Base | g. Covalent Bond       |
| c. Lewis Acid          | h. Polar-Covalent Bond |
| d. Lewis Base          | i. Hydrophobic         |
| e. Electronegativity   | j. Hydrophilic         |
9. \_\_\_\_\_ Any species that can accept electrons.
10. \_\_\_\_\_ A bond between two atoms differing in electronegativity by 0.5 – 2.
11. \_\_\_\_\_ A term used to describe a "water loving" species.
12. \_\_\_\_\_ A compound that can donate a proton.
13. \_\_\_\_\_ The ability of an atom to attract the shared electrons in a covalent bond.
14. \_\_\_\_\_ A term used to describe a "water fearing" species.
15. \_\_\_\_\_ Any species that can donate electrons.
16. \_\_\_\_\_ A bond between two atoms differing in electronegativity by < 0.5.
17. \_\_\_\_\_ A compound that can accept a proton.
18. \_\_\_\_\_ A bond between two atoms differing in electronegativity by > 2.

Phenylalanine is an amino acid that is essential to human nutrition. The representation below shows the structure of phenylalanine at physiological pH. Consider this structure to answer the following question(s).

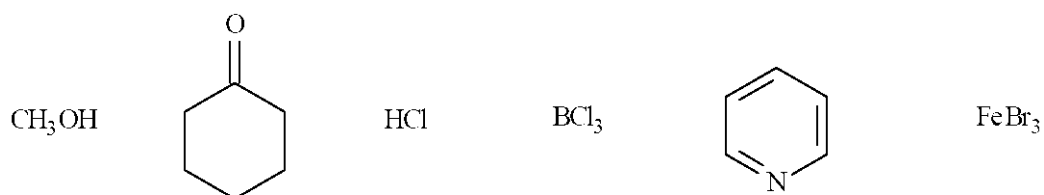


19. Assign any formal charges to atoms in this representation of phenylalanine.

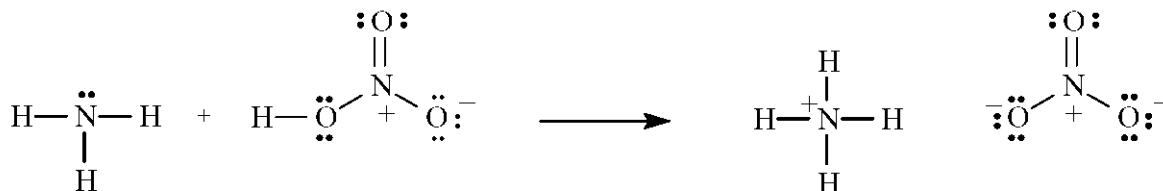
20. The oxygen atom labeled **A**. has \_\_\_\_\_ non-bonding electrons.
21. The oxygen atom labeled **B**. has \_\_\_\_\_ bonding electrons.
22. Circle all the Lewis bases in the group of compounds below.



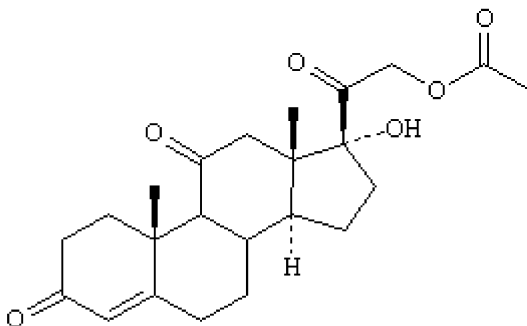
23. Put a box around all the Lewis acids in the group of compounds below.



Consider the reaction below to answer the following question(s).



24. Using the curved arrow formalism, show the flow of electrons for this reaction.
25. Label the acid and the base in the reaction.
26. Circle and name each functional group in the following structure.

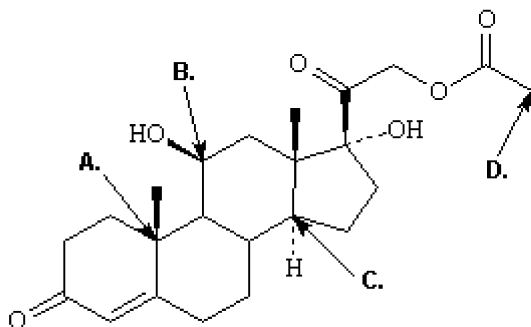


**cortisone acetate** (active ingredient in steroid skin cream)

Name: \_\_\_\_\_

ID: A

Label the indicated atoms in the structure below as 1°, 2°, 3°, or 4°.



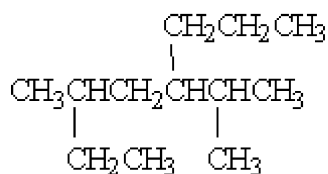
27. The atom at **A** is \_\_\_\_\_.
28. The atom at **B** is \_\_\_\_\_.
29. The atom at **C** is \_\_\_\_\_.
30. The atom at **D** is \_\_\_\_\_.

Provide proper IUPAC names.

31. Name:



32. Name:



Draw structures corresponding to each of the given names.

33. Draw: 4-isopropyl-6-ethyldecane
34. Draw: 4-(2,2-dibromoethyl)-3,5-dichloroheptane

## Orgo 1-Test 1 Answer Section

### SHORT ANSWER

1. ANS:  
 $1s^2 2s^2 2p_x^1 2p_y^1$  or  $1s^2 2s^2 2p^2$

PTS: 1

2. ANS:  
 four

PTS: 1

3. ANS:  
 $\text{:}\ddot{\text{O}}\text{:}\text{:}\ddot{\text{C}}\text{:}\text{:}\ddot{\text{O}}\text{:}$

PTS: 1

4. ANS:  
 $\begin{array}{c} \text{:}\ddot{\text{O}}\text{:} \\ \parallel \\ \text{H}_2\ddot{\text{N}}-\text{C}-\ddot{\text{N}}\text{H}_2 \end{array}$

PTS: 1

5. ANS:  
 b

PTS: 1

6. ANS:  
 b

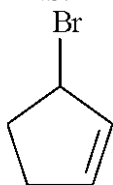
PTS: 1

7. ANS:

- a. d  
 b. The carbon bonded to the oxygen atom in structure d is pentavalent; it has 10 valence electrons. Carbon can only have eight valence electrons. In addition, the other carbon has only six valence electrons when it would prefer to have eight.

PTS: 1

8. ANS:

Molecular formula: C<sub>5</sub>H<sub>7</sub>Br

PTS: 1

9. ANS:

c

PTS: 1

10. ANS:

h

PTS: 1

11. ANS:

j

PTS: 1

12. ANS:

a

PTS: 1

13. ANS:

e

PTS: 1

14. ANS:

i

PTS: 1

15. ANS:

d

PTS: 1

16. ANS:

g

PTS: 1

17. ANS:

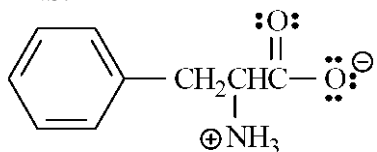
b

PTS: 1

18. ANS:  
f

PTS: 1

19. ANS:



PTS: 1

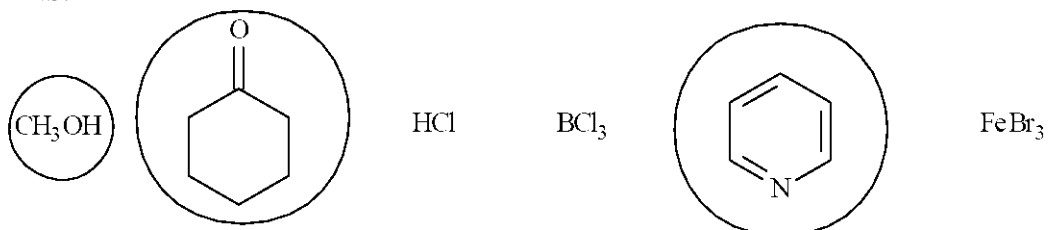
20. ANS:  
four

PTS: 1

21. ANS:  
two

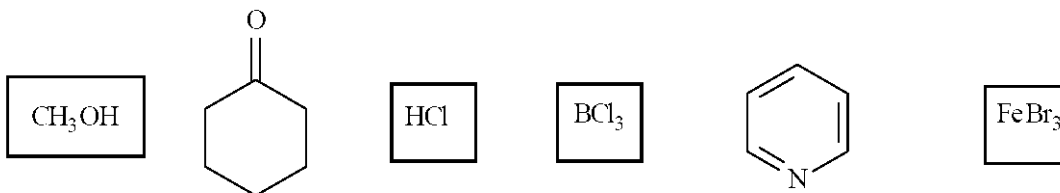
PTS: 1

22. ANS:



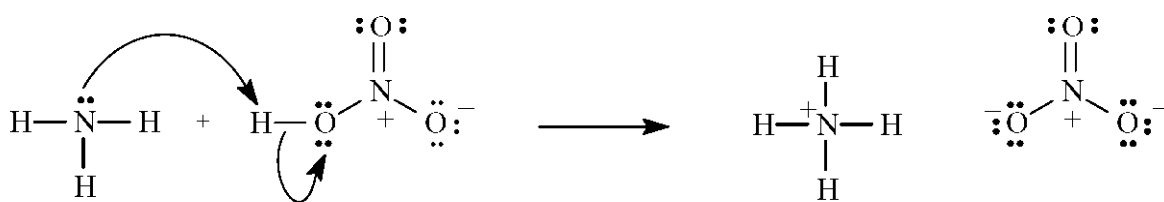
PTS: 1

23. ANS:



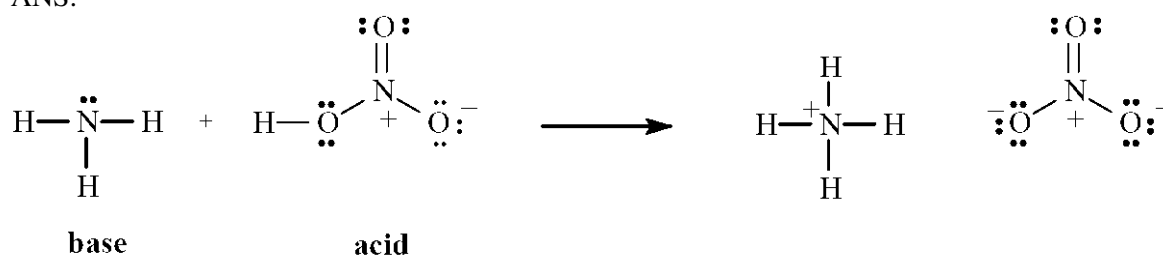
PTS: 1

24. ANS:



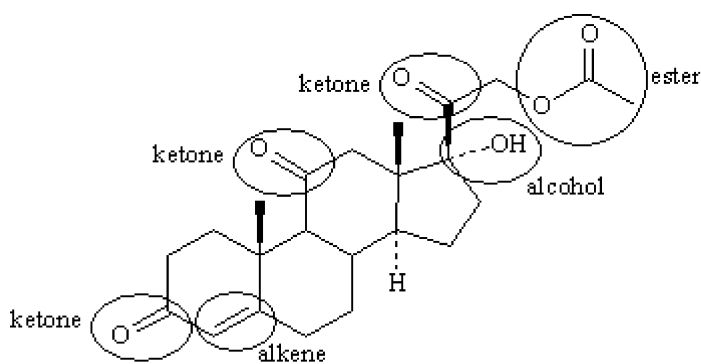
PTS: 1

25. ANS:



PTS: 1

26. ANS:



PTS: 1

27. ANS:

4°

PTS: 1

28. ANS:

2°

PTS: 1

29. ANS:

3°

PTS: 1

30. ANS:

1°

PTS: 1

31. ANS:

4-ethyl-2,2,7-trimethyloctane

PTS: 1

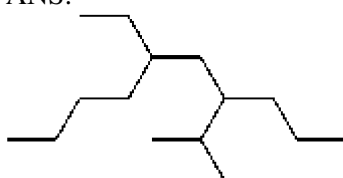
32. ANS:

5-isopropyl-3-methyloctane

PTS: 1

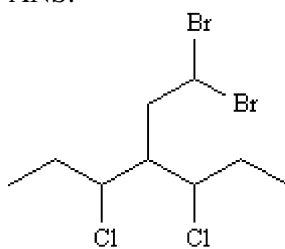


33. ANS:



PTS: 1

34. ANS:



PTS: 1