

Covalent Bonding: Multiple-Choice Review #1

1. The central atom in _____ does not violate the octet rule.

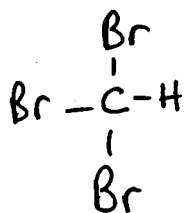
- (a) KrF₂
- (b) CF₄
- (c) XeF₄
- (d) ICl₄¹⁻
- (e) SF₄

B

2. Given the average bond energies for C – H and C – Br bonds are 413 kJ/mole and 276 kJ/mole, respectively, the energy needed to break all bonds of CHBr₃ is _____ kJ/mole.

- (a) -1378
- (b) 689
- (c) 1378
- (d) 1241
- (e) -689

D



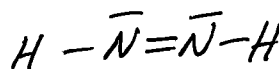
$$413 + 3(276) = 1241 \text{ kJ}$$

3. The Lewis structure of N₂H₂ shows _____.

- (a) each nitrogen has two nonbonding electron pairs
- (b) a nitrogen – nitrogen triple bond
- (c) each hydrogen has one nonbonding electron pair
- (d) a nitrogen – nitrogen single bond
- (e) each nitrogen has one nonbonding electron pair

$$5 + 5 + 1 + 1 = 12e^-$$

6 dashes



E

4. The ion NO¹⁻ contains a total of _____ valence electrons.

- (a) 14
- (b) 12
- (c) 10
- (d) 16
- (e) 15

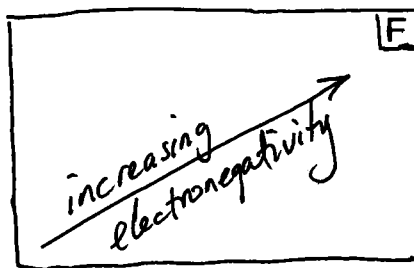
$$5 + 6 + 1 = 12 \text{ electrons}$$

B

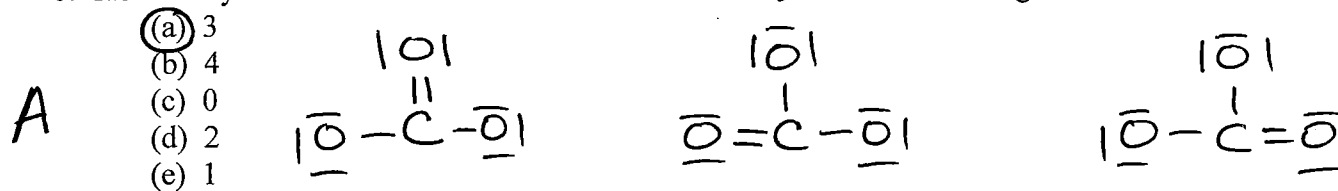
5. Electronegativity _____ from left to right within a period and _____ from top to bottom within a group.

- (a) stays the same, increases
- (b) increases, stays the same
- (c) increases, increases
- (d) decreases, increases
- (e) increases, decreases

E



6. How many resonance structures can be drawn for CO_3^{2-} without violating the octet rule?



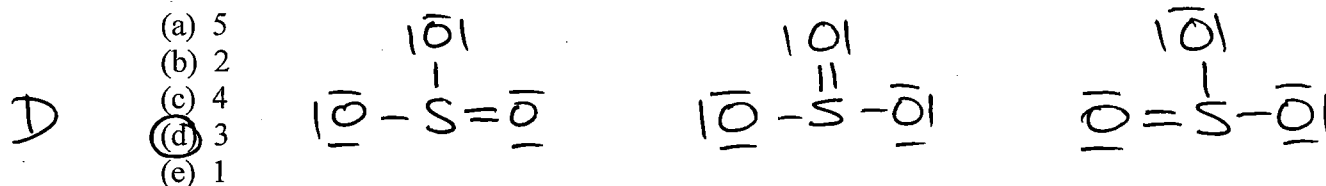
7. Of the possible bonds between two carbon atoms (single, double, and triple)

- A
- (a) a double bond is longer than a triple bond
(b) a triple bond is longer than a single bond
(c) a single bond is stronger than a double bond
(d) a double bond is stronger than a triple bond
(e) a single bond is stronger than a triple bond

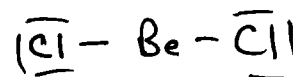
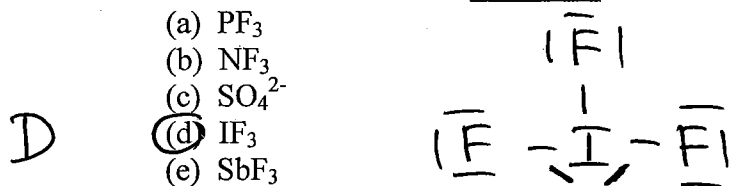
8. Resonance structures differ by _____.

- B
- (a) number and placement of electrons
(b) placement of electrons only
(c) number of atoms only
(d) number of electrons only
(e) placement of atoms only

9. How many different resonance structures can be drawn for the molecule SO_3 without having to violate the octet rule on the sulfur atom?

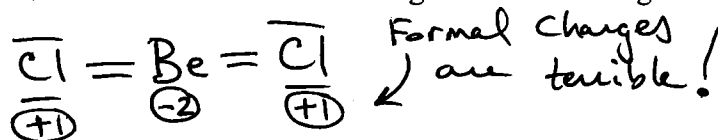


10. A valid Lewis structure of _____ cannot be drawn without violating the octet rule.

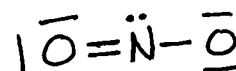
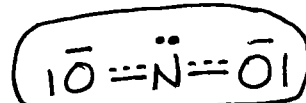
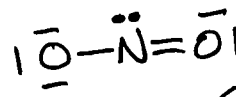
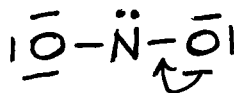


11. Why don't we draw double bonds between the Be atom and the Cl atoms in BeCl_2 ?

- E
- (a) That would result in the formal charges not adding up to zero.
(b) There aren't enough electrons.
(c) That would result in more than eight electrons around the beryllium atom.
(d) That would result in more than eight electrons around each chlorine atom.
(e) That would give positive formal charges to the chlorine atoms and a negative formal charge to the beryllium atom.



$$5 + 12 + 1 = 18 \text{ electrons}$$



Reality

12. In the nitrite ion (NO_2^{-}), _____.

- (a) both bonds are single bonds
 (b) both bonds are double bonds
 (c) one bond is a double bond and the other is a single bond
 (d) there are 20 valence electrons
 (e) both bonds are the same, each being stronger and shorter than a single bond but longer and weaker than a double bond.

E

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

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

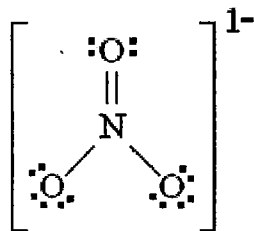
D

14. Of the bonds $\text{C}-\text{N}$, $\text{C}=\text{N}$, and $\text{C}\equiv\text{N}$, the $\text{C}-\text{N}$ bond is _____.

- (a) strongest & longest
 (b) strongest & shortest
 (c) intermediate in both strength and length
 (d) weakest & longest
 (e) weakest & shortest

D

15. The formal charge on the nitrogen in the nitrate ion (NO_3^{-}) is +1.



$$5 - 4 = +1$$

- (a) -2
 (b) +1
 (c) 0
 (d) +2
 (e) -1

B

16. For resonance forms of a molecule or ion,

- (a) the observed structure is an average of the resonance forms
 (b) there cannot be more than two resonance structures for a given species *No*
 (c) all resonance structures are observed in various proportions
 (d) one resonance structure always corresponds to the observed structure *No*
 (e) the same atoms need not be bonded to each other in all resonance forms *No*

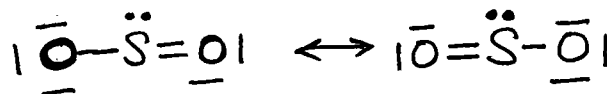
A

$$6 + 12 = 18$$

17. How many equivalent resonance structures can be drawn for SO_2 without expanding the octet on the sulfur atom (sulfur is the central atom)?

- (a) 4
 (b) 1
 (c) 0
 (d) 3
 (e) 2

E



Consider the following species when answering the questions that follow:

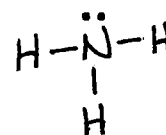
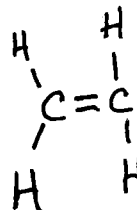
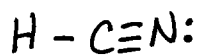
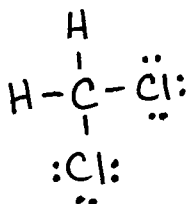
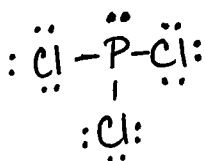
I. PCl_3

II. CH_2Cl_2

III. HCN

IV. C_2H_4

V. NH_3



18. Which Lewis structure has the largest total number of lone (nonbonding) pairs of electrons?

- (a) I
 (b) II
 (c) III
 (d) IV
 (e) V

A

19. The Lewis structures of _____ must have multiple (double and/or triple) bonds in order to satisfy the octet rule on all atoms other than hydrogen.

- (a) I and V
 (b) III
 (c) III and IV
 (d) II and V
 (e) IV

C

20. In the Lewis structures of _____, the central atom has one lone (nonbonding) pair of electrons.

- (a) I only
 (b) I and III
 (c) I and V
 (d) II and IV
 (e) IV only

C

21. In which Lewis structure does the central atom have a non-zero formal charge?

- (a) I
 (b) II
 (c) III
 (d) V
 (e) None

E

22. Given the following electronegativity values, which covalent single bond is most polar?

Element	H	C	N	O
Electronegativity	2.1	2.5	3.0	3.5

Largest
difference
in
electronegativity

E

- (a) C-H
- (b) O-N
- (c) O-C
- (d) N-H
- (e) O-H

23. Which of the following would be expected to conduct electricity?

B

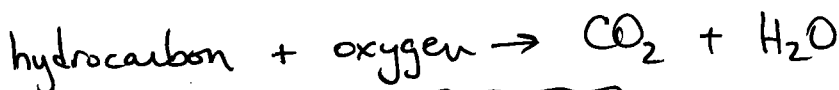
- (a) solid LiCl
- (b) molten LiCl
- (c) aqueous sugar
- (d) solid sugar
- (e) distilled water

covalent bonding notes #1

24. What are the products of a complete combustion reaction?

E

- (a) CO and H₂O
- (b) C and H
- (c) O₃ and H₂
- (d) CO₃²⁻ and H¹⁺
- (e) CO₂ and H₂O



general knowledge

25. Which types of compounds have high melting points?

A

- (a) ionic compounds
- (b) covalent compounds
- (c) diatomic elements
- (d) gases
- (e) isotopes

covalent bonding Notes #1