

9 • Bonding & Molecular Structure

PRACTICE TEST

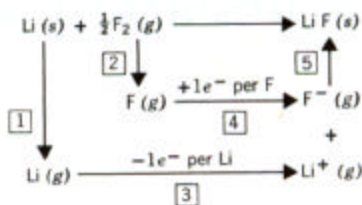
1. The correct Lewis symbol for ground state carbon is

- a) $\cdot\ddot{\text{C}}\cdot$ b) $:\text{C}:$ c) $:\ddot{\text{C}}:$ d) $\cdot\ddot{\text{C}}\cdot$ e) $:\ddot{\text{C}}\cdot$

2. The correct Lewis symbol for ground state aluminum is

- a) $\cdot\ddot{\text{Al}}\cdot$ b) $:\ddot{\text{Al}}\cdot$ c) $:\text{Al}$ d) $:\ddot{\text{Al}}\cdot$ e) $\ddot{\text{Al}}$

3. Using the picture below, what process corresponds to the lattice energy?



- a) 1 b) 2 c) 3 d) 4 e) 5

4. Which of the following favors formation of an ionic compound?

- a) low ionization energy for metal
 b) high electron affinity for non metal
 c) high lattice energy
 d) all of a-c above
 e) none of a-c above

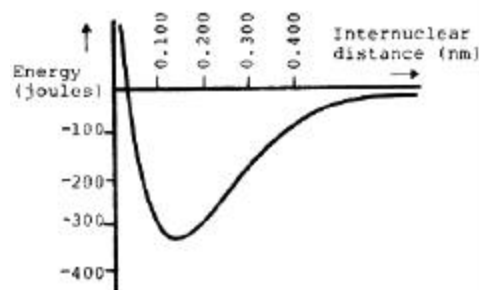
5. Which of the atoms below is least likely to violate the octet rule?

- a) Be b) P c) S d) B e) F

6. How many electrons are shown in the Lewis structure of perchlorate ion, ClO_4^- ?

- a) 30 b) 31 c) 32 d) 50 e) 51

Questions 7 - 9 refer to the following energy diagram:



7. What is the energy of the two isolated atoms?

- a) -400 J d) 0.100 nm
 b) -335 J e) -155 J
 c) 0 J

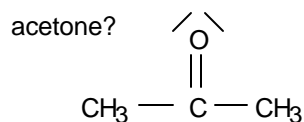
8. What is the bond length of the bond between the two atoms?

- a) 0.020 nm d) 0.330 nm
 b) 0.140 nm e) 2.00 nm
 c) 0.400 nm

9. What is the bond energy (bond strength) of the bond?

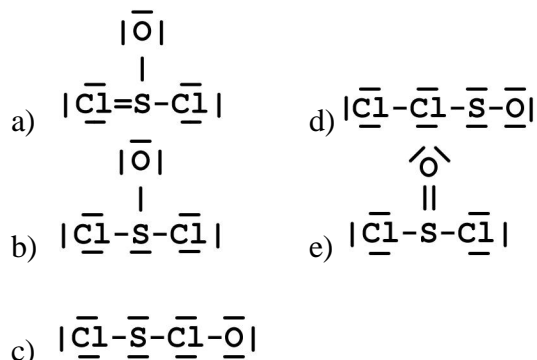
- a) 0 J d) -330 J
 b) -110 J e) -422 J
 c) -10 J

10. What is the bond order of the C-O bond in



- a) 4 b) 1.5 c) 0.5 d) 1 e) 2

11. Which of the following is the correct Lewis structure for SOCl_2 ? (Consider formal charge)



12. As the bond order of a carbon-carbon bond increases, which one of the following decreases?

- # of electrons between the carbon atoms
- vibrational frequency of bond vibrations
- bond energy (bond strength)
- bond length

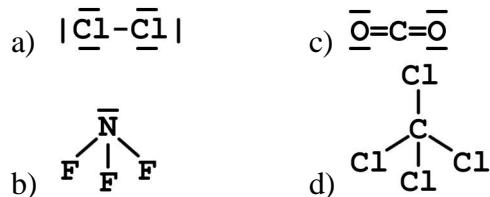
13. In which of the following is the actual compound a resonance hybrid of Lewis structures?

- NO_2
- H_2O
- O_3
- CCl_4
- none of these

14. Which of the following bonds is most polar?

- $\text{N}-\text{Cl}$
- $\text{C}-\text{N}$
- $\text{S}-\text{S}$
- $\text{Br}-\text{Br}$
- $\text{S}-\text{O}$

15. Which one of the following molecules is a polar molecule?



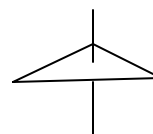
16. Which of the following molecular shapes has six atoms joined to a central atom?

- linear
- tetrahedral
- octahedral
- trigonal bipyramid
- planar triangular

17. Which molecular shape has bond angles which are not all the same?

- linear
- tetrahedral
- octahedral
- planar triangular
- trigonal bipyramid

18. What molecular shape is pictured below?



- linear
- tetrahedral
- octahedral
- planar triangular
- trigonal bipyramid

19. The molecule BrF_3 has how many lone pairs of electrons on the central atom?

- 0
- 1
- 2
- 3

20. What is the geometrical arrangement of electron pairs in H_2O ?

- linear
- bent
- octahedral
- trigonal bipyramidal
- tetrahedral

21. What is the shape of BrI_3 ?

- square planar
- T-shaped
- distorted tetrahedral
- pyramidal
- bent

22. What is the shape of the IF_4^- ion?
- a) square planar d) octahedral
 b) tetrahedral e) T-shaped
 c) square pyramidal
23. Which of the following is a polar species?
- a) CO_2
 b) PCl_5
 c) ICl_2^-
 d) TeCl_4
 e) CCl_4
24. Among those listed below, which element will have the strongest tendency to form double bonds?
- a) S b) B c) Al d) O

Electronegativity Values							
H 2.1							He ---
Li 1.0	Be 1.5	B 2.0	C 2.5	N 3.0	O 3.5	F 4.0	Ne ---
Na 0.9	Mg 1.2	Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0	Ar ---
K 0.8	Ca 1.0	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8	Kr ---
Rb 0.8	Sr 1.0	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5	Xe ---
Cs 0.7	Ba 0.9	Tl 1.8	Pb 1.8	Bi 1.9	Po 2.0	At 2.2	Rn ---
Fr 0.7							