Assignment 4 (1505859)

Question 1234567891011121314151617181920212223242526272829303132

Question DetailsLairdUChem1 3.Supp.2-02. [952419]
 Which two species are isoelectronic?
 Ba²⁺ and Ba
 Cl⁻ and Na⁺
 Sr²⁺ and Se²⁻

Al³⁺ and Ar

Solution or Explanation

Se is in period 4; Sr is in period 5 and one atom loses 2 electrons, while the other gains 2 electrons (same electron configuration as Kr).



◎ Na⁺

Solution or Explanation

The sulfur atom gains 2 electrons, more e-e repulsions and is below chlorine on the periodic table.



4. Question DetailsBurdgeChem2 9.Supp.1-02. [1414934] Which one of the following has a dipole moment?



Solution or Explanation

Both atoms are different in EN values and linear.

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5. Question DetailsBurdgeChem2 9.Supp.1-08. [1414162]
What is the shape of the phosphate ion?
triangular
interated the phosphate ion?
interated the phosphate ion?
planar
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Solution or Explanation AX₄ class with four electron pairs.

6. Question DetailsBurdgeChem2 9.Supp.1-10. [1413707] Which one of the following molecules possesses a trigonal bipyramidal structure?
• BrF ₃
• PF ₆ ⁻
• <i>P</i> F ₅
• SF ₄

Solution or Explanation

Five electron pairs are present (AX₅).

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    Question DetailsBurdgeChem2 9.TB.010. [1412027]
    According to VSEPR theory, which one of the following molecules should be nonlinear?
    SO<sub>2</sub>
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    BeCl<sub>2</sub>
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- KrF₂
- CO2
- C₂H₂

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90° < angle < 109.5°</p>
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- 109.5°
- 109.5° < angle < 120°</p>
- ◎ 90°

Solution or Explanation

109.5 is indicated with a $\mathsf{AX}_3\mathsf{E}$ class, but angle is a little less due to the lone electron pair on S.

9. Question DetailsBurdgeChem2 9.Supp.1-04. [1415580]

A molecule has the formula ML₂. Atom M is the central atom and the L-M-L bond angle is 117°. What is the most likely classification of this molecule?

- AX2E
- AX₂
- AX₂E₃
- AX₂E₂

Solution or Explanation

Closest to 120 bond angle of AX_2E class, with some strain a little less than 120.

10. Question DetailsBurdgeChem2 9.Supp.1-05. [1416399]

Which of the following is the best description of the geometry of the azide ion, N_3 ?

- ◎ triangular, ∠ 120°
- o angular, ∠ 120°
- angular, 90°

Solution or Explanation

Linear based on Lewis structures and thus 180 degree angle.

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    Question DetailsBurdgeChem2 9.Supp.1-06. [1416417]
    A CN2<sup>2-</sup> ion has a structure that is best described as
    angular.
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- aliguiai.
- Iinear.
- tetrahedral.
- planar.

Solution or Explanation AX_2 class is linear.

12. Question DetailsBurdgeChem2 9.Supp.1-07. [1413302] Which of the following is a non-polar molecule having one or more polar bonds?

- PH₃
- ◎ 🤌 CBr₄
- H₂
- ◎ HI

Solution or Explanation

CBr₄ is symmetrical and all the dipoles cancel out.

13.	Question DetailsLairdUChem1 3.PracticeEx.02. [1063692]			
Practice Exercise 3.2				
	Select the Lewis structure for formic acid (HCOOH).			

?

HINTS I'm Stuck

14. Question DetailsLairdUChem1 3.PracticeEx.03. [1063647] Practice Exercise 3.3	?
Select the Lewis structure for the nitrite ion (NO	2`).
° ⊙=N=⊙ ° ≥ [⊙=N−⊙	:] -
$ \overset{\circ}{\underset{i=1}{\overset{i=1}{\underset{i=1}{\overset{\circ}{\underset{i=1}{\overset{\circ}{\underset{i=1}{\overset{\circ}{\underset{i=1}{\overset{\circ}{\underset{i=1}{\underset{i=1}{\overset{i=1}{\underset{i=1}{\overset{i=1}{\underset{i=1}{\overset{i=1}{\underset{i=1}{\overset{i=1}{\underset{i=1}{\overset{i=1}{\underset{i=1}{\overset{i=1}{\underset{i=1}{\underset{i=1}{\overset{i=1}{\underset{i=1}{\overset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\atopi=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\atopi=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\atopi=1}{\underset{i=1}{\atopi=1}{\underset{i=1}{\atopi=1}{\underset{i=1}{\atopi=1}{\underset{i=1}{\underset{i=1}{\underset{i=1}{\atopi=1}{\underset{i=1}{\underset{i=1}{\atopi=1}{\underset{i=1}{\atopi=1}{\underset{i=1}{\atopi=1}{\underset{i=1}{\atopi=1}{\underset{i=1}{\atopi=1}{\underset{i=1}{\atopi=1}{\underset{i=1}{\atopi=1}{$	
	HINTS <u>I'm Stuck</u>

15.	Question DetailsLairdUChem1 3.PracticeEx.04. [1063711] Practice Exercise 3.4 ?
	Give the most reasonable Lewis structure of a molecule that contains a N atom, a C atom, and an H atom. ● □ H-C=N: • :C=N ⁺ -H • H-C=N
	[◎] :C≡N−H
	 Which statements support your choice? (Select all that apply.) All atoms, except hydrogen, obey the octect rule. Formal charges are carried by some of the atoms. No formal charges are carried by any of the atoms. The three atoms have the appropriate number of valence electrons.
	HINTS Getting Started I'm Stuck
16.	Question DetailsLairdUChem1 3.PracticeEx.05. [1063675] Practice Exercise 3.5 ?
	Indicate the formal charges for the nitrite ion (NO ₂ ⁻). (Type your answer using the format -1.)



Four atoms are arbitrarily labeled D, E, F, and G. Their electronegativities are as follows: D = 3.8, E = 3.3, F = 2.8, and G = 1.3. If the atoms of these elements form the molecules DE, DG, EG, and DF, how would you arrange these molecules in order of increasing covalent bond character? (Use the appropriate <, =, or > symbol to separate substances in the list.)





(a) How many resonance structures can be drawn for the nitrate ion, NO_3^- ?



Hint

(b) Consider one of the resonance structures of the nitrate ion, NO_3^{-} . What is the formal charge of nitrogen in this polyatomic ion?

+2
> +1
0
-1
-2

Hint

(c) Consider one of the resonance structures of the nitrate ion, NO_3^- . What is the formal charge of the oxygen atom that is doubly bonded to nitrogen?

+2
+1
>
> 0
-1
-2

Hint

(d) Consider one of the resonance structures of the nitrate ion, NO_3^{-} . What is the formal charge of one of the oxygen atoms singly-bonded to nitrogen?

+2
+1
0
> -1
-2

Hint

(e) What is the sum of the formal charges of all the atoms in the nitrate ion, $\mathrm{NO_3}^-$?

+2
+1
0
 → -1
-2



Which of the following is the electronic configuration for a chlorine atom?

- \circ 1s² 2s² 2p⁶ 3s² 3p⁶
- $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$
- Is² 2s² 2p⁶ 3s² 3p⁵
- \circ 1s² 2s² 2p⁶ 3s² 3p⁴

Solution or Explanation

This is the only configuration that has precisely 17 electrons.

23. Question DetailsChang10 9.Supp.5.04. [1132224]

Which of the following possesses a polar covalent bond?

- SO₂(g)
- NaCl(s)
- Al(s)
- O₂(g)

Solution or Explanation SO₂ contains two sulfur/oxygen bonds which are polar.

Question DetailsChang10 9.Supp.6.09. [1133621]
How many bond pairs (bp) and how many lone pairs (lp) should be shown in the Lewis structure for carbon monoxide?
2 bp and 3 lp

- 1 bp and 4 lp
- 4 bp and 1 lp
- Image: Second 2 lp

Solution or Explanation One triple bond is present, 3 bp and 2 lp.

25. Question DetailsChang10 9.Supp.6.18. [1133220] Which one of the following species contains a triple bond?

• SO_3^{2-} • NO_2^+ • SO_2 • \swarrow CN ⁻

Solution or Explanation

Based on the octet rule the cyanide would show a triple bond.

26. Question DetailsChang10 9.Supp.8.04. [1132018]

What is the formal charge on the sulfur atom in the resonance structure of SO₂ that has one single bond and one double bond?

-2
-1
0
2
+1

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Solution or Explanation 6 - 3 - 2 = +1.
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27. Question DetailsChang10 9.Supp.8.07. [1133194]

How many equivalent resonance structures does the HCO_2^- ion have?

1
3
4
2

Solution or Explanation Only 2 oxygen's are present.

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28. Question DetailsChang10 9.Supp.8.12. [1132433]
Which of the following Lewis structures best represents the cyanogen molecule, C<sub>2</sub>N<sub>2</sub>? 1. N=C=C=N 2. N = C-C = N 3. N-C = C-N
1
2
3
All of them in resonance.
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Solution or Explanation Based on formal charges and the octet rule, two $C \equiv N$ and one C-C bond is the most stable.



^{30.} Question DetailsChang10 9.TB.043. [1134784] The total number of lone pairs in NCl₃ is

31. Question DetailsChang10 10.EOCP.023. [1156421] Which of the following molecules has a higher dipole moment?

32. Question DetailsChang10 10.Supp.1.15. [1131836]

The CHBr₃ is a slightly polar molecule. What atom substitution could be performed to make the molecule non-polar?

- substitute an iodine (I) for the hydrogen (H)
- substitute a bromine (Br) for the hydrogen (H)
- substitute an iodine (I) for a bromine (Br)
- substitute a hydrogen (H) for a bromine (Br)

Solution or Explanation

Another bromine in place of hydrogen would allow the dipoles to cancel out.

Assignment Details

Name (AID): Assignment 4 (1505859)	Feedback Settings	
Submissions Allowed: 5	Before due date	After due date
Category: Homework	Question Score	Question Score
Code: Locked: Yes Author: Hammond, Nicholas (<u>hmnd@bu.edu</u>) Last Saved: Nov 10, 2010 12:15 PM EST	Assignment Score	Assignment Score
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Response