Lewis Structure Worksheet Answer Key PDF

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Part 1: Building a Foundation

Which of the following elements typically does not follow the octet rule?

undefined. A) Oxygen
undefined. B) Nitrogen
undefined. C) Boron ✓
undefined. D) Carbon

The element that typically does not follow the octet rule is Boron.

Select all elements that can have an expanded octet.

undefined. A) Sulfur ✓
undefined. B) Phosphorus ✓
undefined. C) Helium
undefined. D) Chlorine ✓

Sulfur and Phosphorus can have an expanded octet.

Explain the significance of valence electrons in forming chemical bonds.

Valence electrons are crucial as they determine how atoms bond and interact with each other.

List the steps involved in drawing a basic Lewis structure.

1. Step 1
Count total valence electrons.

2. Step 2
Arrange atoms with the least electronegative in the center.

3. Step 3

Distribute electrons to satisfy the octet rule.

The steps include determining the total number of valence electrons, arranging atoms, and distributing electrons.

What is the maximum number of electrons that can be shared in a triple bond?

undefined. A) 2

undefined. B) 4

undefined. C) 6 ✓

undefined. D) 8

In a triple bond, a maximum of 6 electrons can be shared.

Part 2: Understanding and Interpretation

Which molecule is most likely to have a resonance structure?

undefined. A) H_2O

undefined. B) CO_2

undefined. C) O_3 ✓

undefined. D) CH_4

O_3 (ozone) is most likely to have a resonance structure.

Which of the following are characteristics of a polar covalent bond?

undefined. A) Unequal sharing of electrons ✓

undefined. B) Equal sharing of electrons

undefined. C) High electronegativity difference ✓

undefined. D) No electronegativity difference

Polar covalent bonds are characterized by unequal sharing of electrons and a high electronegativity difference.

Describe how formal charge is used to determine the most stable Lewis structure.

Formal charge helps identify the most stable Lewis structure by minimizing charges and ensuring the most favorable electron distribution.

Part 3: Application and Analysis

Which of the following Lewis structures correctly represents the nitrate ion (NO3^-)?

undefined. A) A structure with one double bond and two single bonds ✓
undefined. B) A structure with three single bonds
undefined. C) A structure with two double bonds and one single bond
undefined. D) A structure with three double bonds

The correct structure for the nitrate ion has one double bond and two single bonds.

When drawing the Lewis structure for sulfur hexafluoride (SF6), which of the following statements are true?

undefined. A) Sulfur has an expanded octet ✓
undefined. B) Each fluorine atom forms a single bond with sulfur ✓
undefined. C) Sulfur follows the octet rule
undefined. D) There are no lone pairs on sulfur ✓

Sulfur has an expanded octet, each fluorine forms a single bond, and there are no lone pairs on sulfur.

Draw the Lewis structure for ammonia (NH3) and explain the arrangement of electrons around the nitrogen atom.

The Lewis structure for ammonia shows nitrogen with three bonding pairs and one lone pair of electrons.

In the molecule CO2, what is the formal charge on the oxygen atoms?

undefined. A) +1
undefined. B) 0 ✓
undefined. C) -1
undefined. D) -2

The formal charge on the oxygen atoms in CO2 is 0.

Analyze the following statements about the molecule H2O. Which are true?

undefined. A) The molecule has a bent shape ✓

undefined. B) The oxygen atom has two lone pairs ✓

undefined. C) The molecule is nonpolar

undefined. D) Each hydrogen atom forms a single bond with oxygen ✓

The true statements are that H2O has a bent shape, the oxygen atom has two lone pairs, and each hydrogen forms a single bond with oxygen.

Compare and contrast the Lewis structures of O2 and O3, focusing on bond types and electron arrangement.

O2 has a double bond between two oxygen atoms, while O3 has resonance structures with one double bond and one single bond.

Part 4: Evaluation and Creation

Which Lewis structure is more stable for the sulfate ion (SO4^2-), considering formal charges?

undefined. A) A structure with all single bonds

undefined. B) A structure with two double bonds and two single bonds ✓

undefined. C) A structure with four double bonds

undefined. D) A structure with one double bond and three single bonds

The more stable structure for the sulfate ion has two double bonds and two single bonds.

Evaluate the following Lewis structures for the phosphate ion (PO4^3-). Which are correct?

undefined. A) A structure with three single bonds and one double bond ✓

undefined. B) A structure with four single bonds ✓

undefined. C) A structure with two double bonds and two single bonds

undefined. D) A structure with one triple bond and one single bond

The correct structures for the phosphate ion include one with three single bonds and one double bond, and one with four single bonds.

Design a Lewis structure for a hypothetical molecule with the formula X2Y3, where X and Y are different elements. Explain your reasoning for the arrangement of bonds and electron pairs.

The Lewis structure for X2Y3 will depend on the valence electrons of X and Y, and the arrangement should minimize formal charges.