Which of the following possible Lewis symbols for Cl is correct?

A. - [Cl]
B. - [Cl]
C. - [Cl]
D. - [Cl]

Describe the electron transfers that occur in the formation of magnesium fluoride from elemental magnesium and fluorine.

A. Each magnesium atom loses one electron and each fluorine atom gains two electrons.
B. Each magnesium atom loses two electrons and each fluorine atom gains one electron.
C. Each magnesium atom gains one electron and each fluorine atom loses two electrons.
D. Each magnesium atom gains two electrons and each fluorine atom loses one electron.

Which element forms a 1+ ion that has the electron configuration [Kr] 4d^5?

A. Rh
B. Tc
C. Ru
D. Pd

Because it is less stable than two separated He atoms, the He₂ molecule does not exist. What are the attractive forces in He₂? What are the repulsive forces? Which are greater, the attractive or repulsive forces?

A. There are no attractive forces in He₂; that’s why it doesn’t exist. Repulsive > attractive.
B. Attractive forces are between between the two entire atoms; repulsive forces are only between the electron clouds. Attractive > repulsive.
C. Attractive forces are between each electron and either nucleus; repulsive forces are those between the two nuclei and those between the two electrons. Repulsive > attractive.
D. Attractive forces are between each electron and either nucleus; repulsive forces are those between the two nuclei and those between the two electrons. Attractive > repulsive.
E. Attractive forces are between each atom’s two electrons and between the two nuclei; repulsive forces are those between the nuclei and the two electrons. Repulsive > attractive.

The C-O bond length in carbon monoxide, CO, is 113 pm, whereas the C-O bond length in CO₂ is 124 pm. Without drawing a Lewis structure, what sort of bond exists between the C and O atoms in CO?

A. C–O in carbon monoxide is a single bond.
B. C–O in carbon monoxide is a double bond.
C. C–O in carbon monoxide is a triple bond.

How does the electronegativity of an element differ from its electron affinity?

A. EN and EA are the same; they both measure the same characteristic.
B. EA measures the energy released when an isolated atom gains an electron to form a 1⁻ ion; EN measures the ability of an atom to hold onto its own electrons and attract electrons from other atoms.
C. EN values of neutral atoms are just the negative of EA values of neutral atoms.
D. EN measures the energy released when an isolated atom gains an electron to form a 1⁻ ion; EA measures the ability of an atom to hold onto its own electrons and attract electrons from other atoms.
The difference in the electronegativity of two elements is 0.7. How would you describe the bond between these elements?

A. nonpolar
B. polar covalent
C. ionic

The molecules chlorine monofluoride, CIF, and iodine monofluoride, IF, are examples of interhalogen compounds – compounds that contain bonds between different halogen elements. Which of these molecules will have the larger dipole moment?

A. They have the same dipole moment.
B. Neither has a dipole moment; they are both nonpolar.
C. CIF
D. IF

How do you interpret the fact there is no red in the HBr and HI representations below?

A. The large size of the I and the Br make the charge density less noticeable.
B. The dipole moments in both HI and HBr are in the opposite direction of HF and HCl.
C. Because HI and HBr are both strong acids, less negative charge forms on the halogens.
D. In HI and HBr the electronegativity differences are too small to lead to large charge separations in the molecules.

Suppose that a Lewis structure for a neutral fluorine-containing molecule results in a formal charge on the fluorine atom of +1. What conclusion would you draw?

A. The structure actually represents an ion.
B. The F in the structure must have four covalent bonds attached to it.
C. There must be another F in the structure carrying a –1 formal charge.
D. There must be a better Lewis structure since F is not expected to carry a formal charge of +1, being the most electronegative element.

The O-O bonds in ozone are often described as “one-and-a-half” bonds. Is this description consistent with the idea of resonance?

A. Yes
B. No

In the same sense that we describe the O-O bonds in O$_3$ as “one-and-a-half” bonds, how would you describe the N-O bonds in NO$_3$?

A. one-and-a-fifth bonds
B. one-and-a-quarter bonds
C. one-and-a-third bonds
D. one-and-a-half bonds
Each Lewis structure of benzene has 3 C=C double bonds. Another hydrocarbon with 3 C=C bonds is hexatriene, C₆H₈ (see below). Would you expect hexatriene to have multiple resonance structures like benzene? If not, why is this molecule different from benzene with respect to resonance?

A. Yes, because double bonds can be moved to give equivalent structures.
B. No, because double bonds cannot be moved to give equivalent structures.

Consider the hydrocarbon ethane, C₂H₆. How could you use the enthalpy of atomization of C₂H₆ along with the value of D(C–H) to provide an estimate for D(C–C)?

A. The enthalpy of atomization / 7 bonds broken = a good estimate of D(C–C)
B. The enthalpy of atomization – 6 × D(C–H) = a good estimate of D(C–C)
C. The enthalpy of atomization + 6 × D(C–H) = a good estimate of D(C–C)
D. The enthalpy of atomization / 7 bonds broken – 6 × D(C–H) = a good estimate of D(C–C)