

2. Exercise General Chemistry

06.11.2022

WS 2022/23

2.1

8-40. Predict which of the following molecules are polar:

(a) TeBr_4 (b) BCl_3 (c) SF_5Br (d) SOF_4

2.2

(WDP5-90) The first ionization energy of potassium, K, is 419 kJ/mol. What is the minimum frequency of light required to ionize gaseous potassium atoms?

2.3

9-6. Use molecular orbital theory to explain why the bond energy of an O_2 molecule is less than that of an O_2^+ ion.

2.4

9-40. How many σ bonds and π bonds are there in each of the following molecules?

(a) $\text{H}_2\text{C}=\text{CCl}_2$

(b) $\text{HOOC}-\text{COOH}$

(c) $\text{FHC}=\text{C}=\text{CHF}$

2.5

6-58. Calcium ions exist in a +2 ionic charge in ionic compounds, but fluorine ions exist in a -1 ionic charge. Explain how you can predict this using only the periodic table.

2.6

411) Give the Lewis formulas including lone pairs of electrons for the following molecules or ions: BaSO_4 , CH_3OH , CH_3CHO , PO_4^{3-} and P_4O_{10} . Write down mesomeric structures, if there.

2.7

440) What are the dipole moments of CH_4 , CH_3Cl , CH_2Cl_2 , CHCl_3 , $\text{CHCl}=\text{CCl}_2$, $\text{ClC}\equiv\text{C}-\text{CClH}_2$, $\begin{smallmatrix} \text{Cl} & & \text{Cl} \\ | & & | \\ \text{H} & \text{C}=\text{C} & \text{H} \end{smallmatrix}$, $\begin{smallmatrix} \text{Cl} & & \text{H} \\ | & & | \\ \text{H} & \text{C}=\text{C} & \text{Cl} \end{smallmatrix}$ expressed in multiples of the dipole moment of a C-Cl group? Suppose that the C-H group has no dipole moment and that the C-Cl dipole moment is not altered by the other bonds in the molecule.