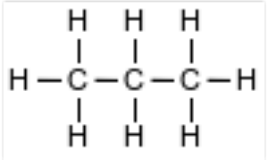
Polar Bond Polar Molecules.

1 Which formula represents an asymmetrical molecule?
(1) CH_4 (3) N_2
(2) CO_2 (4) NH_3

2 Which statement describes the charge distribution and the polarity of a CH_4 molecule?
(1) The charge distribution is symmetrical and the molecule is nonpolar.
(2) The charge distribution is asymmetrical and the molecule is nonpolar.
(3) The charge distribution is symmetrical and the molecule is polar.
(4) The charge distribution is asymmetrical and the molecule is polar.

3 Which phrase describes the molecular polarity and distribution of charge in a molecule of carbon dioxide, CO_2?
(1) polar and symmetrical
(2) polar and asymmetrical
(3) nonpolar and symmetrical
(4) nonpolar and asymmetrical

4 Given the formula representing a molecule:



Which statement explains why the molecule is nonpolar?
(1) Electrons are shared between the carbon atoms and the hydrogen atoms.
(2) Electrons are transferred from the carbon atoms to the hydrogen atoms.
(3) The distribution of charge in the molecule is symmetrical.
(4) The distribution of charge in the molecule is asymmetrical.

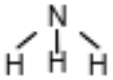
5 Which substance has nonpolar covalent bonds?
(1) Cl_2 (3) SiO_2
(2) SO_3 (4) CCl_4

6 A molecule must be nonpolar if the molecule
(1) is linear
(2) is neutral
(3) has ionic and covalent bonding
(4) has a symmetrical charge distribution

7 Which formula represents a polar molecule?
(1) O_2 (3) NH_3
(2) CO_2 (4) CH_4

8 Which formula represents a nonpolar molecule containing polar covalent bonds?
(1)

(3)



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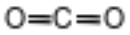

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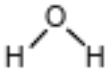


9 Which statement explains why a CO_2 molecule is nonpolar?
(1) Carbon and oxygen are both nonmetals.
(2) Carbon and oxygen have different electronegativities.
(3) The molecule has a symmetrical distribution of charge.
(4) The molecule has an asymmetrical distribution of charge.

10 Which phrase describes a molecule of CH_4, in terms of molecular polarity and distribution of charge?
(1) polar with an asymmetrical distribution of charge
(2) polar with a symmetrical distribution of charge
(3) nonpolar with an asymmetrical distribution of charge
(4) nonpolar with a symmetrical distribution of charge

11 Which statement explains why a molecule of CH_4 is nonpolar?
(1) The bonds between the atoms in a CH_4 molecule are polar.
(2) The bonds between the atoms in a CH_4 molecule are ionic.
(3) The geometric shape of a CH_4 molecule distributes the charges symmetrically.
(4) The geometric shape of a CH_4 molecule distributes the charges asymmetrically.

12 Which phrase describes the distribution of charge and the polarity of a CH_4 molecule?
(1) symmetrical and polar
(2) symmetrical and nonpolar
(3) asymmetrical and polar
(4) asymmetrical and nonpolar

Base your answers to questions 13 on the information below and on your knowledge of chemistry.

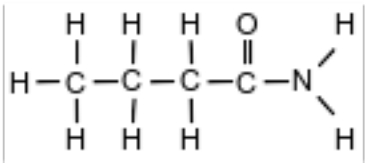
The formulas and names of four chloride compounds are shown in the table below.

Formula	Name
CCl_4	carbon tetrachloride
RbCl	rubidium chloride
CsCl	cesium chloride
HCl	hydrogen chloride

13 Explain, in terms of charge distribution, why a molecule of carbon tetrachloride is a nonpolar molecule.

Base your answers to questions 14 on the information below and on your knowledge of chemistry.

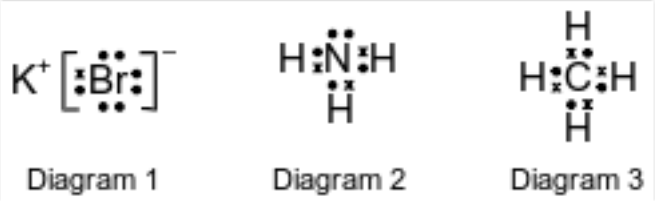
The formula below represents a molecule of butanamide.



14 Explain, in terms of charge distribution, why a molecule of butanamide is polar.

Base your answers to questions 15 on the information below and on your knowledge of chemistry.

The Lewis electron-dot diagrams for three substances are shown below.



15 Explain, in terms of distribution of charge, why a molecule of the substance represented in diagram 3 is nonpolar.

Answer Keys

1 4

2 1

3 3

4 3

5 1

6 4

7 3

8 2

9 3

10 4

11 3

12 2

13 Allow 1 credit. Acceptable responses include, but are not limited to:
- The molecule is nonpolar because it has a symmetrical charge distribution.
- The center of positive and negative charges coincide.

14 Allow 1 credit. Acceptable responses include, but are not limited to:
- The butanamide molecule has an asymmetrical distribution of charge.
- The molecule has an unequal charge distribution.

15 Allow 1 credit. Acceptable responses include, but are not limited to:
- Charge is symmetrically distributed.
- The molecule has uniform charge distribution.
- The centers of positive charge and negative charge coincide.