AP Chemistry: Unit - 2- Molecular and Ionic Compound Structure and Properties Practice Test

Question 1

Which of the following is a property of an ionic compound?

- **A.** high melting point
- **B.** soft
- **C.** malleable
- **D.** liquid at room temperature

Question 2

In what form can an ionic compound conduct electricity?

- **A.** when dissolved in water
- **B.** as a solid
- **C.** as a solid
- **D.** when warmed slightly

Question 3

The following properties are all characteristics of ionic compounds *EXCEPT*

- **A.** high melting and boiling points
- **B.** soft
- **C.** crystal lattice structure
- **D.** conduct electricity when dissolved in water

Question 4

Which types of elements can become cations?

- **A.** non-metals
- **B.** all metals
- **C.** only transition metals
- **D.** some metals and some metalloids

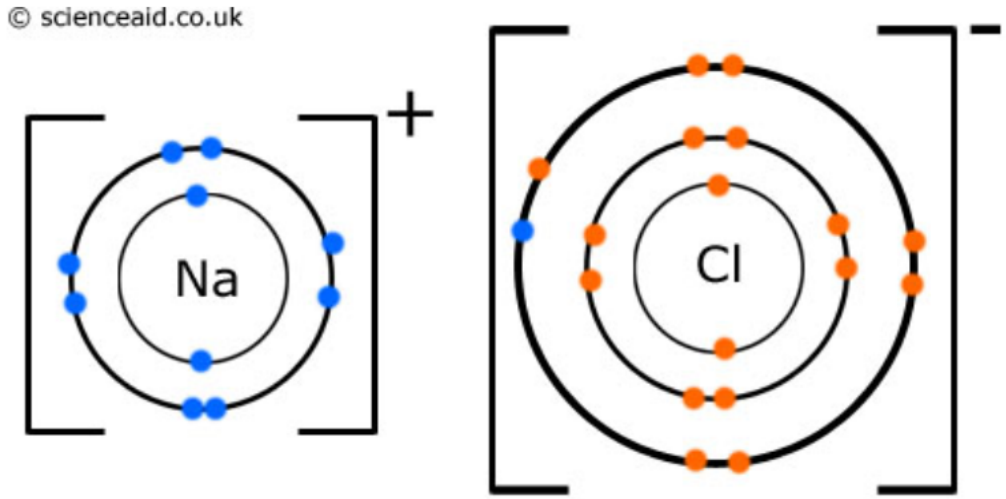
Question 5

Ionic bonds could be best described as:

A. A bond formed when 2 atoms share electrons
B. A firm handshake
C. An electrostatic attraction between oppositely charged ions
D. An electrostatic attraction between anions

Question 6

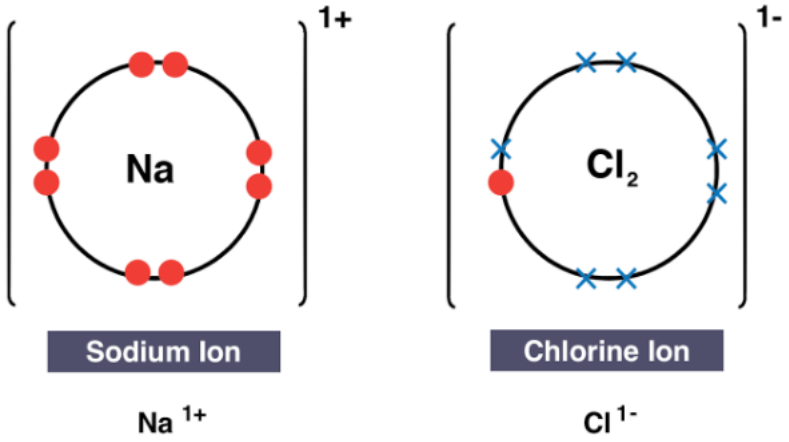
The reason that a sodium atom bonds with a chlorine atom is because



A. Sodium transfers an electron to Chlorine
B. oppositely charged ions form a strong electrostatic attraction
C. ions are the same size
D. the ions have a full outer shell

Question 7

The diagram shows



A. the transfer of electrons from the metal to the non-metal
B. an ionic bond between oppositely charge ions
C. the number of electrons lost or gained by each ion
D. All of the above

Question 8

Which of the following is an ionic compound?

A. CCl_4
B. CO
C. MgO
D. CH_4

Question 9

Which of the following is a molecular compound?

A. CaO
B. NaCl
C. $CaCl_2$
D. CH_4

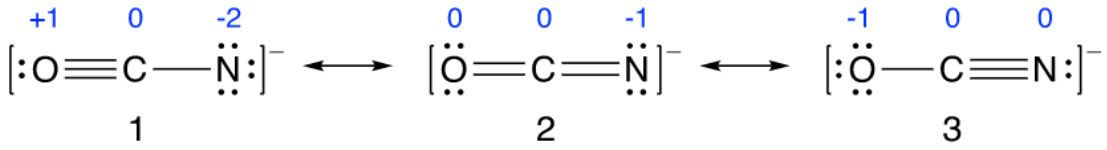
Question 10

What types of elements combine to form a molecular compound?

A. two or more metals
B. two or more different nonmetals
C. a metal and a non-metal
D. two of the same non-metal

Question 11

Three possible resonance structures for the cyanate ion, OCN^-, are shown below. Formal charges are indicated above the atoms in each structure.



Based on the formal charges, which of the three structures contributes most to the resonance hybrid of OCN^- ?

A. Structure 1
B. Structure 2
C. Structure 3
D. All of the structures contribute equally.

Question 12

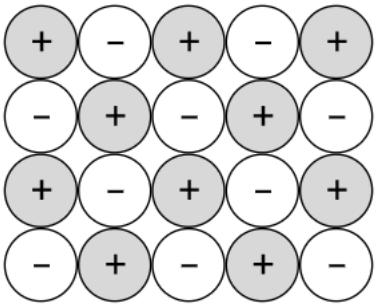
The geometric shape of the SF_4 molecule is best described as

A. tetrahedral
B. trigonal bipyramidal
C. seesaw
D. square planar

Question 13

Based on periodic trends, which of the following diagrams best depicts the structure of the ionic solid KCl?

A.



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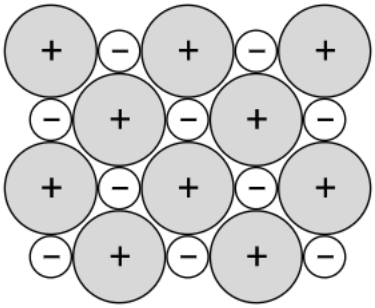

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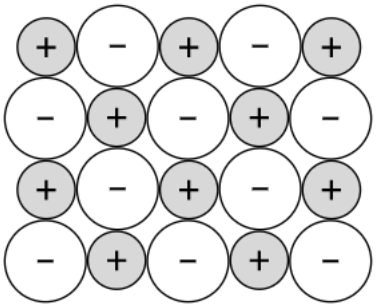
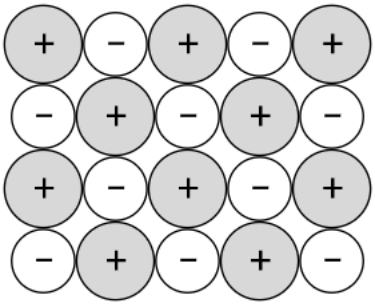


D.



Question 14

Which of the following best predicts the type of bond that forms between Cs and Cl?

A. Nonpolar covalent
B. Polar covalent
C. Ionic
D. Metallic

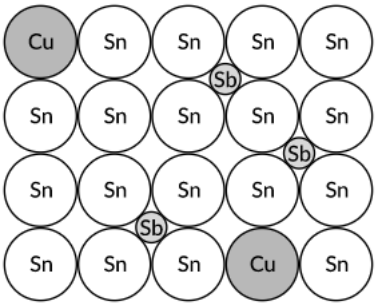
Question 15

In figure skating competitions, the fourth-place finishers are often awarded medals made of pewter, a silvery-white alloy composed of tin and small amounts of antimony and copper. The atomic radii of tin, antimony, and copper are shown in the following table.

Element	Atomic radius
Sn	140 pm
Sb	141 pm
Cu	128 pm

Based on the data in the table, which of the following diagrams best depicts the structure of pewter?

A.



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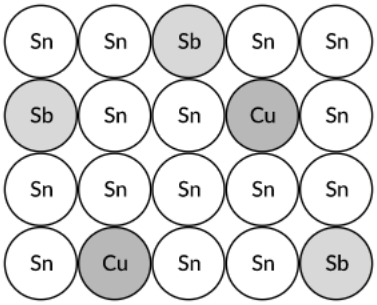

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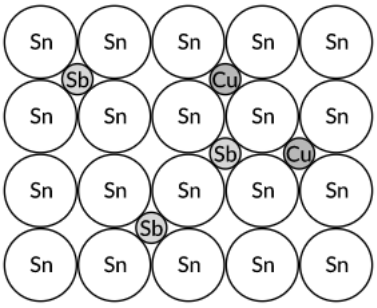

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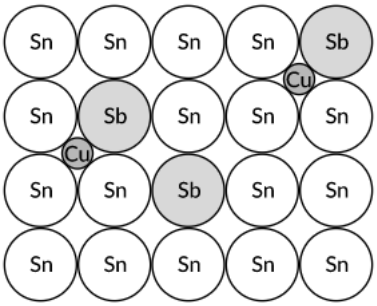
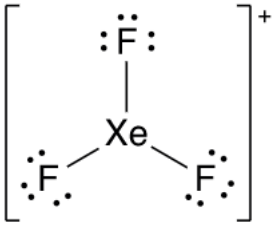


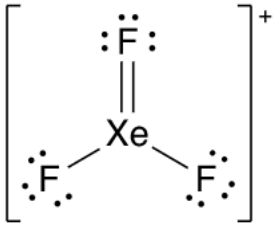
Question 16

Which of the following Lewis diagrams correctly shows the electronic structure of XeF_3^+ ?

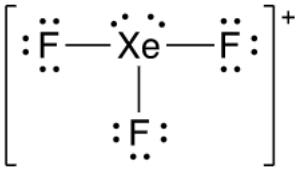
A.

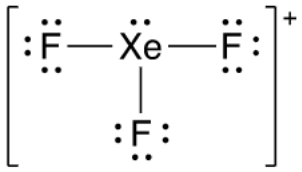


B.



C.



D. 

Question 17

The energy required to separate the ions in a NaCl crystal lattice into individual Na^+ (g) and Cl^- (g) ions is known as the lattice energy of NaCl(s). As shown in the table below, the lattice energy of NaCl(s) is greater than the lattice energy of a similar compound, RbCl(s).

Compound	Lattice energy (kJ/mol)
NaCl	790
RbCl	695

Which of the following best explains why the lattice energy of NaCl is greater than the lattice energy of RbCl?

A. Sodium and chlorine have a smaller electronegativity difference than rubidium and chlorine, so the Na– Cl bond is less polar than the Rb– Cl bond.
B. Na^+ contains fewer core electrons than Rb^+, so the valence electrons in Na^+ are less shielded from the nucleus than the valence electrons in Rb^+.
C. Sodium has a larger first ionization energy than rubidium, so more energy is required to form the Na^+ ion than to form the Rb^+ ion.
D. Na^+ has a smaller ionic radius than Rb^+, so the distance between cation and anion is shorter in NaCl than in RbCl.

Answer Key

1. A
2. A
3. B
4. B
5. C
6. B
7. D
8. C
9. D
10. B
11. C
12. C
13. C
14. C
15. B
16. C
17. D