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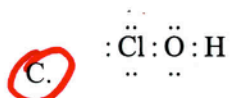
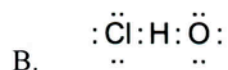
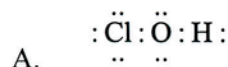
Practice Exam: Paper 1

Topic 4: Bonding

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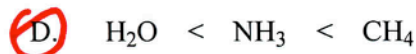
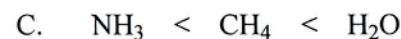
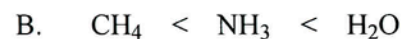
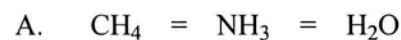
1. What is the correct Lewis structure for hypochlorous acid, a compound containing chlorine, hydrogen and oxygen?



2. Which compound forms hydrogen bonds in the liquid state?



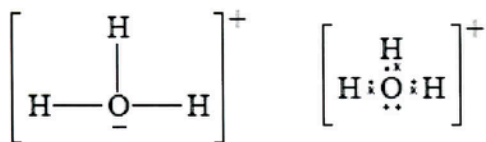
3. How do the bond angles in CH_4 , NH_3 and H_2O compare?



4. Which combination of the characteristics of element X, a metal, and element Y, a non metal, is most likely to lead to ionic bonding?

	X	Y
<input checked="" type="radio"/> A.	low ionization energy	high electronegativity value
B.	low ionization energy	low electronegativity value
C.	high ionization energy	high electronegativity value
D.	high ionization energy	low electronegativity value

5. Which particles are responsible for electrical conductivity in metals?
- A. Anions **C.** Electrons
 B. Cations D. Protons
6. Which molecule has a non-bonding (lone) pair of electrons on the central atom?
- A. BF_3 C. CO_2
B. SO_2 D. SiF_4
7. When C_2H_2 , C_2H_4 and C_2H_6 are arranged in order of **increasing** carbon-carbon bond strength (weakest bond first), what is the correct order?
- A. C_2H_2 , C_2H_4 , C_2H_6
 B. C_2H_2 , C_2H_6 , C_2H_4
C. C_2H_6 , C_2H_4 , C_2H_2
 D. C_2H_6 , C_2H_2 , C_2H_4
8. The number of electrons in the valence shell of elements A and B, are 6 and 7 respectively. What is the formula and type of bonding in a compound formed by these elements?
- A. A_2B , covalent C. A_2B , ionic
B. AB_2 , covalent D. AB_2 , ionic
9. Lewis structures are represented in different ways in different parts of the world. Two ways of drawing the Lewis structure for H_3O^+ are shown below.



Which statement is correct about H_3O^+ ?

- A. The ion has a tetrahedral shape.
 B. The H–O–H bond angle is 120° .
 C. The H–O–H bond angle is 90° .
D. The ion has a trigonal pyramidal shape.

10. Which statement best describes metallic bonding?
- A. Electrostatic attractions between oppositely charged ions
 - B. Electrostatic attractions between a lattice of positive ions and delocalized electrons
 - C. Electrostatic attractions between a lattice of negative ions and delocalized protons
 - D. Electrostatic attractions between protons and electrons
11. Which is the best description of the bonding present in the ammonium ion, NH_4^+ ?
- A. Sharing of electrons between atoms
 - B. Electrostatic attraction between ions
 - C. Electrostatic attraction between positive ions and delocalized electrons
 - D. Sharing of electrons between atoms and electrostatic attraction between ions
12. The formula of cerium(III) sulfate is $\text{Ce}_2(\text{SO}_4)_3$. What is the correct formula of cerium(III) phosphate?
- A. CeP
 - B. $\text{Ce}_2(\text{PO}_4)_3$
 - C. $\text{Ce}_3(\text{PO}_4)_2$
 - D. CePO_4
13. Which molecule has the shortest carbon-oxygen bond length?
- A. CH_3COOH
 - B. $\text{CH}_3\text{CH}_2\text{OH}$
 - C. CO_2
 - D. CO
14. Which pair of compounds is arranged in correct order of relative boiling points?

	Lower Boiling Point	Higher Boiling Point
<input checked="" type="radio"/> A.	H_2S	H_2O
B.	NH_3	PH_3
C.	HF	HCl
D.	CH_3COOH	$\text{CH}_3\text{CH}_2\text{OH}$

15. Which statement about the bonding between carbon atoms is correct?
- A. In C_{60} fullerene each carbon atom is covalently bonded to three other carbon atoms.
 - B. In C_{60} fullerene each carbon atom is covalently bonded to four other carbon atoms.
 - C. In graphite each carbon atom is covalently bonded to four other carbon atoms.
 - D. In graphite each carbon atom forms a double covalent bond with three other carbon atoms.
16. Which intermolecular forces exist between molecules of carbon monoxide, CO?
- A. Hydrogen bonds and Dispersion forces
 - B. Dipole-dipole attractions and Dispersion forces
 - C. Dispersion forces only Recall, all molecules will have dispersion forces!
 - D. Dipole-dipole attractions only
17. What is the formula of magnesium fluoride?
- A. Mg_2F_3
 - B. Mg_2F
 - C. Mg_3F_2
 - D. MgF_2
18. What is the shape of the ammonia molecule, NH_3 ?
- A. Trigonal planar
 - B. Trigonal pyramidal
 - C. Linear
 - D. V-shaped (bent)
19. Which molecule is polar?
- A. CH_2Cl_2
 - B. BCl_3
 - C. Cl_2
 - D. CCl_4

20. Which substance can form intermolecular hydrogen bonds in the liquid state?

- A. CH_3OCH_3
- B. $\text{CH}_3\text{CH}_2\text{OH}$
- C. CH_3CHO
- D. $\text{CH}_3\text{CH}_2\text{CH}_3$

21. Which compound has a covalent macromolecular (giant covalent) structure?

- A. MgO(s)
- B. $\text{Al}_2\text{O}_3\text{(s)}$
- C. $\text{P}_4\text{O}_{10}\text{(s)}$
- D. $\text{SiO}_2\text{(s)}$

22. The electronegativities of four different elements are given below (the letters are not their chemical symbols).

Element	W	X	Y	Z
Electronegativity	0.9	1.2	3.4	4.0

Based on this information which statement is correct?

- A. W is a non-metal.
- B. W and X form an ionic compound.
- C. Y is a metal.
- D. Y and Z form a covalent compound.

23. Which species contain a dative covalent bond?

- I. HCHO
- II. CO
- III. H_3O^+

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

24. Which substance is made up of a lattice of positive ions and free moving electrons?
- A. Graphite
 - B. Sodium chloride
 - C. Sulfur
 - D. Sodium**
25. Which order is correct when the following compounds are arranged in order of **increasing** melting point?
- A. $\text{CH}_4 < \text{H}_2\text{S} < \text{H}_2\text{O}$**
 - B. $\text{H}_2\text{S} < \text{H}_2\text{O} < \text{CH}_4$
 - C. $\text{CH}_4 < \text{H}_2\text{O} < \text{H}_2\text{S}$
 - D. $\text{H}_2\text{S} < \text{CH}_4 < \text{H}_2\text{O}$
26. What are the correct formulas of the following ions?

	Ammonium	Hydrogencarbonate	Phosphate
A.	NH_4^+	HCO_3^{2-}	PO_4^-
B.	NH_3^+	HCO_3^-	PO_4^{3-}
C.	NH_4^+	HCO_3^{2-}	PO_4^{2-}
D.	NH_4^+	HCO_3^-	PO_4^{3-}

27. What happens when magnesium metal reacts with chlorine gas?
- A. Each magnesium atom loses two electrons and each chlorine atom gains two electrons.
 - B. Each magnesium atom gains one electron and each chlorine atom loses one electron.
 - C. Each magnesium atom loses two electrons and each chlorine atom gains one electron.**
 - D. Each magnesium atom gains one electron and each chlorine atom loses two electrons.
28. Which is the best description of ionic bonding?
- A. The electrostatic attraction between positively charged nuclei and an electron pair
 - B. The electrostatic attraction between positive ions and delocalized negative ions
 - C. The electrostatic attraction between positive ions and delocalized electrons
 - D. The electrostatic attraction between oppositely charged ions**

29. Which is the best description of the bonding present in silicon dioxide, SiO_2 ?

- A. Each silicon atom forms four single covalent bonds to oxygen atoms.
- B. Each silicon atom forms two double covalent bonds to oxygen atoms.
- C. Each silicon atom forms two single covalent bonds to oxygen atoms.
- D. Each silicon atom forms four double covalent bonds to oxygen atoms.

30. Which statement best describes the **intramolecular** bonding in HCN(l) ?

- A. Electrostatic attractions between H^+ and CN^- ions
- B. Only Dispersion forces
- C. Dispersion forces and hydrogen bonding
- D. Electrostatic attractions between pairs of electrons and positively charged nuclei