

Name \_\_\_\_\_

AP Chemistry

**HW 10\_1: Due 1/19/18 Write the letter of the correct answer on the line in front of the question.**

Use the following answers for questions 1- 11.

- (A) A network solid with covalent bonding (B) A molecular solid with zero dipole moment  
(C) A molecular solid with hydrogen bonding (D) An ionic solid  
(E) A metallic solid

- \_\_\_\_\_ Solid ethyl alcohol,  $C_2H_5OH$
- \_\_\_\_\_ Solid Silicon dioxide,  $SiO_2$
- \_\_\_\_\_ Solid lithium chloride ( $LiCl$ )
- \_\_\_\_\_ Solid ammonia ( $NH_3$ )
- \_\_\_\_\_ Solid gold ( $Au$ )
- \_\_\_\_\_ Solid dry ice ( $CO_2$ )
- \_\_\_\_\_ Solid magnesium oxide ( $MgO$ )
- \_\_\_\_\_ Solid  $I_2$
- \_\_\_\_\_ Solid hydrogen fluoride ( $HF$ )
- \_\_\_\_\_ Solid osmium ( $Os$ )
- \_\_\_\_\_ Solid cesium iodide ( $CsI$ )

Use these answers for questions 12-15

- (A) hydrogen bonding (B) hybridization (C) ionic bonding  
(D) resonance (E) van der Waals forces (London dispersion forces)

- \_\_\_\_\_ Is used to explain why iodine molecules are held together in the solid state
- \_\_\_\_\_ Is used to explain why the boiling point of  $HF$  is greater than the boiling point of  $HBr$
- \_\_\_\_\_ Is used to explain the fact that the four bonds in methane are equivalent
- \_\_\_\_\_ Is used to explain the fact that the carbon-to-carbon bonds in benzene,  $C_6H_6$ , are identical

Use the following answers for questions 16 - 18.

- (A) Macromolecules held together with strong polar bonds.  
(B) Closely packed lattice with delocalized electrons throughout  
(C) Lattice of positive and negative ions held together by electrostatic forces.  
(D) Strong multiple covalent bonds (including bonds.) with weak intermolecular forces  
(E) Strong single covalent bonds with weak intermolecular forces.

- \_\_\_\_\_ Cesium chloride,  $CsCl$  (s)
- \_\_\_\_\_ Silver,  $Ag$  (s)
- \_\_\_\_\_ Carbon dioxide,  $CO_2$ (s)
- \_\_\_\_\_ A hard, crystalline solid with a high melting point does not conduct electricity in any phase. This solid is most likely:  
(A) an ionic solid. (B) a metallic solid. (C) a molecular solid.  
(D) a network covalent solid. (E) none of the above
- \_\_\_\_\_ A solid is insoluble in water, does not conduct electricity, and does not melt below  $1000\text{ }^\circ C$ . This solid could be

- (A) Pt                      (B) SiC                      (C) CsCl                      (D) C<sub>10</sub>H<sub>22</sub>                      (E) CH<sub>3</sub>CH<sub>2</sub>OH

21. \_\_\_\_\_ The boiling points of the halogens, F<sub>2</sub>, Cl<sub>2</sub>, Br<sub>2</sub> and I<sub>2</sub>, increase in that order. This is best attributed to differences in:

- (A) covalent bond strengths      (B) dipole forces      (C) London dispersion forces      (D) colligative forces      (E) atomic radius

22. \_\_\_\_\_ The lowest melting points overall occur for members of which class of solids?

- (A) ionic                      (B) metallic                      (C) polar molecular                      (D) network covalent                      (E) non-polar molecular

23. \_\_\_\_\_ What are the strongest intermolecular force between neighboring carbon tetrachloride, CCl<sub>4</sub>, molecules?

- (A) dipole-dipole forces      (B) dispersion forces      (C) hydrogen bonds      (D) covalent bonds      (E) ionic bonds

24. \_\_\_\_\_ The compounds C<sub>3</sub>H<sub>8</sub>, CH<sub>3</sub>CH<sub>2</sub>OH, and CH<sub>3</sub>OCH<sub>3</sub> have very similar molar masses. When they are arranged in order of *increasing* strength of their intermolecular forces, what is the correct order?

- (A) C<sub>3</sub>H<sub>8</sub>, CH<sub>3</sub>OCH<sub>3</sub>, CH<sub>3</sub>CH<sub>2</sub>OH      (B) CH<sub>3</sub>CH<sub>2</sub>OH, CH<sub>3</sub>OCH<sub>3</sub>, C<sub>3</sub>H<sub>8</sub>      (C) CH<sub>3</sub>OCH<sub>3</sub>, CH<sub>3</sub>CH<sub>2</sub>OH, C<sub>3</sub>H<sub>8</sub>  
(D) CH<sub>3</sub>OCH<sub>3</sub>, C<sub>3</sub>H<sub>8</sub>, CH<sub>3</sub>CH<sub>2</sub>OH      (E) CH<sub>3</sub>CH<sub>2</sub>OH, C<sub>3</sub>H<sub>8</sub>, CH<sub>3</sub>OCH<sub>3</sub>

25. \_\_\_\_\_ Which property does *not* indicate strong intermolecular forces?

- (A) high enthalpy of vaporization      (B) high viscosity      (C) high critical temperature  
(D) high vapor pressure      (E) high melting point

26. \_\_\_\_\_

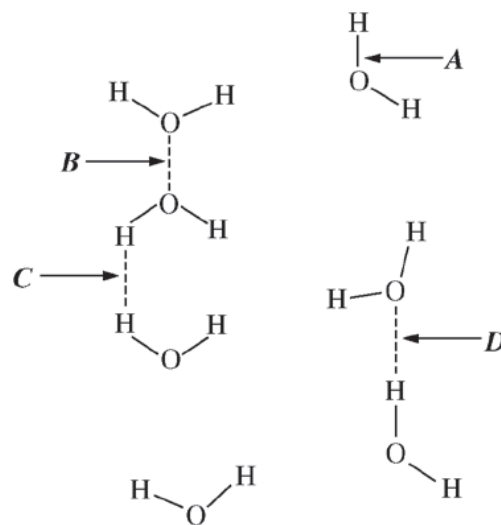
Substance	Equilibrium Vapor Pressure at 20°C (torr)
C <sub>6</sub> H <sub>6</sub> (l)	75
C <sub>2</sub> H <sub>5</sub> OH(l)	44
CH <sub>3</sub> OH(l)	92
C <sub>4</sub> H <sub>9</sub> OH(l)	32
C <sub>2</sub> H <sub>6</sub> O <sub>2</sub> (l)	0.06

Based on the data in the table above, which of the following liquid substances has the weakest intermolecular forces?

- (A) C<sub>6</sub>H<sub>6</sub>(l)      (B) C<sub>2</sub>H<sub>5</sub>OH(l)      (C) CH<sub>3</sub>OH(l)      (D) C<sub>4</sub>H<sub>9</sub>OH(l)      (E) C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>(l)

27. \_\_\_\_\_ In the diagram to the right, which of the labeled arrows identifies hydrogen bonding in water?

- (A) A                      (B) B                      (C) C                      (D) D  
(E) none of these



28. \_\_\_\_\_ Which of the following is the best explanation for the difference in the boiling points of liquid Br<sub>2</sub> and I<sub>2</sub>, which are 59°C and 184°C, respectively?

- (A) Solid iodine is a network covalent solid, whereas solid bromine is a molecular solid.  
(B) The covalent bonds in I<sub>2</sub> molecules are weaker than those in Br<sub>2</sub> molecules.  
(C) I<sub>2</sub> molecules have electron clouds that are more polarizable than those of Br<sub>2</sub> molecules, thus London dispersion forces are stronger in liquid I<sub>2</sub>.  
(D) Bromine has a greater electronegativity than iodine, thus there are stronger dipole-dipole forces in liquid bromine than in liquid iodine.  
(E) The Br<sub>2</sub> molecules are smaller than the I<sub>2</sub> molecules and move more rapidly making it easier to boil.

29. \_\_\_\_\_ The figure above shows that in solid hydrogen fluoride there are two different distances between H atoms and F atoms. Which of the following best accounts for the two different distances?

- (A) Accommodation of the necessary bond angles in the formation of the solid  
(B) Difference in strength between covalent bonds and intermolecular attractions  
(C) Different isotopes of fluorine present in the samples  
(D) Uneven repulsions among nonbonding electron pairs  
(E) Hydrogen bonds are strong and shorter than bonds between molecules

