This print-out should have 16 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 10.0 points

Which one of the following substances is INCORRECTLY matched with the kind of solid that it forms?

1. methane : molecular

2. sulfur dioxide : molecular

3. graphite : covalent

4. calcium bromide : ionic

5. lithium : covalent

002 10.0 points

Why does it take longer to cook foods in boiling water at higher altitude than at or below sea level?

1. The ambient temperature is lower at higher altitudes.

2. There is a reduction in atmospheric pressure.

3. It does not take longer.

4. There is an increase in atmospheric pressure.

003 10.0 points

Arrange the compounds

$$CsCl,\ BaCl_2,\ \text{diamond (C)},\ H_2,\ HF$$

in order of increasing expected melting points.

1. H_2, HF, diamond, CsCl, $BaCl_2$

2. HF, H_2, CsCl, $BaCl_2$, diamond

3. H_2, HF, CsCl, $BaCl_2$, diamond

4. HF, H_2, diamond, CsCl, $BaCl_2$

5. H_2, HF, $BaCl_2$, CsCl, diamond

004 10.0 points

Which of the following statements regarding intermolecular forces (IMF) is/are true?

I) Intermolecular forces result from attractive forces between regions of positive and negative charge density in neighboring molecules.

II) The stronger the bonds within a molecule are, the stronger the intermolecular forces will be.

III) Only non-polar molecules have instantaneous dipoles.

1. II and III

2. I only

3. II only

4. III only

5. I and III

6. I and II

7. I, II, and III

005 10.0 points

Which of the following is not correctly paired with its dominant type of intermolecular forces?

1. NH_3, hydrogen bonding

2. HBr, hydrogen bonding

3. C_6H_6 (benzene), instantaneous dipoles

4. CaO, ionic forces

5. SiH_4, instantaneous dipoles

006 10.0 points

Identify the dominant intermolecular force in the following species, respectively: RbCl,

C_6H_6 (benzene), HI, Fe_2O_3, CH_2NH.
a) ionic forces
b) hydrogen bonding
c) dipole-dipole
d) instantaneous dipoles

1. b, d, c, d, d

2. a, c, c, d, b

3. c, d, a, a, b

4. a, b, d, a, c

5. a, b, c, b, a

6. a, d, c, a, b

7. c, b, d, c, c

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007 10.0 points

Which of the following statements about boiling is false?

1. For a given pressure, the boiling point is always at a higher temperature than melting point.

2. Boiling occurs when vapor pressure exceeds atmospheric pressure.

3. As intermolecular forces increase, boiling point increases as well.

4. The boiling point of a liquid is independent of atmospheric pressure.

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008 10.0 points

Dispersion (London) forces result from

1. attractive forces between a molecule at the surface of a liquid and those beneath it which are not balanced by corresponding forces from above.

2. the formation of a loose covalent linkage between a hydrogen atom connected to a very electronegative atom in one molecule and another very electronegative atom in a neighboring molecule.

3. attraction between molecules in a liquid and molecules or atoms in a solid surface with which the liquid is in contact.

4. distortion of the electron cloud of an atom or molecule by the presence of nearby atoms or molecules.

5. the balance of attractive and repulsive forces between two polar molecules.

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009 10.0 points

Consider four molecules
I) $CHCl_3$
II) CH_4
III) CH_3Cl
IV) CCl_4

Which of these exhibit permanent dipole-dipole interactions?

1. I, III, and IV only

2. None of these

3. I and III only

4. I only

5. III only

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010 10.0 points

Classify the solid dry ice (CO_2).

1. ionic

2. molecular

3. network

4. None of these

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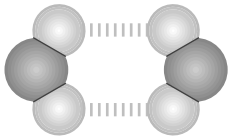
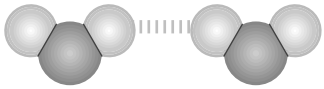
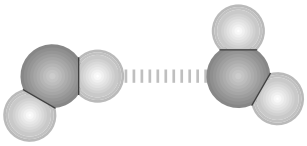
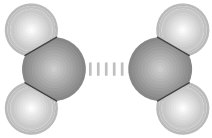
011 10.0 points

Which best describes the hydrogen bonding between two water molecules?

1. 

2. 

3. 

4. 

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012 10.0 points

In which of these compounds would you find ONLY dispersion forces existing between the molecules?

I. CO_2;
II. CCl_4;
III. CH_2Cl_2;
IV. NH_3.

1. II and IV only

2. III and IV only

3. II only

4. I and IV only

5. I only

6. III only

7. I and III only

8. II and III only

9. IV only

10. I and II only

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013 10.0 points

Rank the following compounds by boiling point, from lowest to highest: HF, sugar ($C_6H_{12}O_6$), H_2O, NH_3.

1. $HF < H_2O <$ sugar $< NH_3$

2. $H_2O < NH_3 <$ sugar $< HF$

3. $NH_3 < HF < H_2O <$ sugar

4. $H_2O <$ sugar $< NH_3 < HF$

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014 10.0 points

Rank the following liquids by viscosity, from most viscous to least: C_5H_{12}, CH_4, C_3H_8, C_2H_6, C_4H_{10}.

1. $CH_4 > C_2H_6 > C_4H_{10} > C_3H_8 > C_5H_{12}$

2. $CH_4 > C_2H_6 > C_3H_8 > C_5H_{12} > C_4H_{10}$

3. $C_5H_{12} > C_4H_{10} > C_3H_8 > C_2H_6 > CH_4$

4. $C_5H_{12} > C_3H_8 > C_4H_{10} > C_2H_6 > CH_4$

5. $CH_4 > C_2H_6 > SC_3H_8 > C_4H_{10} > C_5H_{12}$

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015 10.0 points

Rank the following species by vapor pressure, from lowest to highest: $K_2S, CHCl_3, Kr, CH_3NH_2, CHF_3$.

1. $K_2S < CH_3NH_2 < CHF_3 < CHCl_3 <$ Kr

2. $CH_3NH_2 < CHCl_3 < CHF_3 <$ Kr $< K_2S$

3. $CH_3NH_2 < CHF_3 < K_2S < CHCl_3 <$ Kr

4. Kr $< CH_3NH_2 < CHF_3 < CHCl_3 < K_2S$

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016 10.0 points

Which of the following is not a covalent network solid?

1. glass

2. diamond

3. cellulose

4. table sugar

5. starch

6. graphite