

**Liquids and Solids Practice****Multiple Choice**

Identify the choice that best completes the statement or answers the question.

- \_\_\_\_\_ 1. Which is a characteristic that increases a substance's viscosity?
- larger particle size
  - weaker intermolecular forces
  - greater distance between particles
  - increased temperature
- \_\_\_\_\_ 2. Why does a liquid's rate of evaporation increase when the liquid is heated?
- More molecules have enough energy to overcome the attractive forces holding them in the liquid.
  - The average kinetic energy of the liquid decreases.
  - The surface area of the liquid is reduced.
  - The potential energy of the liquid increases.
- \_\_\_\_\_ 3. If a liquid is sealed in a container and kept at constant temperature, how does its vapor pressure change over time?
- It continues to steadily increase.
  - It increases at first, then remains constant.
  - It increases at first, then decreases.
  - It continues to steadily decrease.
- \_\_\_\_\_ 4. Water could be made to boil at 105°C instead of 100°C by \_\_\_\_\_.
- adding a lot of energy to the water
  - increasing the external pressure
  - decreasing the external pressure
  - taking the sample to a higher altitude
- \_\_\_\_\_ 5. The normal boiling point of chloroform, which has a higher vapor pressure than water at 100°C, is \_\_\_\_\_.
- higher than the normal boiling point of water
  - lower than the normal boiling point of water
  - the same as the normal boiling point of water
  - unable to be measured
- \_\_\_\_\_ 6. The smallest group of particles in a crystal that retains the shape of the crystal is called the \_\_\_\_\_.
- cube
  - unit cell
  - cage
  - crystal lattice
- \_\_\_\_\_ 7. A solid is a poor conductor of electricity, is very hard, has a high melting point, and is non-brittle. The solid is probably \_\_\_\_\_.
- metallic.
  - covalent network.
  - ionic.
  - molecular.
- \_\_\_\_\_ 8. The orbital hybridizations of graphite and diamond, respectively, are \_\_\_\_\_.
- sp<sup>3</sup> and sp<sup>3</sup>.
  - sp<sup>2</sup> and sp<sup>2</sup>.
  - sp<sup>3</sup> and sp<sup>2</sup>.
  - sp<sup>2</sup> and sp<sup>3</sup>.
- \_\_\_\_\_ 9. Which conduct(s) electricity?
- neither graphite nor diamond
  - graphite only
  - diamond only
  - both graphite and diamond

- \_\_\_\_\_ 10. All of the following are true. Which best explains why ionic substances are brittle?
- Ionic solids have relatively large Coulombic attractions.
  - Planes of strongly attracted ions can reposition so Coulombic attractions repel.
  - Polar water molecules can pull apart three-dimensional lattices of cation-anion Coulombic attractions.
  - Ionic solids have relatively large lattice energies due to Coulombic attractions.
- \_\_\_\_\_ 11. Which of the following is the correct order of boiling points for  $\text{KNO}_3$ ,  $\text{CH}_3\text{OH}$ ,  $\text{C}_2\text{H}_6$ ,  $\text{Ne}$ ?
- $\text{KNO}_3 < \text{CH}_3\text{OH} < \text{C}_2\text{H}_6 < \text{Ne}$
  - $\text{Ne} < \text{C}_2\text{H}_6 < \text{KNO}_3 < \text{CH}_3\text{OH}$
  - $\text{Ne} < \text{C}_2\text{H}_6 < \text{CH}_3\text{OH} < \text{KNO}_3$
  - $\text{C}_2\text{H}_6 < \text{Ne} < \text{CH}_3\text{OH} < \text{KNO}_3$
- \_\_\_\_\_ 12. Steel is considered to be
- an interstitial alloy.
  - a metallic compound.
  - a substitutional alloy.
  - two of these
- \_\_\_\_\_ 13. Given the following boiling point data, which substance would you expect to have the highest vapor pressure?

Substance	Boiling Point
water, $\text{H}_2\text{O}$	$100^\circ\text{C}$
methanol, $\text{CH}_3\text{OH}$	$64.96^\circ\text{C}$
ethanol, $\text{CH}_3\text{CH}_2\text{OH}$	$78.5^\circ\text{C}$
diethyl ether, $\text{CH}_3\text{OH}_2\text{-O-CH}_2\text{CH}_3$	$34.5^\circ\text{C}$

- water
  - methanol
  - ethanol
  - diethyl ether
- \_\_\_\_\_ 14. Which of the following has the greatest electrical conductivity?
- Ga
  - Si
  - P
  - As
- \_\_\_\_\_ 15. In which of the following processes will energy be produced (released) as heat?
- sublimation
  - crystallization
  - vaporization
  - melting
- \_\_\_\_\_ 16. Generally the vapor pressure of a liquid is related to
- the amount of liquid
  - atmospheric pressure
  - temperature
  - intermolecular forces
- I, III
  - II, III, IV
  - I, III, IV
  - III, IV
- \_\_\_\_\_ 17. At room temperature,  $\text{CsF}$  is expected to be
- a conducting solid.
  - a soft solid.
  - a brittle solid.
  - two of these

- \_\_\_\_\_ 18. On a relative basis, the weaker the intermolecular forces in a substance,
- the greater its vapor pressure at a particular temperature.
  - the higher its melting point.
  - the greater its heat of vaporization.
  - the more it deviates from ideal gas behavior.
- \_\_\_\_\_ 19. As molecular solids, which of the following exhibits dipole-dipole intermolecular forces:  
PBr<sub>3</sub>, SO<sub>2</sub>, I<sub>2</sub>, and CO<sub>2</sub>
- PBr<sub>3</sub> only
  - PBr<sub>3</sub> and SO<sub>2</sub>
  - SO<sub>2</sub> and CO<sub>2</sub>
  - I<sub>2</sub> and CO<sub>2</sub>
- \_\_\_\_\_ 20. Arrange H<sub>2</sub>O, H<sub>2</sub>S, and H<sub>2</sub>Se in order from lowest to highest boiling point.
- H<sub>2</sub>O < H<sub>2</sub>S < H<sub>2</sub>Se
  - H<sub>2</sub>O < H<sub>2</sub>Se < H<sub>2</sub>S
  - H<sub>2</sub>Se < H<sub>2</sub>S < H<sub>2</sub>O
  - H<sub>2</sub>S < H<sub>2</sub>Se < H<sub>2</sub>O
- \_\_\_\_\_ 21. Which of the following nonpolar molecules has the highest boiling point?
- CO<sub>2</sub>
  - F<sub>2</sub>
  - CH<sub>4</sub>
  - O<sub>2</sub>
- \_\_\_\_\_ 22. Which of the following compounds is expected to have the strongest ionic bonds?
- MgO
  - KBr
  - NaI
  - BaO
- \_\_\_\_\_ 23. Which of the following substances would you expect to have the lowest boiling point?
- diamond
  - sodium nitrate
  - CH<sub>3</sub>CH<sub>2</sub>OH
  - copper
- \_\_\_\_\_ 24. Which of the statements is false?
- Metallic crystals are usually good conductors.
  - Diamond is a covalent crystal.
  - Molecular crystals usually have low melting points.
  - The size of the unit cell of Li and Cs are approximately the same.
- \_\_\_\_\_ 25. Which of the following has the highest melting temperature?
- MgF<sub>2</sub>
  - S<sub>8</sub>
  - H<sub>2</sub>O
  - CO<sub>2</sub>
- \_\_\_\_\_ 26. Which substance can be described as cations bonded together by mobile electrons?
- Kr(s)
  - Ag(s)
  - KCl(s)
  - S<sub>8</sub>(s)
- \_\_\_\_\_ 27. Which compound below is an example of a network solid?
- P<sub>4</sub>(s)
  - SiO<sub>2</sub>(s)
  - C<sub>25</sub>H<sub>52</sub>(s)
  - CO<sub>2</sub>(s)

Name: \_\_\_\_\_

ID: A

- \_\_\_\_\_ 28. A student observed that a small amount of acetone sprated on the back of her hand felt cool compared to a similar amount of water. What is the explanation for this phenomenon?
- a. the observed effect is not real and only imagined.
  - b. the high vapor pressure of acetone results in more rapid evaporation and heat loss.
  - c. acetone has a lower viscosity than water and therefore transfers heat better.
  - d. water has a higher heat capacity than acetone, therefore retaining more heat.

**Liquids and Solids Practice  
Answer Section**

**MULTIPLE CHOICE**

- |             |               |                      |                      |
|-------------|---------------|----------------------|----------------------|
| 1. ANS: A   | PTS: 1        | DIF: Bloom's Level 2 |                      |
| NAT: B.2    | STA: ABC 16.1 |                      |                      |
| 2. ANS: A   | PTS: 1        | DIF: L2              | REF: p. 391          |
| OBJ: 13.2.2 | STA: SC6.a    |                      |                      |
| 3. ANS: B   | PTS: 1        | DIF: L2              | REF: p. 392          |
| OBJ: 13.2.3 | STA: SC6.a    |                      |                      |
| 4. ANS: B   | PTS: 1        | DIF: L2              | REF: p. 394          |
| OBJ: 13.2.4 | STA: SC6.a    |                      |                      |
| 5. ANS: B   | PTS: 1        | DIF: L3              | REF: p. 394   p. 395 |
| OBJ: 13.2.4 | STA: SC6.a    |                      |                      |
| 6. ANS: B   | PTS: 1        | DIF: L1              | REF: p. 398          |
| OBJ: 13.3.2 | STA: SC6.a    |                      |                      |
| 7. ANS: B   | PTS: 1        |                      |                      |
| 8. ANS: D   | PTS: 1        |                      |                      |
| 9. ANS: B   | PTS: 1        |                      |                      |
| 10. ANS: B  | PTS: 1        |                      |                      |
| 11. ANS: C  | PTS: 1        |                      |                      |
| 12. ANS: A  | PTS: 1        |                      |                      |
| 13. ANS: D  | PTS: 1        |                      |                      |
| 14. ANS: A  | PTS: 1        |                      |                      |
| 15. ANS: B  | PTS: 1        |                      |                      |
| 16. ANS: D  | PTS: 1        |                      |                      |
| 17. ANS: C  | PTS: 1        |                      |                      |
| 18. ANS: A  | PTS: 1        |                      |                      |
| 19. ANS: B  | PTS: 1        |                      |                      |
| 20. ANS: D  | PTS: 1        |                      |                      |
| 21. ANS: A  | PTS: 1        |                      |                      |
| 22. ANS: A  | PTS: 1        |                      |                      |
| 23. ANS: C  | PTS: 1        |                      |                      |
| 24. ANS: D  | PTS: 1        |                      |                      |
| 25. ANS: A  | PTS: 1        |                      |                      |
| 26. ANS: B  | PTS: 1        |                      |                      |
| 27. ANS: B  | PTS: 1        |                      |                      |
| 28. ANS: B  | PTS: 1        |                      |                      |