SUPA Chapter 11 Problem set

1. Crystalline solids _____.
   a. have their particles arranged randomly
   b. have highly ordered structures
   c. are usually very soft
   d. exist only at high temperatures
   e. exist only at very low temperatures

2. In liquids, the attractive intermolecular forces are _____.
   a. very weak compared with kinetic energies of the molecules
   b. strong enough to hold molecules relatively close together
   c. strong enough to keep the molecules confined to vibrating about their fixed lattice points
   d. not strong enough to keep molecules from moving past each other
   e. strong enough to hold molecules relatively close together but <u>not</u> strong enough to keep molecules from moving past each other

3. As a solid element melts, the atoms become _____ and they have _____ attraction for one another.
   a. more separated, more
   b. more separated, less
   c. closer together, more
   d. closer together, less
   e. larger, greater

4. A gas is _____ and assumes _____ of its container whereas a liquid is _____ and assumes _____ of its container.
   a. compressible, the volume and shape, not compressible, the shape of a portion
   b. compressible, the shape, not compressible, the volume and shape
   c. compressible, the volume and shape, compressible, the volume
   d. condensed, the volume and shape, condensed, the volume and shape
   e. condensed, the shape, compressible, the volume and shape

5. Which statement is true about liquids but not true about solids?
   a. They flow and are highly ordered.
   b. They are highly ordered and not compressible.
   c. They flow and are compressible.
   d. They assume both the volume and the shape of their containers.
   e. They flow and are not compressible.

6. The strongest interparticle attractions exist between particles of a _____ and the weakest interparticle attractions exist between particles of a _____.
   a. solid, liquid
   b. solid, gas
   c. liquid, gas
   d. liquid, solid
   e. gas, solid

7. The principal source of the difference in the normal boiling points of ICl (97°C; molecular mass 162 amu) and Br_2 (59°C; molecular mass 160 amu) is _____.
   a. London-dispersion forces
   b. dipole-dipole interactions
   c. hydrogen bonding
   d. both hydrogen-bonding and dipole-dipole interactions
   e. both dipole-dipole interactions and London dispersion forces

8. When NaCl dissolves in water, aqueous Na^+ and Cl^- ions result. The force of attraction that exists between Na^+ and H_2O is called a(n) _____ interaction.
   a. dipole-dipole
   b. ion-ion
   c. hydrogen bonding
   d. ion-dipole
   e. London dispersion force

9. The strength of London dispersion forces between like-molecules depends on _____ and _____ __.
   a. molecular mass, polarizability
   b. polarizability, size
   c. molecular mass, volatility
   d. size, shape
   e. vapor pressure, size

10. The London dispersion force is the attractive force between _____.
    a. an ion and a permanent dipole
    b. an instantaneous dipole and an induced dipole
    c. two permanent dipoles
    d. two molecules with hydrogen bonded to an oxygen atom
    e. any of the above

11. Which one of the following derivatives of ethane has the highest boiling point?
    a. C_2Br_6
    b. C_2F_6
    c. C_2I_6
    d. C_2Cl_6
    e. C_2H_6

12. What is the predominant intermolecular force in CBr_4?
    a. London-dispersion forces
    b. ion-dipole attraction
    c. ionic bonding
    d. dipole-dipole attraction
    e. hydrogen-bonding

13. Elemental iodine (I_2) is a solid at room temperature. What is the major attractive force that exists among different I_2 molecules in the solid?
    a. London dispersion forces
    b. dipole-dipole rejections
    c. ionic-dipole interactions
    d. covalent-ionic interactions
    e. dipole-dipole attractions

14. Of the following substances, only _____ has London dispersion forces as its only intermolecular force.
    a. CH_3OH
    b. NH_3
    c. H_2S
    d. CH_4
    e. HCl

15. Which one of the following compounds will have hydrogen bonds as one of its intermolecular forces?
    HF NH_3 SiH_4 CH_4
    a. HF and NH_3
    b. SiH_4 only
    c. CH_4 only
    d. NH_3 only
    e. HF only

16. What intermolecular force is responsible for the fact that ice is less dense than liquid water?
    a. London dispersion forces
    b. dipole-dipole forces
    c. ion-dipole forces
    d. hydrogen bonding
    e. ionic bonding

17. The shape of a liquid's meniscus is determined by _____.
    a. the viscosity of the liquid
    b. the type of material the container is made of
    c. the relative magnitudes of cohesive forces in the liquid and adhesive forces between the liquid and its container
    d. the amount of hydrogen bonding in the liquid
    e. the volume of the liquid

18. Viscosity is _____.
    a. the "skin" on a liquid surface caused by intermolecular attraction
    b. the resistance to flow
    c. the same as density
    d. inversely proportional to molar mass
    e. unaffected by temperature

19. How high a liquid will rise up a narrow tube as a result of capillary action depends on _____.
    a. the magnitudes of cohesive forces in the liquid and adhesive forces between the liquid and the tube, and gravity
    b. gravity alone
    c. only the magnitude of adhesive forces between the liquid and the tube
    d. the viscosity of the liquid
    e. only the magnitude of cohesive forces in the liquid

20. The direct conversion of a solid to a gas is called _____.
    a. fusion
    b. vaporization
    c. condensation
    d. boiling
    e. sublimation

21. The substance with the largest heat of vaporization is _____.
    a. I_2
    b. Br_2
    c. Cl_2
    d. F_2
    e. O_2

22. Of the following, _____ is an exothermic process.
    a. melting
    b. subliming
    c. freezing
    d. boiling
    e. All of these are exothermic.

23. The heat of fusion of water is 6.01 kJ/mol. The heat capacity of liquid water is 75.2 J/mol-K. The conversion of 50.0 g of ice at 0.00°C to liquid water at 22.0°C requires _____ kJ of heat.
    a. 3.8×10^2
    b. 21.3
    c. 17.2
    d. 0.469
    e. Insufficient data are given.

24. If 10.0 kJ of heat are added to a 15.5 g ice cube at -5.00°C, what will be the resulting state and temperature of the water?
    a. liquid, 13.9°C
    b. liquid, 72.0°C
    c. vapor, 103°C
    d. vapor, 134°C
    e. solid, -4.85°C

25. A volatile liquid is one that _____.
    a. is highly flammable
    b. is highly viscous
    c. is highly hydrogen-bonded
    d. is highly cohesive
    e. readily evaporates

26. Of the following, _____ is the most volatile.
    a. CBr_4
    b. CCl_4
    c. CF_4
    d. CH_4
    e. C_6H_{14}

27. In general, the vapor pressure of a substance increases as _____ increases.
    a. surface tension
    b. molecular weight
    c. hydrogen bonding
    d. viscosity
    e. temperature

28. The vapor pressure of any substance at its normal boiling point is
    a. 1 Pa
    b. 1 torr
    c. 1 atm
    d. equal to atmospheric pressure
    e. equal to the vapor pressure of water

29. Some things take longer to cook at high altitudes than at low altitudes because _____.
    a. water boils at a lower temperature at high altitude than at low altitude
    b. water boils at a higher temperature at high altitude than at low altitude
    c. heat isn't conducted as well in low density air
    d. natural gas flames don't burn as hot at high altitudes
    e. there is a higher moisture content in the air at high altitude

30. On a phase diagram, the critical pressure is _____.
    a. the pressure required to melt a solid
    b. the pressure below which a substance is a solid at all temperatures
    c. the pressure above which a substance is a liquid at all temperatures
    d. the pressure at which a liquid changes to a gas
    e. the pressure required to liquefy a gas at its critical temperature

31. On a phase diagram, the melting point is the same as _____.
    a. the triple point
    b. the critical point
    c. the freezing point
    d. the boiling point
    e. the vapor-pressure curve