Chemistry
EOC Review 5: Physical Behavior of Matter

1. Which gas is monatomic at STP?
   a. chlorine
   b. fluorine
   c. neon
   d. nitrogen

2. What Kelvin temperature is equal to 25°C?
   a. 248 K
   b. 298 K
   c. 100 K
   d. 200 K

3. When the external pressure is 101.3 kPa torr, water will boil at what temperature?
   a. 12.8°C
   b. 14.5°C
   c. 100°C
   d. 18°C

4. As ice cools from 273 K to 263 K, the average kinetic energy of its molecules will
   a. decrease
   b. increase
   c. remain the same

5. The phase change represented by the equation I_2 (s) ----> I_2 (g) is called
   a. sublimation
   b. condensation
   c. melting
   d. boiling

6. The heat of fusion is defined as the energy required at constant temperature to change 1 unit mass of a
   a. gas to a liquid
   b. gas to a solid
   c. solid to a gas
   d. solid to a liquid

7. Solid X is placed in contact with solid Y. Heat will flow spontaneously from X to Y when
   a. X is 20°C and Y is 20°C
   b. X is 10°C and Y is 5°C
   c. X is -25°C and Y is -10°C
   d. X is 25°C and Y is 30°C

8. As the pressure of a gas at 2 atm is changed to 1 atm at constant temperature, the volume of the gas
   a. decreases
   b. increases
   c. remains the same

9. What is the total number of joules of heat energy absorbed by 15 grams of water when it is heated from 30°C to 40°C?
   a. 10

b. 63
c. 150
d. 630

10. A compound differs from a mixture in that a compound always has a
    a. homogeneous composition
    b. maximum of two components
    c. minimum of three components
    d. heterogeneous composition

11. Which substance cannot be decomposed into simpler substances?
    a. ammonia
    b. aluminum
    c. methane
    d. methanol

12. How many joules are equivalent to 35 kilojoules?
    a. 0.035 joules
    b. 0.35 joules
    c. 3,500 joules
    d. 35,000 joules

13. Under the same conditions of temperature and pressure, a liquid differs from a gas because the particles of
    the liquid
    a. are in constant straight-line motion
    b. take the shape of the container they occupy
    c. have no regular arrangement
    d. have stronger forces of attraction between them

14. According to Reference Table G, a temperature change from 60°C to 90°C has the least effect on the solubility of
    a. SO_2
    b. NH_3
    c. KCl
    d. $KClO_3$

15. Which statement describes a chemical property?
    a. Its crystals are a metallic gray.
    b. It dissolves in alcohol.
    c. It forms a violet-colored gas.
    d. It reacts with hydrogen to form a gas.

16. The volume of a given mass of an ideal gas at constant pressure is
    a. directly proportional to the Kelvin temperature.
    b. directly proportional to the Celsius temperature.
    c. inversely proportional to the Kelvin temperature.
    d. inversely proportional to the Celsius temperature.

17. Based on Reference Table F, which of the following saturated solutions would be the least concentrated?
    a. sodium sulfate
    b. potassium sulfate

c. copper (II) sulfate
d. barium sulfate

18. A solution in which the crystallizing rate of the solute equals the dissolving rate of the solute must be
a. saturated
b. unsaturated
c. concentrated
d. dilute

19. How are the boiling and freezing points of a sample of water affected when salt is dissolved in the water?
a. The boiling point decreases and the freezing point decreases.
b. The boiling point decreases and the freezing point increases.
c. The boiling point increases and the freezing point decreases.
d. The boiling point increases and the freezing point increases

20. A sample of unknown gas at STP has a density of 0.630 g per liter. What is the gram molecular mass of this gas?
a. 2.81 g
b. 14.1 g
c. 22.4 g
d. 63 g

21. The heat of fusion of a compound is 30 joules per gram. What is the total number of joules of heat that must be absorbed by a 15.0 gram
sample to change the compound from a solid to a liquid at its melting point?
a. 15 cal
b. 45 cal
c. 150 cal
d. 450 cal

22.How many joules of heat are absorbed when 70.0 grams of water is completely vaporized at its boiling point?
a. 23, 352
b. 7, 000
c. 15, 813
d. 158, 130

23. Under which conditions are gases most soluble in water?
a. high pressure and high temperature
b. high pressure and low temperature
c. low pressure and high temperature
d. low pressure and low temperature

24. Petroleum is classified chemically as
a. a substance
b. a compound
c. an element
d. a mixture

25. Given: (52.6 cm) (1.214 cm)
What is the product expressed to the correct number of significant figures?

a. 64 cm^2
b. 63.9 cm^2
c. 63.86 cm^2
d. 63.8564 cm^2

26. Which measurement contains three significant figures?
a. 0.08 cm
b. 0.080 cm
c. 800 cm
d. 8.08 cm

27. A student investigated the physical and chemical properties of a sample of unknown gas and then investigated the gas. Which statement represents a conclusion rather than an experimental observation?
a. The gas is colorless.
b. The gas is carbon dioxide.
c. When the gas is bubbled in limewater, the liquid becomes cloudy.
d. When placed in the gas, a flaming splint stops burning.

28. A student determined the heat of fusion of water to be 366.9 J/g. If the accepted value is 333.3J/g, what is the student's percent error?
a.8.0%
b. 10.0%
c. 15%
d. 30.0%

29. In an experiment, a student found 18.6% by mass of water in a sample of $BaCl_2 * 2H_2O$. The accepted value is 14.8%. What was the student's experimental percent error?
a. 3.8 / 18.6 x 100
b. 3.8 / 14. 8 x 100
c. 14.8 / 18.6 x 100
d. 18.6 / 14.8 x 100

30. The following set of procedures was used by a student to determine the heat of solution of NaOH
A) Read the original temperature of the water
B) Read the final temperature of the water
C) Pour the water into a beaker
D) Stir the mixture
E) Add the sodium hydroxide
What is the correct order of procedures for making this determination?

a. A-> C-> E-> B-> D->
b. E-> D-> C-> A-> B
c. C-> A-> E-> D-> B
d. C-> E-> D-> A-> B

31. A student using a Styrofoam cup as a calorimeter added a piece of metal to distilled water and stirred the mixture.
a) The initial temperature of 50.0 g of water was 25°C.
b) The initial temperature of 20.0 g of metal was 100 °C.
c) The final temperature of the water and metal was 32.0° C

Which statement correctly describes the heat flow in calories? (Ignore heat gained or lost by the calorimeter)

a. The water lost 1360 calories of heat and the metal gained 140 calories of heat.
b. The water lost 350 calories of heat and the metal gained 350 calories of heat.
c. The water gained 1360 calories of heat and the metal lost 140 calories of heat.
d. The water gained 350 calories of heat and the metal lost 350 calories of heat.

32. What is the sum of 6.6412 g + 12.85 + 0.046 g + 3.48 g Expressed to the correct number of significant figures?

a. 23 g
b. 23.0 g
c. 23.017 g
d. 23.02 g

33. What occurs as potassium nitrate is dissolved in a beaker of water, indicating that the process is endothermic?

a. The temperature of the solution decreases.
b. The temperature of the solution increases.
c. The solution changes color.
d. The solution gives off a gas.

34. Salt A and salt B were dissolved separately in 100 mL beakers of water. The water temperatures were measured and recorded as shown in the table below:

Salt A: initial water temp. 25.1°C *final water temp.* 30.2°C
Salt B: initial water temp. 25.1°C *final water temp.* 20.0°C

Which statement is a correct interpretation of these data?

a. The dissolving of only salt A was endothermic.
b. The dissolving of only salt B was exothermic
c. The dissolving of both salt A and salt B was endothermic.
d. The dissolving of salt A was exothermic and the dissolving of salt B was endothermic.

35. In a laboratory exercise to determine the volume of a mole of a gas at STP, a student determines the volume to be 2.25 liters greater than the accepted value of 22.4 liters. The percent error in the student's value is

a. 2.25%
b. 10.0 %
c. 20.2%
d. 24.7%

36. A solid is dissolved in a beaker of water. Which observation suggests that the process is endothermic?

a. The solution gives off a gas.
b. The solution changes color.
c. The temperature of the solution decreases.
d. The temperature of the solution increases.

37. To determine the density of an irregularly shaped object, a student immersed the object in 21.2 milliliters of H_2O in a graduated cylinder, causing the level of the H_2O to rise to 27.8 milliliters. If the object had a mass of 22.4 grams, what was the density of the object.

a. 27.8 g / mL

b. 6.6 g / mL
c. 3.0 g / mL
d. 3.4 g/ mL