Test 5 Review questions

Name: _____

Thursday, December 13, 2007

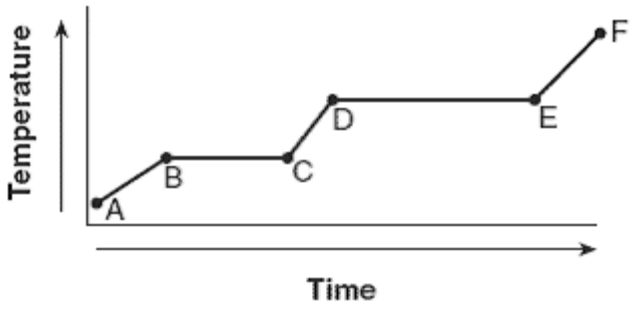
1.

As ice cools from 273 K to 263 K, the average kinetic energy of its molecules will

1. decrease
2. increase
3. remain the same

2.

The graph below represents the uniform heating of a substance, starting with the substance as a solid below its melting point.



Which line segment represents an increase in potential energy and no change in average kinetic energy?

1. $\overline{AB}$
2. $\overline{BC}$
3. $\overline{CD}$
4. $\overline{EF}$

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3.

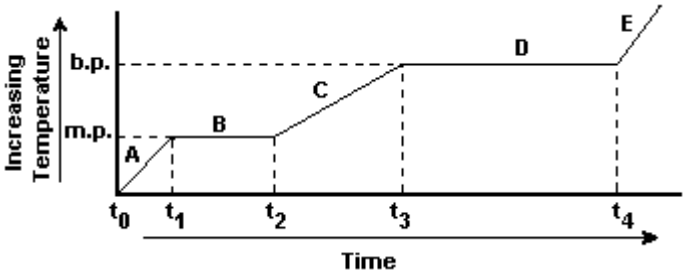

Figure 1

The graph represents a relationship between temperature and time as heat is added uniformly to a substance, starting when the substance is a solid below its melting point. Which portions of the graph represents times when heat is absorbed and potential energy increases while kinetic energy remains constant?

1. *A* and *B*
2. *B* and *D*
3. *A* and *C*
4. *C* and *D*

4.

Which Kelvin temperature is equal to -73°C?

1. 100 K
2. 173 K
3. 200 K
4. 346 K

5.

Which term is defined as a measure of the average kinetic energy of the particles in a sample?

1. temperature
2. pressure
3. thermal energy
4. chemical energy

6.

The boiling point of water at standard pressure is

1. 0.000 K
2. 100. K
3. 273 K
4. 373 K

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7.

Which transfer of energy occurs when ice cubes are placed in water that has a temperature of $45^{o}C$?

1. Chemical energy is transferred from the ice to the water.
2. Chemical energy is transferred from the water to the ice.
3. Thermal energy is transferred from the ice to the water.
4. Thermal energy is transferred from the water to the ice.

8.

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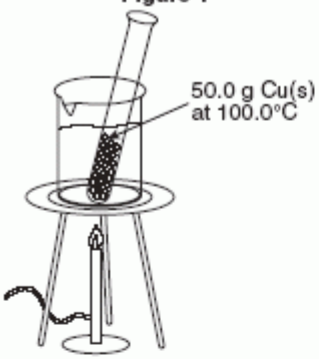
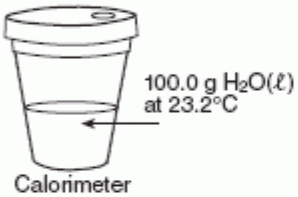
Figure 1



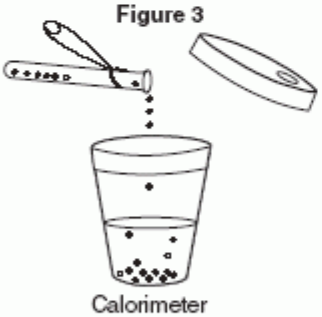
In a laboratory investigation, a 50.0-gram sample of copper is at 100.0°C in a boiling water bath.

Figure 2



A Styrofoam cup with a lid is used as a calorimeter. The cup contains 100.0 grams of distilled water at 23.2°C.

Figure 3



The hot copper is poured into the cup of water, and the cup is quickly covered with the lid.

Figure 4

A thermometer is inserted through the lid. The copper and water are gently stirred in the cup. The temperature is checked periodically. The highest temperature noted is 26.3°C.

Figure 2

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Using the information given, complete the data table, rounding to 1 decimal place.

Data Table

Quantity Measured	**Data** (units are given)
Mass of copper	g
Temperature of hot copper	°C
Mass of H_2O in calorimeter	g
Initial temperature of H_2O in calorimeter	°C
Final temperature of H_2O and copper	°C

9.

Which kind of energy is stored within a chemical substance?

1. free energy
2. activation energy
3. kinetic energy
4. potential energy

10.

As the temperature of a substance *decreases*, the average kinetic energy of its particles

1. decreases
2. increases
3. remains the same

11.

Base your answer to the question on the information below.

The graph below shows a compound being cooled at a constant rate starting in the liquid phase at 75°C and ending at 15°C.

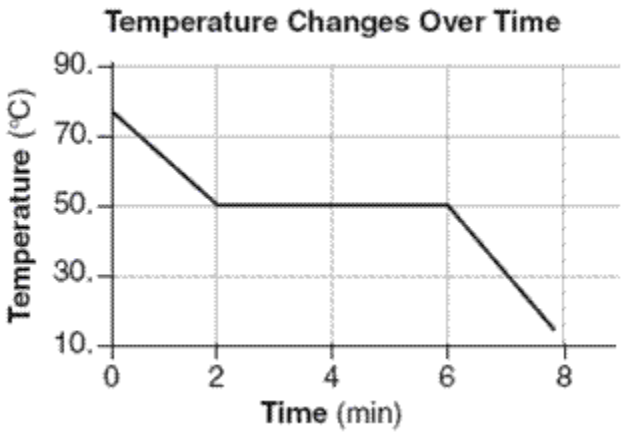

Figure 3

What kelvin temperature is equal to 15°C?

Answer: _____ K

12. _____

At 1 atmosphere of pressure, the steam-water equilibrium occurs at a temperature of

1. 0 K
2. 100 K
3. 273 K
4. 373 K

13. _____

Which Kelvin temperatures represent, respectively, the normal freezing point and the normal boiling point of water?

1. 0 K and 273 K
2. 0 K and 100 K
3. 100 K and 273 K
4. 273 K and 373 K

14.

The potential energy possessed by a molecule is dependent upon

1. its composition, only
2. its structure, only
3. both its composition and its structure
4. neither its composition nor its structure

15.

The temperature of a sample of water is changed from 10°C to 30°C. The same change in Kelvins would be

1. 20
2. 100
3. 273
4. 303

16.

Base your answer to the question on the information below.

A light bulb contains argon gas at a temperature of 295 K and at a pressure of 75 kilopascals. The light bulb is switched on, and after 30 minutes its temperature is 418 K.

Figure 4

What Celsius temperature is equal to 418 K?

Answer: °C

17.

At one atmosphere of pressure, the fixed temperature points on a Celsius thermometer are located on the basis of

1. the ice/water equilibrium temperature only
2. the water/steam equilibrium temperature only
3. both the ice/water and water/steam equilibrium temperatures
4. neither the ice/water nor the water/steam equilibrium temperature

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18.

Energy is being added to a given sample. Compared to the Celsius temperature of the sample, the Kelvin temperature will

1. always be 273 greater
2. always be 273 lower
3. have the same reading at 0°
4. have the same reading at 273°

19.

Which kind of energy is stored in a chemical bond?

1. potential energy
2. kinetic energy
3. activation energy
4. ionization energy

20.

The temperature of a sample of nitrogen gas is a measure of the molecules' average

1. activation energy
2. potential energy
3. kinetic energy
4. ionization energy

21.

The burning of magnesium involves a conversion of

1. chemical energy to mechanical energy
2. chemical energy to heat energy
3. heat energy to chemical energy
4. heat energy to mechanical energy

22.

At which temperature would atoms of a He(g) sample have the greatest average kinetic energy?

1. 25°C
2. 37°C
3. 273 K
4. 298 K

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23.

Two samples of gold that have different temperatures are placed in contact with one another. Heat will flow spontaneously from a sample of gold at 60°C to a sample of gold that has a temperature of

1. 50°C
2. 60°C
3. 70°C
4. 80°C

24.

When the average kinetic energy of a gaseous system is increased, the average molecular velocity of the system

1. increases and the molecular mass increases
2. decreases and the molecular mass increases
3. increases and the molecular mass remains the same
4. decreases and the molecular mass remains the same

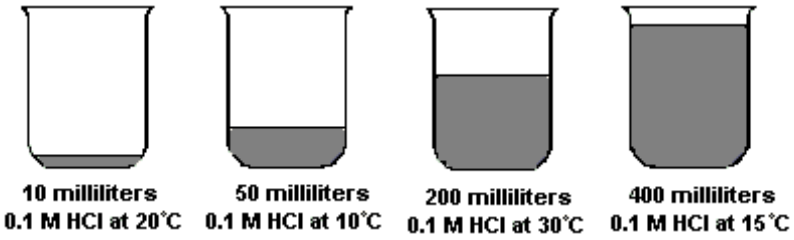
25.

The temperature of a sample of a substance changes from 10°C to 20°C. By how many Kelvins does the temperature change?

1. 10
2. 20
3. 283
4. 293

26.

In which beaker would the particles have the highest average kinetic energy?



1. 2. 3. 4.

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27.

At which temperature does a water sample have the highest average kinetic energy?

1. 0°C
2. 100°C
3. 0. K
4. 100. K

28.

Which equilibrium at one atmosphere pressure is correctly associated with Kelvin temperature at which it occurs?

1. ice-water equilibrium at 0 K
2. ice-water equilibrium at 32 K
3. steam-water equilibrium at 212 K
4. steam-water equilibrium at 373 K

29.

Which type of change must occur to form a compound?

1. chemical
2. physical
3. nuclear
4. phase

30.

At which condition of temperature and pressure would the molecules of a gas have the greatest average kinetic energy?

1. 0°C and 3 atm
2. 10°C and 2 atm
3. 50°C and 4 atm
4. 100°C and 1 atm

31.

An increase in the average kinetic energy of a sample of copper atoms occurs with an increase in

1. concentration
2. temperature
3. pressure
4. volume

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32.

Which change in the temperature of a 1-gram sample of water would cause the greatest increase in the average kinetic energy of its molecules?

1. 1°C to 10°C
2. 10°C to 1°C
3. 50°C to 60°C
4. 60°C to 50°C

33.

Two pure water samples held in separate containers at one atmosphere pressure must have molecules possessing the same average kinetic energy if the samples have the same

1. volume
2. temperature
3. mass
4. density

34.

The particles in a crystalline solid are arranged

1. randomly and far apart
2. randomly and close together
3. regularly and far apart
4. regularly and close together

35.

A substance is a solid at 15°C. A student heated a sample of the solid substance and recorded the temperature at one-minute intervals in the data table below.

Time (min)	0	1	2	3	4	5	6	7	8	9	10	11	12
Temperature (°C)	15	32	46	53	53	53	53	53	53	53	53	60	65

Figure 5

Based on the data table, the melting point of this substance is _____ °C.

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36.

The amount of energy needed to change a given mass of ice to water at constant temperature is called the heat of

1. condensation
2. crystallization
3. fusion
4. formation

37.

Which set of properties does a substance such as $CO_2(g)$ have?

1. definite shape and definite volume
2. definite shape but no definite volume
3. no definite shape but definite volume
4. no definite shape and no definite volume

38.

Which substance has vibrating particles in regular, fixed positions?

1. $Ca(s)$
2. $Hg(l)$
3. $Cl_2(g)$
4. $CaCl_2(aq)$

39.

Which equation represents the phase change called sublimation?

1. $CO_2(s) \rightarrow CO_2(g)$
2. $H_2O(s) \rightarrow H_2O(l)$
3. $H_2O(l) \rightarrow H_2O(g)$
4. $NaCl(l) \rightarrow NaCl(s)$

40.

[Refer to figure 5 in question 35]

The heat of fusion for this substance is 122 joules per gram. How many joules of heat are needed to melt 7.50 grams of this substance at its melting point?

Answer: J

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41.

Which sample contains particles in a rigid, fixed, geometric pattern?

1. $CO_2(aq)$
2. $HCl(g)$
3. $H_2O(\ell)$
4. $KCl(s)$

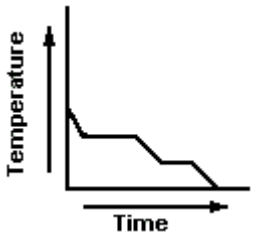
42.

What occurs when the temperature of 10.0 grams of water is changed from 15.5°C to 14.5°C?

1. The water absorbs 42 joules.
2. The water releases 42 joules.
3. The water absorbs 4200 joules.
4. The water releases 4200 joules.

43.

Which graph best represents a change of phase from a gas to a solid?

1.


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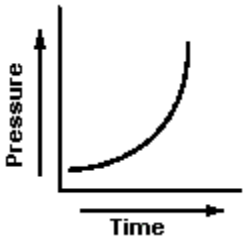

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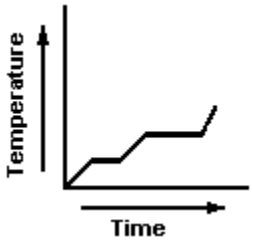

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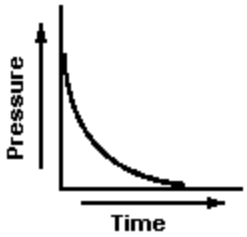

44.

At which point do a liquid and solid exist at equilibrium?

1. sublimation point
2. vaporization point
3. boiling point
4. melting point

45.

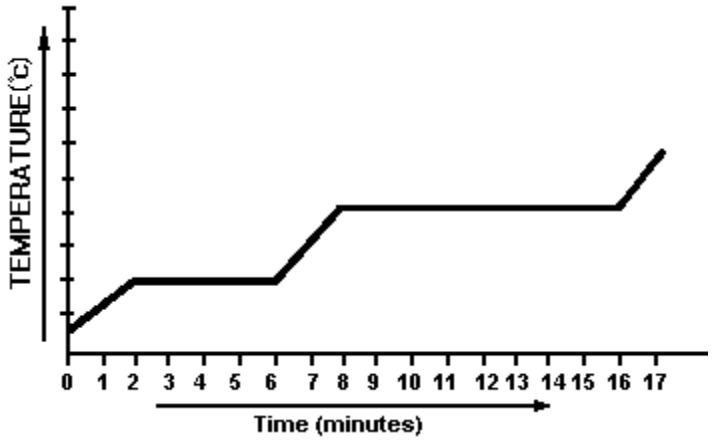

Figure 6

The graph was constructed by a student to show the relationship between temperature and time as heat was uniformly added to a solid below its melting point. What is the total length of time that the solid phase was in equilibrium with the liquid phase?

1. 6 min
2. 10 min
3. 8 min
4. 4 min

46.

The solid and liquid phases of water can exist in a state of equilibrium at 1 atmosphere of pressure and a temperature of

1. 0°C
2. 100°C
3. 273°C
4. 373°C

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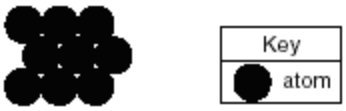
47.

Given the particle diagram:



At 101.3 kPa and 298 K, which element could this diagram represent?

1. Rn
2. Xe
3. Ag
4. Kr

48.

As ice melts at standard pressure, its temperature remains at 0°C until it has completely melted. Its potential energy

1. decreases
2. increases
3. remains the same

49.

In which sample are the particles arranged in a regular geometric pattern?

1. HCL(*l*)
2. NaCl(*aq*)
3. $N_2(g)$
4. $I_2(s)$

50.

What type of change do the reactants undergo in the reaction $2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$?

1. atomic
2. phase
3. chemical
4. nuclear

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Answer Key for Test 5 Review questions

1. 1
2. 2
3. 2
4. 3
5. 1
6. 4
7. 4
8. 50, 100, 100, 23.2, 26.3
9. 4
10. 1
11. 288
12. 4
13. 4
14. 3
15. 1
16. 145
17. 3
18. 1
19. 1
20. 3
21. 2
22. 2
23. 1
24. 3
25. 1
26. 3
27. 2
28. 4
29. 1
30. 4
31. 2
32. 3
33. 2
34. 4
35. 53
36. 3
37. 4
38. 1
39. 1
40. 915
41. 4
42. 2
43. 1
44. 4
45. 4
46. 1

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47. 3
48. 2
49. 4
50. 3