Name: _____

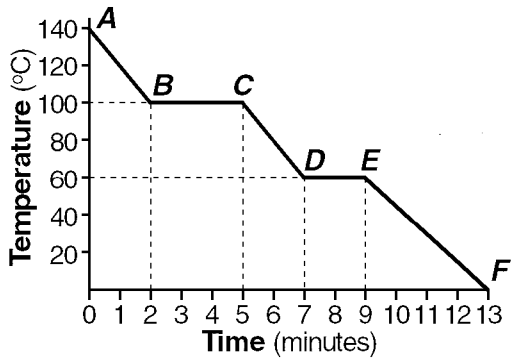
___ 1) The amount of heat required to raise the temperature of one gram of a substance by one degree Celsius is called

1) heat of fusion
2) specific heat capacity
3) vapor pressure
4) heat of vaporization

___ 2) Which temperature is the same as -13° Celsius?

1) 747 K
2) 773 K
3) 260 K
4) 286 K

___ 3) The graph below represents the uniform cooling of a sample of a substance, starting with the substance as a gas above its boiling point.



What segment of the curve represents a time when *both* the liquid and the solid phases are present?

1) *DE*
2) *BC*
3) *CD*
4) *EF*

___ 4) What unit is used to express the amount of energy absorbed or released during a chemical reaction?

1) torr
2) joule
3) gram
4) degree

___ 5) Which of the following *best* describes exothermic chemical reactions?

1) They never release heat.
2) They never occur spontaneously.
3) They always occur spontaneously.
4) They always release heat.

___ 6) How many joules are equivalent to 35 kilojoules?

1) 0.35 joule
2) 3,500 joules
3) 0.035 joule
4) 35,000 joules

___ 7) As ice at 0° C changes to water at 0° C, the average kinetic energy of the ice molecules

1) decreases
2) remains the same
3) increases

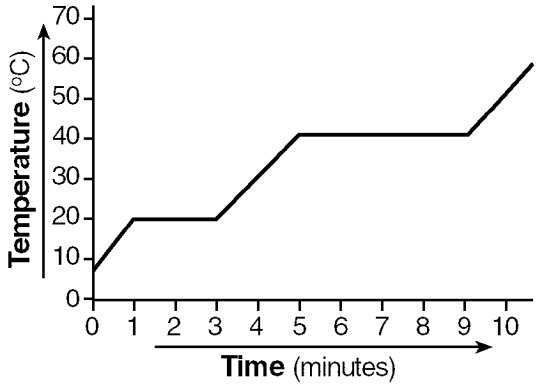
___ 8) What type of energy is stored within a chemical substance?

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

___ 9) Which unit is used to express the amount of energy absorbed or released during a chemical reaction?

1) calorie
2) torr
3) degree
4) gram

___ 10) The graph below represents changes of state for an unknown substance.



What is the boiling temperature of the substance?

1) 40° C
2) 0° C
3) 20° C
4) 70° C

___ 11) The minimum number of fixed points required to establish the Celsius temperature scale for a thermometer is

1) 1
2) 2
3) 3
4) 4

___ 12) Which phase change results in a release of energy?

1) $NH_3(\ell) \longrightarrow NH_3(g)$
2) $H_2O(s) \longrightarrow H_2O(\ell)$
3) $Br_2(g) \longrightarrow Br_2(s)$
4) $I_2(s) \longrightarrow I_2(g)$

___ 13) As a 1-gram sample of $H_2O(\ell)$ changes to $H_2O(g)$ at 100°C, the potential energy of the molecules

1) decreases
2) remains the same
3) increases

___ 14) What is the specific heat capacity of $H_2O(\ell)$?

1) 1.0 J/g•K
2) 333.6 J/g
3) 2,259 J/g
4) 4.2 J/g•K

___ 15) Which of the following substances is made of particles with the *highest* average kinetic energy?

1) $CO_2(g)$ at 25°C
2) $H_2O(\ell)$ at 30°C
3) $Br_2(\ell)$ at 20°C
4) Fe(s) at 35°C

___ 16) The temperature of a substance is a measure of its particles'

1) average potential energy
2) entropy
3) average kinetic energy
4) enthalpy

___ 17) The temperature of 50. grams of water was raised to 50.°C by the addition of 4,180 joules of heat energy. What was the initial temperature of the water? [*Specific Heat of Water = 4.18 J/g•k*]

1) 60.°C
2) 10.°C
3) 30.°C
4) 20.°C

___ 18) If 4.0 grams of water at 1°C absorbs 33 joules of heat, what will be the change in temperature of the water? [*Specific Heat of Water = 4.18 J/g•k*]

1) 1.0°C
2) 3.0°C
3) 4.0°C
4) 2.0°C

___ 19) According to an accepted chemistry reference, the heat of vaporization of water is 2,260 joules per gram. A student determined in the laboratory that the heat of vaporization of water was 2,590 joules per gram. What is the percent error of the student's result?

1) 12.7
2) 14.6
3) 87.3
4) 80.0

___ 20) Which is the equivalent of 750. calories?

1) 0.750 kcal
2) 75.0 kcal
3) 7.50 kcal
4) 750. kcal

___ 21) As electrical energy is converted into heat energy, the total amount of energy in the system

1) remains the same
2) decreases
3) increases

___ 22) A 7.0 gram sample of water is heated and the temperature rises from 10°C to 15°C. What is the total amount of heat energy absorbed by the water? [*Specific Heat of Water = 4.18 J/g•k*]

1) 117 joules
2) 29 joules
3) 146 joules
4) 88 joules

___ 23) In an experiment, the gram atomic mass of magnesium was determined to be 24.7. Compared to the accepted value 24.3, what is the percent error for this determination?

1) 24.7
2) 98.4
3) 0.400
4) 1.65

___ 24) What is the total number of joules of heat energy absorbed when the temperature of 200 grams of water is raised from 10°C to 40°C? [*Specific Heat of Water = 4.18 J/g •k*]

1) 200 joules
2) 25,080 joules
3) 30 joules
4) 33,440 joules

___ 25) Solid *X* is placed in contact with solid *Y*. Heat will flow spontaneously from *X* to *Y* when

1) *X* is 20°C and *Y* is 20°C
2) *X* is -25°C and *Y* is -10°C
3) *X* is 10°C and *Y* is 5°C
4) *X* is 25°C and *Y* is 30°C

___ 26) What occurs when the temperature of 10.0 grams of water is changed from 15.5°C to 14.5°C? [*Specific Heat of Water = 4.18 J/g •k*]

1) The water absorbs 41.8 joules.
2) The water absorbs 155 joules.
3) The water releases 41.8 joules.
4) The water releases 155 joules.

___ 27) Which change of phase is exothermic?

1) gas to a liquid
2) liquid to a gas
3) solid to a liquid
4) solid to a gas

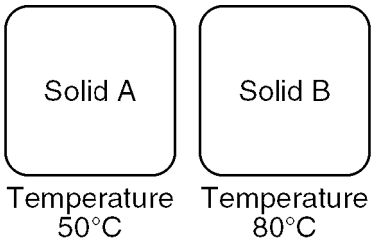
___ 28) The amount of energy needed to change a given mass of ice to water at constant temperature is called the heat of

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

___ 29) What is the total number of joules of heat needed to change 150.0 grams of ice to water at 0°C? (heat of fusion = 333.6 J/g)

1) 333.6
2) 1,394
3) 50,040
4) 2.224

___ 30) The diagrams below represent two solids and the temperature of each.



What occurs when the two solids are placed in contact with each other?

1) Heat energy flows from solid *A* to solid *B*. Solid *A* decreases in temperature.
2) Heat energy flows from solid *B* to solid *A*. Solid *B* decreases in temperature.
3) Heat energy flows from solid *A* to solid *B*. Solid *A* increases in temperature.
4) Heat energy flows from solid *B* to solid *A*. Solid *B* increases in temperature.

___ 31) How many grams of water will absorb a total of 2,510 joules of energy when the temperature of the water changes from 10.0°C to 30.0°C? [*Specific Heat of Water = 4.18 J/g •k*]

1) 20.0 g
2) 83.6 g
3) 126 g
4) 30.0 g

___ 32) How many kilojoules of heat are absorbed when 70.00 grams of water is completely vaporized at its boiling point? [*Specific Heat of Water = 4.18 J/g •k*]

1) 2.259 kJ
2) 2,259 kJ
3) 158.1 kJ
4) 158,130 kJ

___ 33) When a substance was dissolved in water, the temperature of the water increased. This process is described as

1) endothermic, with the absorption of energy
2) exothermic, with the absorption of energy
3) exothermic, with the release of energy
4) endothermic, with the release of energy

___ 34) Which Kelvin temperature is equal to -33°C?

1) -33 K
2) 33 K
3) 306 K
4) 240 K

___ 35) Energy of position or stored energy is also called

1) chemical energy
2) potential energy
3) activation enery
4) kinetic energy

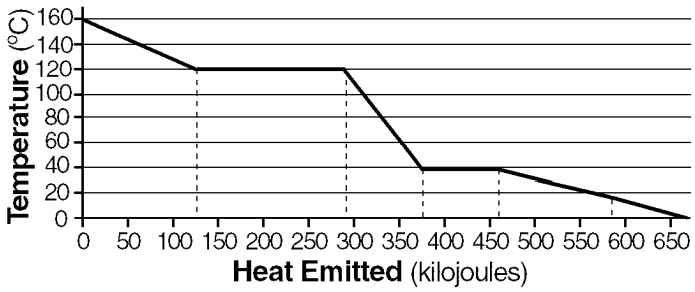
___ 36) What quantity of heat does a kilojoule represent?

1) 1,000 joules
2) $\frac{1}{100}$ of a joule
3) 100 joules
4) $\frac{1}{1{,}000}$ of a joule

___ 37) As the temperature of a gas is increased, the average kinetic energy of its molecules

1) decreases
2) increases
3) remains the same

___ 38) The graph below represents the uniform cooling of a substance starting as a gas at 160°C.



At which temperature does a phase change occur for this substance?

1) 0°C
2) 140°C
3) 40°C
4) 80°C

___ 39) A student obtained the following data while cooling a substance. The substance was originally in the liquid phase at a temperature below its boiling point.

Time (minutes)	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Temperature (°C)	70	63	57	54	53	53	53	53	53	52	51	48

What is the freezing point of the substance?

1) 70°C
2) 48°C
3) 53°C
4) 59°C