***LEGIT LIGHTNING ROUND 7***

**TOSS-UP**

1) CHEMISTRY *Short Answer* What law describes the direct proportionality between the solubility of a gas and the partial pressure of said gas?

ANSWER: HENRY’S LAW

**TOSS-UP**

2) CHEMISTRY *Short Answer* By name or number, identify all of the following that are colligative properties.

I. increasing of the vapor pressure of a solvent

II. the raising of the boiling point of a solvent

III. the lowering of the freezing point of a solvent

IV. osmosis

ANSWER: II, III AND IV

**TOSS-UP**

1. 3) CHEMISTRY *Short Answer* The equation for freezing point depression often includes a variable represented with “i”. What does this variable stand for?

ANSWER: VAN’T HOFF FACTOR

**TOSS-UP**

4) CHEMISTRY *Short Answer*  What kind of azeotrope would be formed from the mixture of acetone and chloroform?

ANSWER: MAXIMUM-BOILING AZEOTROPE

**TOSS-UP**

5) CHEMISTRY *Short Answer* What colloidal phenomenon describes the process where colloids come out of a suspension in the form of flakes by addition of a clarifying agent?

ANSWER: FLOCCULATION

**TOSS-UP**

6) CHEMISTRY *Short Answer* By name or number, identify all of the following four statements that are true in chemical kinetics.

I. The order with respect to each reactant can be predicted by the reactants’ coefficients in an elementary reaction.

II. The initial rate for a first order reaction is greater than the rate as the reaction progresses.

III. The units for the rate constant for a third order reaction are L^3 / mol^3 s

IV. The steady-state approximation allows us to assume that the concentrations of intermediates in a multistep reaction are small, and constant, allowing us to ignore them.

ANSWER: I, II AND IV

**TOSS-UP**

7) CHEMISTRY *Short Answer* What law states that, at equilibrium, the composition of the reaction mixture can be expressed in terms of an equilibrium constant?

ANSWER: LAW OF MASS ACTION

**TOSS-UP**

8) CHEMISTRY *Short Answer* A reaction in which all of the bond breaking, and bond making occurs in one step is said to be what?

ANSWER: CONCERTED

**TOSS-UP**

9) CHEMISTRY *Short Answer* By name or number, identify all of the following four statements that are true.

I. Lithium and magnesium share a diagonal relationship.

II. Sodium and beryllium share a diagonal relationship.

III. Beryllium and aluminum share a diagonal relationship.

IV. All nonradioactive elements share at least one diagonal relationship with some other nonradioactive element?

ANSWER: I AND III

**TOSS-UP**

1. 10) CHEMISTRY *Short Answer*  What is formed when ethyne, C2H2, is exposed to hydrogen gas in the presence of the Lindlar catalyst?

ANSWER: ETHENE (DO NOT ACCEPT: ETHANE)

**TOSS-UP**

11) CHEMISTRY *Short Answer* What theory is used to explain the properties of an activated complex?

ANSWER: TRANSITION STATE THEORY (ACCEPT: ACTIVATED COMPLEX THEORY)

**TOSS-UP**

12) CHEMISTRY *Short Answer* What is the only alkali metal that forms a compound with the nitride ion, N 3-?

ANSWER: LITHIUM

**TOSS-UP**

13) CHEMISTRY *Short Answer* By name or number, identify all of the following four types of plants that can be used for industrial biomass.

I. switchgrass

II. hemp

III. corn

IV. miscanthus

ANSWER: ALL OF THEM

**TOSS-UP**

14) CHEMISTRY *Multiple Choice* Approximately what percent of the CHEMISTRY from the sun is absorbed by clouds, oceans and land masses?

W) 30%

X) 50%

Y) 70%

Z) 90%

ANSWER: Y) 70%

**TOSS-UP**

15) CHEMISTRY *Multiple Choice* As of 2006, what country is the world leader in the total installed capacity of solar hot water systems with 70 gigawatts installed?

W) Canada

X) Australia

Y) Japan

Z) China

ANSWER: Z) CHINA

**TOSS-UP**

16) CHEMISTRY *Multiple Choice*  Which of the following would have the greatest tendency to undergo a Sn1 reaction?

W) n-butane

1. X) isobutane

Y) pentane

Z) propane

ANSWER: X) ISOBUTANE

**TOSS-UP**

17) CHEMISTRY *Short Answer* Also known as black liquor, what is the largest source of CHEMISTRY from wood?

ANSWER: PULPING LIQUOR

**TOSS-UP**

18) CHEMISTRY *Short Answer* What type of electrolytic cell can be used to directly make hydrogen gas from plant matter?

ANSWER: MICROBIAL ELECTROLYSIS CELL

**TOSS-UP**

19) CHEMISTRY *Multiple Choice* About what percent of Earth’s geothermal CHEMISTRY originates from the radioactive decay of minerals?

W) 20%

X) 40%

Y) 60%

Z) 80%

ANSWER: Z) 80%

**TOSS-UP**

20) CHEMISTRY *Multiple Choice* Which of the following best explains why a more substituted carbocation is more stable?

W) The positive charge can be stabilized by being localized when the carbon carrying the positive charge is more substituted.

X) The positive charge can be stabilized through the sigma bonds of adjacent C-H bonds donating into the empty p-orbital of the carbon carrying the positive charge.

Y) The positive charge can be stabilized through intermolecular interactions with adjacent molecules when the carbon carrying the positive charge is more substituted.

Z) The positive charge can be stabilized through the formation of an ionic bond between a neighboring negative molecule and the carbon carrying the positive charge.

ANSWER: X) The positive charge can be stabilized through the sigma bonds of adjacent C-H bonds donating into the empty p-orbital of the carbon carrying the positive charge.

**TOSS-UP**

21) CHEMISTRY *Short Answer* In the second step of biochemical conversion, plant waste fermentation produces what acid?

ANSWER: ACETIC ACID (ACCEPT: ETHANOIC ACID)

**TOSS-UP**

22) CHEMISTRY *Multiple Choice* Which of the following phenomena best explains why a more substituted carbocation is more stable than a less substituted carbocation?

W) resonance

X) hyperconjugation

Y) conjugation

Z) Coulomb attraction

ANSWER: X) HYPERCONJUGATION

**TOSS-UP**

23) CHEMISTRY *Short Answer* What value for l, or the orbital angular momentum quantum number, describes an orbital that can hold 10 electrons?

ANSWER: l = 2

**TOSS-UP**

24) CHEMISTRY *Multiple Choice* If Q, the reaction quotient, is less than K, the equilibrium constant, which of the following will occur?

W) the equilibrium will shift to the right

X) the equilibrium will shift to the left

Y) the equilibrium will not change

Z) the equilibrium will change, but the direction will be dictated by coefficients

ANSWER: W) THE EQUILIBRIUM WILL SHIFT TO THE RIGHT

**TOSS-UP**

25) CHEMISTRY *Multiple Choice* Which of the following colloids does not have a liquid as its dispersion medium?

W) aerosol

X) gel

Y) emulsion

Z) foam

ANSWER: W) AEROSOL