***LEGIT LIGHTNING ROUND 5***

**TOSS-UP**

1) ENERGY *Short Answer* What industrial process is used to produce alumina through the refinement of bauxite, the most important ore of aluminum?

ANSWER: BAYER PROCESS

**TOSS-UP**

2) ENERGY *Short Answer* By name or number, identify all of the following four functions that are equations of state.

I. enthalpy

II. Gibbs free energy

III. internal energy

IV. Helmholtz free energy

ANSWER: I, II AND IV

**TOSS-UP**

1. 3) ENERGY *Short Answer* What international organization was established in 1978 by the OECD International Energy Agency with the aim of improving cooperation and information exchange between countries that have national programs in bioenergy research, development and deployment?

ANSWER: International Energy Agency Bioenergy (IEA Bioenergy)

**TOSS-UP**

4) ENERGY *Short Answer*  What industrial process, sometimes known as the carbonyl process, is used to extract and purify nickel from nickel oxides?

ANSWER: MOND PROCESS

**TOSS-UP**

5) ENERGY *Short Answer* What technique is used to separate air into liquid oxygen, liquid nitrogen and concentrated argon?

ANSWER: FRACTIONAL DISTILLATION (DO NOT ACCEPT DISTILLATION OR SIMPLE DISTILLATION)

**TOSS-UP**

6) ENERGY *Short Answer* Using the wave power formula, identify all of the following three variables that are directly proportional to the wave energy flux per unit of wave-crest length.

I. wave period

II. water density

III. significant wave height

ANSWER: I AND II

**TOSS-UP**

7) ENERGY *Short Answer* In a thermodynamic cycle, the overall change in a state function is what?

ANSWER: ZERO

**TOSS-UP**

8) ENERGY *Short Answer* What is the name of the specific thermodynamic cycle used to find the lattice energy of a specific compound?

ANSWER: BORN-HABER CYCLE

**TOSS-UP**

9) ENERGY *Short Answer* One of the main environmental repercussions of geothermal energy is the fact that fluids drawn from the deep earth carry a mixture of gases that contribute to global warming, acid rain and noxious smells. By name or number, identify all of the following that are gases that can be found in this mixture.

I. carbon dioxide

II. hydrogen sulfide

III. methane

IV. ammonia

ANSWER: ALL OF THEM

**TOSS-UP**

1. 10) ENERGY *Short Answer*  By using a mathematical relation between the temperature at the hot source and the temperature of the cold sink of a Carnot engine, Kelvin was able to deduce that the zero of his scale occurred at a Carnot efficiency of what?

ANSWER: 1

**TOSS-UP**

11) ENERGY *Short Answer* What is the name of the following expression: dS must be greater than or equal to (dq/T).

ANSWER: CLASIUS INEQUALITY

**TOSS-UP**

12) ENERGY *Short Answer* What is the name of the empirical observation that a wide range of liquids give approximately the same standard entropy of vaporization at about 85 J/Kmol?

ANSWER: TROUTON’S RULE

**TOSS-UP**

13) ENERGY *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) ENERGY *Multiple Choice* Approximately what percent of the energy 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) ENERGY *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) ENERGY *Multiple Choice*  In what country was the world’s first wave farm created?

W) Scotland

1. X) Portugal

Y) England

Z) Australia

ANSWER: X) PORTUGAL

**TOSS-UP**

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

ANSWER: PULPING LIQUOR

**TOSS-UP**

18) ENERGY *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) ENERGY *Multiple Choice* About what percent of Earth’s geothermal energy originates from the radioactive decay of minerals?

W) 20%

X) 40%

Y) 60%

Z) 80%

ANSWER: Z) 80%

**TOSS-UP**

20) ENERGY *Multiple Choice* As of 2010, what country has the most installed geothermal electric capacity?

W) United States

X) Philippines

Y) Italy

Z) New Zealand

ANSWER: W) UNITED STATES

**TOSS-UP**

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

ANSWER: ACETIC ACID (ACCEPT: ETHANOIC ACID)

**TOSS-UP**

22) ENERGY *Multiple Choice* In the geothermal industry, low temperature refers to which of the following temperature ranges?

W) 0 degrees Celsius or less

X) 150 degrees Celsius or less

Y) 300 degrees Celsius or less

Z) 450 degrees Celsius or less

ANSWER: X) 150 DEGREES CELSIUS OR LESS

**TOSS-UP**

23) ENERGY *Short Answer* What industrial process is the electrolytic method of bromine extraction from brine?

ANSWER: DOW PROCESS

**TOSS-UP**

24) ENERGY *Multiple Choice* Biomass alcohol fuel, or ethanol, is derived primarily from which two plants?

W) sugarcane and corn

X) sugarcane and willow

Y) corn and switchgrass

Z) corn and hemp

ANSWER: W) SUGARCANE AND CORN

**TOSS-UP**

25) ENERGY *Multiple Choice* Which of the following countries does not have a hydroelectricity plant larger than 10 gigawatts?

W) China

X) Brazil

Y) Venezuela

Z) England

ANSWER: Z) ENGLAND