Name_____ Date _____

Mark: ___/65 = ____ %

PRETEST ON CHAPTER 3

Part 1 – MULTIPLE CHOICES

Answer all the questions on the multiple choice sheet provided at the end

1) Which of the following statements is consistent with the law of conservation of energy?

A) Energy can be created and destroyed only in nuclear reactions.
B) Energy can be transferred, but not transformed.
C) The total amount of energy in an isolated system always remains constant.
D) The total amount of energy in a non isolated system always remains constant.

2) Which of the following statements about energy efficiency IS TRUE?

A) The energy efficiency of a system is the percentage of the useful energy transformed into consumed energy.
B) Electrical devices transform all the energy consumed into useful energy.
C) The energy efficiency of an electrical device that loses energy is less than 100%
D) The energy efficiency of an electrical device that uses all consumed energy is more than 100%

3) Which of the following statements is TRUE?

A) Thermal energy is energy transferred between two objects with different temperatures.
B) Temperature takes into account only the speed of particles of a substance or their degree of agitation.
C) Heat is the energy contained in matter due to the movement of particles that make it up.
D) Temperature depends on the mass of the particles.

4) Using a hot plate, a 250 mL cup of water was heated from 20^0C to 35^0C. ***Which of the following statements describing this change is FALSE?***

A) The water molecules became more agitated.
B) The thermal energy of the water increased.
C) Heat went from the plate to the water.
D) Temperature went from the plate to the water.

5) Below are situations in which the concepts of ***heat*** and ***temperature*** are involved:

1) *The rain melted the ice on the roads.*
2) *At - 29°C, last Thursday was the coldest day of the year.*
3) *The gas stoves are extensively used to prepare foods.*
4) *In Canada, the maximum temperature that a home oven could reach is 550 degrees Fahrenheit.*
5) *If we touch a person that has high fever, their skin feels hot.*

Which of the following represents a correct description of the above concepts?

A) 1 – heat; 2 –temperature; 3- heat; 4 – temperature; 5 – heat
B) 1 – heat; 2 –temperature; 3- heat; 4 – heat; 5 – temperature
C) 1 – temperature; 2 –heat; 3- heat; 4 – temperature; 5 – temperature
D) 1 – temperature; 2 – temperature; 3- heat; 4 – temperature; 5 – temperature

6) The table below represents some changes that a sample of matter undergoes. ***Which of the following changes would produce an increase in the thermal energy?***

	Variation
1	The temperature goes from 0°C to -10°C.
2	The temperature goes from 15°C to 25°C.
3	The number of particles goes from 25 g to 10 g.
4	The number of particles goes from 60 g to 100 g.

A) 1 and 4
B) 2 and 4
C) 1 and 3
D) 2 and 3

7) Which one of the following sentences is FALSE?

A) A 40 kg radiator at 60°C gives off less heat than a burning candle at 120°C.
B) A plate of boiling soup gives off less heat than a plate of edible soup.
C) A 50 kg block of ice gives off more heat than a 10 kg block of ice.
D) 200 g of ice cream give off more heat than a 200 mL glass of coke.

8) A heat furnace produces 6.8 kJ of useful energy to heat a house. The electrical efficiency of the furnace is 92%. ***What is the amount of energy consumed?***

A) $6{,}25 \times 10^3\ kJ$
B) $7.39\ kJ$
C) $13.5\ kJ$
D) $6250\ J$

9) A light bulb transforms electrical energy into light. Over a certain period of time, a light bulb consumes 500 J of electrical energy. The energy efficiency of this light bulb is 78%. ***How much energy is lost as heat?***

A) *641 kJ*
B) *390 kJ*
C) *156 kJ*
D) *641 J*

10) Which of the following statements is NOT consistent with the law of conservation of mass?

A) Matter is not created nor destroyed.
B) In all chemical reactions, the number of atoms of each type is equal before and after the reaction.
C) In all chemical reactions, the total mass of the reactants equals the total mass of the products.
D) In all chemical reactions, the number of molecules of each type is equal before and after the reaction.

11) The following equation represents the cellular respiration reaction, a vital process taking place in the green cells of all plants.

$$C_6H_{12}O_{6(s)} + 6\ O_{2(g)} \rightarrow 6\ CO_{2(g)} + 6\ H_2O_{(l)} + \text{energy}$$

The law of conservation of mass is respected for the above reaction if:

A) The number of reactant molecules equals the number of product molecules.
B) The sum of all reactant coefficients equals the sum of all product coefficients.
C) The number of atoms of each element is the same on the reactant and product side.
D) The number of electrons is the same on the reactant and product side.

12) When 191 g of copper, Cu, is combined with 756 g of nitric acid, HNO_3, the chemical reaction produces 563 g of copper nitrate, $Cu(NO_3)_2$, 108 g of water, H_2O, and a certain amount of nitrogen dioxide, NO_2. This reaction is represented by the following balanced chemical equation:

$$Cu + 4HNO_3 \rightarrow Cu(NO_3)_2 + 2H_2O + 2NO_2$$

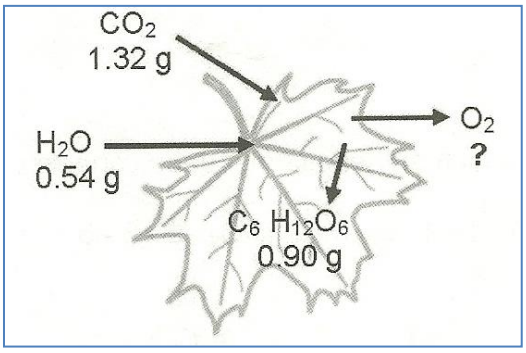
What mass of nitrogen dioxide does this reaction produce?

A) 138 g
B) 276 g
C) 1218 g
D) 2436 g

13) The balanced chemical equation for photosynthesis is as follows:

$$6\ CO_{2(g)} + 6\ H_2O_{(l)} + \text{energy} \rightarrow C_6H_{12}O_{6(s)} + 6\ O_{2(g)}$$

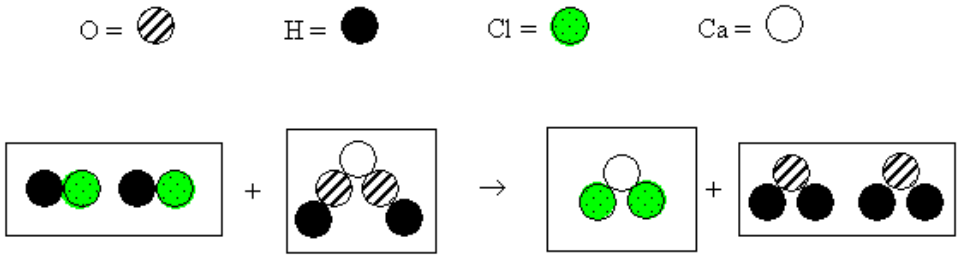
A situation involving the photosynthesis of a maple leaf is illustrated in the diagram below:



Given the masses indicated in this diagram, what is the mass of oxygen gas (O_2) produced in this situation?

A) 0.16 g B) 0.96 g C) 1.86 g D) 2.76 g

14) The following model represents a balanced neutralization reaction involving an acid and a base.



Which of the following correctly represents this neutralization reaction?

A) $2HCl + Ca(OH)_2 \rightarrow CaCl_2 + 2H_2O$

B) $H_2Cl_2 + Ca(OH)_2 \rightarrow CaCl_2 + 2H_2O$

C) $H_2Cl_2 + CaO_2H_2 \rightarrow CaCl_2 + H_4O_2$

D) $2HCl + CaO_2H_2 \rightarrow CaCl_2 + H_4O_2$

15) Consider the chemical reactions represented by the equations below. ***Which one represents a neutralization equation in which the law of conservation of matter is respected?***

A) $H_2SO_4 + NaOH \rightarrow N_2SO_4 + 2\ H_2O$

B) $2\ Na + 2\ H_2O \rightarrow 2\ NaOH + H_2$

C) $C_6H_{12}O_{6(s)} + 6\ O_{2(g)} \rightarrow 6\ CO_{2(g)} + 6\ H_2O_{(l)} + \text{energy}$

D) $3\ HBr + Fe(OH)_3 \rightarrow FeBr_3 + 3\ H_2O$

Mark: ___ /20

Part 2 – EXTENDED ANSWERS

Answer all the questions in the space provided

1) A television is designed to transform electrical energy into a variety of usable forms of energy such as light and sound. Over a certain period of time, the television consumes 450 kJ of electrical energy. A total of 180 kJ of energy is lost as heat. ***What is the energy efficiency of the television?*** *Show all your work.* *(4 marks)*

Answer:

2) The decomposition of 20 g of copper oxide (CuO) is represented by the following equation:

$$2\ CuO \rightarrow 2\ Cu + O_2$$

If you obtain 16 g of copper(Cu), ***what amount of oxygen(O_2) was released?*** *Show all your work.*

(4 marks)

Answer:

3) ***Balance each of the following chemical equations.*** *(4 marks)*

a) $PbO_2 \rightarrow PbO + O_2$

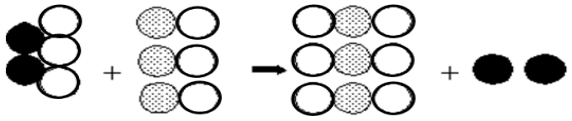
b) $SO_2 + O_2 \rightarrow SO_3$

4) Hematite is a mineral that contains iron oxide (Fe_2O_3). In order to extract iron (Fe) from hematite, carbon monoxide (CO) is reacted with the mineral at a very high temperature. The balanced equation for the reaction is: *(4 marks)*

$$Fe_2O_3 + 3\,CO \rightarrow 3\,CO_2 + 2\,Fe$$

The following diagram uses the particle model to represent the chemical equation above:

Iron : ● Carbon : ◌ Oxygen : ○



What law is proven by the above diagram?

Answer_____

5) A variety of human activities involve the combustion of fossil fuels (coal, natural gas and other hydrocarbon derivatives). For example, when methane (CH_4), burns it reacts with oxygen gas to produce carbon dioxide (CO_2) and water. The ***unbalanced*** chemical equation is written below:

$$CH_4 + O_2 \rightarrow CO_2 + H_2O + \text{energy}$$

Write the balanced chemical equation for this reaction and represent it using the particle model. *(4 marks)*

Symbols: ● carbon ○ oxygen ⊞ hydrogen

Balanced chemical equation:

$$CH_4 + O_2 \rightarrow CO_2 + H_2O + \text{energy}$$

Particle representation:

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Part 1– Multiple Choices - Questions 1 to 15

BLACKEN *the letter that corresponds to your answer.* Example: [A] [B] [C] [D]
Each question is worth three marks.

1 [A] [B] [C] [D]

2 [A] [B] [C] [D]

3 [A] [B] [C] [D]

4 [A] [B] [C] [D]

5 [A] [B] [C] [D]

6 [A] [B] [C] [D]

7 [A] [B] [C] [D]

8 [A] [B] [C] [D]

9 [A] [B] [C] [D]

10 [A] [B] [C] [D]

11 [A] [B] [C] [D]

12 [A] [B] [C] [D]

13 [A] [B] [C] [D]

14 [A] [B] [C] [D]

15 [A] [B] [C] [D]

$$EnergyEfficiency = \frac{AmountOfUsefulEnergy}{AmountOfEnergyConsumed} \times 100\,\%$$

Mark: ___ /45