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Question: 1

Which of the following elements are ordered from least reactive to most reactive according to the Periodic Table?

- A. Ar, Cu, Na
- B. Na, Ar, Cu
- C. Na, Cu, Ar
- D. Ar, Na, Cu

Answer: A

Explanation:

The Periodic Table's two most reactive groups are Group I and Group 17; therefore, Na, found in Group 1, would be the most reactive of the three elements. The element Cu is found in Group 11, which marks it as a transition metal, and is only somewhat reactive. Group 18, which includes Ar, contains the Noble Gases, which are not at all reactive.

Question: 2

The group of elements that contains most of the semiconductors is called?

- A. Metals
- B. Metalloids
- C. Nonmetals
- D. Noble gases

Answer: B

Explanation:

An element that has semi-conductive properties would be a metalloid. Metals are good conductors of electricity and heat. In contrast, nonmetals and the noble gases are not good conductors of electricity and heat. A semi-conductor is one that will conduct electricity under some conditions, but not others.

Question: 3

Place your answer on the provided griddable answer sheet.

In the chemical formula for glucose, $5C_6H_{12}O_6$, which number represents a coefficient?

Answer:

5: In the formula for glucose, the numbers 6 and 12 both represent subscripts. A subscript represents the number of molecules for that specific element present in the formula. The C, H, and O are symbols for the elements Carbon, Hydrogen, and Oxygen, respectively. A coefficient is the number in front of the formula and represents the total number of molecules; in this formula there are five glucose molecules.

Question: 4

Which of the following answers shows $\text{CH}_4 + \text{O}_2 = \text{CO}_2 + \text{H}_2\text{O}$ as balanced?

- A. $\text{CH}_4 + 2\text{O}_2 = 2\text{CO}_2 + 2\text{H}_2\text{O}$
- B. $2\text{CH}_4 + 4\text{O}_2 = 2\text{CO}_2 + \text{H}_2\text{O}$
- C. $2\text{CH}_4 + \text{O}_2 = 2\text{CO}_2 + \text{H}_2\text{O}$
- D. $\text{CH}_4 + 2\text{O}_2 = \text{CO}_2 + 2\text{H}_2\text{O}$

Answer: D

Explanation:

For the formula $\text{CH}_4 + \text{O}_2 = \text{CO}_2 + \text{H}_2\text{O}$ to be balanced there must be an equal number of molecules on both the reactant and product sides. In this case, for the formula to be balanced, a coefficient of a 2 needs to be placed in front of the O_2 and the H_2O molecules.

Question: 5

Identify the leaf shown below using the provided dichotomous key:



Step 1			
Is the leaf irregular, but symmetrical?	Go to Step 2	Is the leaf long and skinny?	It is a Black Walnut

Step 2			
Does the leaf have smooth edges?	Go to Step 3	Does the leaf have saw tooth edges?	It is a Mulberry

Step 3			
Does the leaf have no lobes (fingers)?	It is a Dogwood	Does the leaf have lobes (fingers)?	It is a Sassafras

The leaf shown in the pictures is:

- A. Black Walnut
- B. Mulberry
- C. Dogwood
- D. Sassafras

Answer: D

Explanation:

A sassafras leaf is irregular in shape but symmetrical. It also has smooth edges and finger like lobes. Following the dichotomous key helps to identify the leaf based on its physical characteristics.

Question: 6

Evidence of a chemical reaction can be determined by all of the following except?

- A. Modifying the arrangement of atoms
- B. Endothermic and exothermic reactions
- C. Equal masses of reactants and products
- D. No change in energy

Answer: D

Explanation:

A chemical reaction will always have an endothermic (absorb energy) or exothermic (release energy) reaction, and a chemical formula must always be balanced. Therefore, the masses of the reactants and products will always be equal, resulting in the modification of the atoms arrangement and a change in energy.

Question: 7

Two boys on skateboards decide to race to the end of the street. Both travel the same distance but arrive at different times. This example illustrates which concept?

- A. Direction
- B. Acceleration
- C. Speed
- D. Velocity

Answer: C

Explanation:

Speed is the distance at which something travels within a given time. The example states that both skateboarders traveled the same distance but arrived at different time. Therefore, they traveled at different speeds.

Question: 8

Place your answer on the provided griddable answer sheet.

Aubrey lives 200m from Brianna's house. If it takes her 100s to travel the distance, what is Aubrey's speed?

Answer:

2 m/s: The formula to calculate speed is $S=D/T$. In this problem, divide 200m by 100s, which gives you 2m/s.

Question: 9

Which of the following devices changes chemical energy into electrical energy?

- A. Battery
- B. Closed electric circuit
- C. Generator
- D. Transformer

Answer: A

Explanation:

In a Zn-Cu battery, the zinc terminal has a higher concentration of electrons than the copper terminal, so there is a potential difference between the locations of the two terminals. This is a form of electrical energy brought about by the chemical interactions between the metals and the electrolyte the battery uses. Creating a circuit and causing a current to flow will transform the electrical energy' into heat energy, mechanical energy, or another form of electrical energy, depending on the devices in the circuit. A generator transforms mechanical energy into electrical energy, and a transformer changes the electrical properties of a form of electrical energy.

Question: 10

In the store, you are pushing a cart with no problem. However, as you are shopping, you add items to the cart that have varying masses. Which of Newton's Laws play a role in the amount of force needed to push the cart through the store?

- A. Newton's First Law
- B. Newton's Second Law
- C. Newton's Third Law
- D. Newton's Fourth Law

Answer: B

Explanation:

Newton's Second Law states that the acceleration of an object is increased by the force applied and decreased by its mass. As the cart becomes heavier through the store, the shopper must apply more force when pushing it to achieve its acceleration. Newton's First Law states if an object is at rest, it will stay at rest until a force is acted upon it. Newton's Third Law states that any object that exerts a force will be met by an equal opposing force. There is no Fourth Law.

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