Endothermic and Exothermic Reactions Worksheet

1. Instant cold packs are used to treat athletic injuries. They contain solid ammonium nitrate, NH_4NO_3, and a bag of water.
   When the pack is squeezed, the bag of water breaks and the solid dissolves. This process quickly lowers the temperature of the pack to below 0°C. Which of the following best describes this situation?
   A) More energy is released than absorbed during the dissolution of NH_4NO_3.
   B) The dissolution of NH_4NO_3 in water is an exothermic reaction.
   C) $NH_4NO_{3(s)} + 25.7\ kJ \rightarrow NH_4NO_{3(aq)}$
   D) $NH_4NO_{3(s)} \rightarrow NH_4NO_{3(aq)} + 25.7\ kJ$

Answer: C

2. Mario is studying the energy changes of different chemical reactions. He mixes ethanoic acid (CH_3COOH) with sodium carbonate (Na_2CO_3) in a reaction vessel. The balanced chemical equation for this reaction is shown below.

$$2\ CH_3COOH + Na_2CO_3 + energy \rightarrow 2\ CH_3COONa + H_2O + CO_2$$

Which of the following statements correctly describes what Mario should observe and conclude about the reaction?

A) The temperature of the reaction vessel will increase and therefore the reaction is endothermic.
B) The temperature of the reaction vessel will increase and therefore the reaction is exothermic.
C) The temperature of the reaction vessel will decrease and therefore the reaction is endothermic.
D) The temperature of the reaction vessel will decrease and therefore the reaction is exothermic.

Answer: C

3. Transformations can be chemical or physical changes. Which of the following transformations is an endothermic chemical change?

A) $H_2O_{(s)} + energy \rightarrow H_2O_{(l)}$

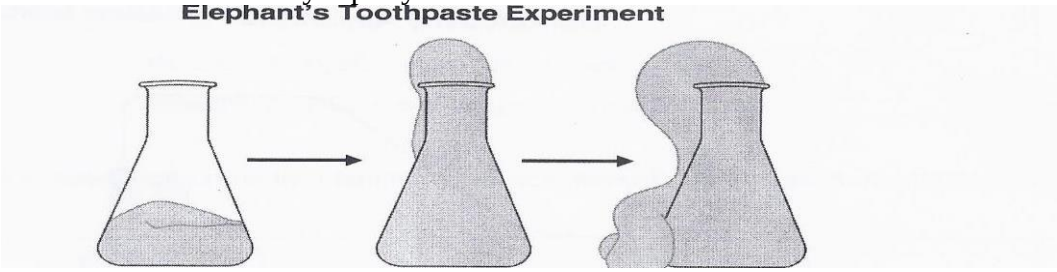
B) $H_2O_{(g)} \rightarrow H_2O_{(l)} + energy$

C) $2\ H_2O_{(l)} + energy \rightarrow 2\ H_{2(g)} + O_{2(g)}$

D) $2\ H_{2(g)} + O_{2(g)} \rightarrow 2\ H_2O_{(l)} + energy$

Answer: C

4. The Elephant's Toothpaste experiment is a spectacular reaction that produces large amount of foam very rapidly?



The reaction is the decomposition of hydrogen peroxide, H_2O_2, into water, H_2O, and oxygen, O_2. It is represented in the chemical equation below.

$2\ H_2O_2 \rightarrow 2\ H_2O + O_2 + 196\ kJ.$

Which of the following correctly identifies the type of reaction and a possible observation for the experiment?

	Type of reaction	Possible observation
A	Endothermic reaction	The flask feels cold
B	Endothermic reaction	The flask feels hot
C	Exothermic reaction	The flask feels hot
D	Exothermic reaction	The flask feels cold

Answer: C

5. The terms endothermic and exothermic refer to whether heat is absorbed or released during a chemical reaction. Below is a list of endothermic and exothermic reactions. Which of the following correctly identifies the exothermic reactions?

Endothermic and Exothermic Reactions

1.	$CH_{4(g)} + 2\ O_{2(g)} \rightarrow CO_{2(g)} + 2\ H_2O_{(l)} + 891\ kJ$
2.	When hydrochloric acid, HCl, and sodium hydroxide, NaOH, are combined together in a beaker, the temperature of the water increases by 5 °C.
3.	$N_{2(g)} + O_{2(g)} + \text{energy} \rightarrow 2\ NO_{(g)}$
4.	When ammonium chloride, NH_4Cl, dissociates in water, the temperature of the water drops from 25 °C to 16 °C.

Answer: 1 and 2 are exo