Name:_____

Explosives and Air Bags

SNC2D

Explosive reactions involve the rapid production of large amounts of hot gases, which expand and exert force on their surroundings. For example, when gunpowder is heated, it reacts to produce large amounts of nitrogen and carbon dioxide gases.

For an explosion to be useful, the reaction must be stable enough to be exploded in a controlled manner. For example, the reactions that take place inside internal combustion engines are explosive reactions of gasoline or diesel fuel with oxygen. These reactions must be controlled for the pistons to turn the crankshaft with a regular frequency.

How does the collision model explain explosions? The bonds that hold the molecules together in explosives are generally weak enough that most collisions between reactant molecules are effective and lead to the formation of products. Explosive mixtures are often made by forcing the reactants together in a confined space to increase their concentrations. Since each reaction is **exothermic**, i.e. produces energy, the temperature of the reacting mixture rises, causing the molecules to move even faster and the rate of reaction to increases.

Give three reasons explosive reactions happen quickly:

1. _____

2. _____

3. _____

One useful explosive is sodium azide (NaN_3). This compound is used in air bags in automobiles. An air bag contains a sodium azide pellet. If the automobile hit something or is hit, the impact triggers the decomposition of the pellet to produce sodium, nitrogen gas, and heat:

Write the word equation for this reaction:

Write the balanced chemical equation for this reaction:

The reaction occurs so quickly that roughly 100 g of sodium azide can produce 60 L of nitrogen gas in less than a tenth of a second to create a cushion of gas that protects the driver or passenger, although children and small adults can be injured by the reaction's explosive force.

The pellet also contains iron (III) oxide, which almost immediately reacts to consume the sodium.

Why would the manufacturers include iron (III) oxide to consume the sodium?

_____

Write the word equation for this reaction:

Write the balanced chemical equation for this reaction:

What type of reaction is this? _____
(synthesis, decomposition, single displacement, or double displacement)

The resulting sodium oxide reacts with atmospheric carbon dioxide and water to produce sodium bicarbonate.

Write the word equation for this reaction:

Write the balanced chemical equation for this reaction:

What type of reaction is this? _____