Name:_____

Elements and Oxides

SNC2D

Reactions of Metals

Generally, metals are found on the left side of the periodic table. They have some common physical properties: they are generally shiny, malleable, and ductile, and they tend to be good conductors of heat and electricity. With the exception of mercury, most metals are solids at room temperature. Metals also have some common chemical properties: e.g., metals react in oxygen to form **metal oxides**. These metal oxides are always solids and react in water to form bases. Metal oxides can therefore also be called basic oxides.

For example, potassium, an alkali metal, burns in oxygen to produce _____.

Write the balanced chemical equation to represent this reaction:

This oxide then reacts with water to form _____, which is used in making soap, liquid fertilizer, paint removers, and cosmetics.

Write the balanced chemical equation to represent this reaction:

This base can also be formed directly by adding potassium to water:

_____ K + _____ H_2O -> _____ _____ + _____ _____

(This reaction also produces _____.)

Less-reactive metals show similar behaviours. Calcium is a member of the alkaline earth metals. Its reactions in oxygen and water follow a similar pattern:

_____ Ca + _____ O_2 -> ____ _____

_____ _____ + _____ H_2O -> _____ _____

Calcium oxide, more commonly called lime, is used to enrich the soil and make it possible for new plants to grow. Calcium hydroxide is used to make brick mortar and plasters and as a food additive.

Write balanced chemical equations that show the reactions that occur when the following elements react with oxygen and the resulting oxides react with water.

sodium: _____ Na + _____ O_2 -> ____ _____

_____ _____ + _____ H_2O -> _____ _____

magnesium: _____ Mg + _____ O_2 -> ____ _____

_____ _____ + _____ H_2O -> _____ _____

Reactions of Non-Metals

Non-metals are general dull and brittle and tend to be poor conductors. They have a variety of states at room temperature. They will react with oxygen to form **non-metal oxides**, which are often gases or liquids. These non-metal oxides react in water to form acids and are therefore also known as acidic oxides.

For example, nitrogen can react with oxygen to produce nitrogen dioxide:

_____ N_2 + _____ O_2 -> _____ _____

The nitrogen dioxide then reacts with water to form _____ acid.

_____ _____ + _____ H_2O -> _____ HNO_3 + _____ NO

(The other product in the reaction is _____.)

Nitric acid is used in many industrial reactions and is a key contributor to air pollution.

Similarly, phosphorus can react with oxygen to form diphosphorus pentoxide:

_____ P + _____ O_2 -> _____ _____

The diphosphorus pentoxide reacts with water to form phosphoric acid:

_____ _____ + _____ H_2O -> _____ _____

Most of the phosphoric acid produced is used to make fertilizers. It is also found in soft drinks.

The most familiar non-metal oxide is carbon dioxide. When carbon dioxide reacts with water, it forms carbonic acid:

_____ CO_2 + _____ H_2O -> _____ _____

Carbonic acid is the basis of most soft drinks and contributes to their slightly sour taste as well as the bubbles that are released when the cap is removed from the bottle.

Predict what kind of solution (acidic or basic) would be formed when each of the following oxides reacts with water:

bromine monoxide _____ nickel (II) oxide _____

barium oxide _____ sulphur trioxide _____

lithium oxide _____ iodine monoxide _____