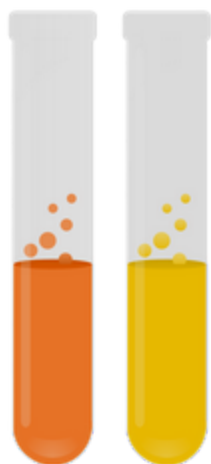


Chemical Land



Materials:

- Game Board
- Player pieces
- Die
- Nitric Acid
- Silver Nitrate
- Potassium iodine
- zinc
- ethanol
- water

Setup:

- Pull out game board and set chemicals/elements off to the side

Instructions:

- 1) Pull out materials - pick character
- 2) Begin game on "Start" Square
- 3) Roll die to determine number of squares to move on board
- 4) Spin spinner to determine one of four reaction starters to combine
- 5) If the space you are on reacts with The reactant given by spinner, complete the reaction
- 6) First player to complete 4 reactions Wins and get to light the LED
- 7) Go around board till winner determined

Safety Precautions:

-Be sure to use caution when handling fragile parts

- Ethanol and match reaction be sure to tie back any loose hair, clothing, etc. include eye protection

-For single displacement reaction gloves are needed, goggles need to be worn, and all hair and loose clothing needs to be out of the way.

Reactions:

-Ethanol and match (production of a gas)

-H₂O and heat (physical change)

-Zinc and Nitric Acid (single displacement)

-Potassium Iodide and Silver Nitrate (double displacement)

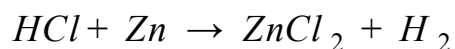
Explanations of Reactions

Single Displacement

Zinc reacts with hydrochloric acid to form hydrogen gas and zinc nitrate. In a single displacement reaction an element replaces its like element in an ionic compound or acid, in this specific reaction electrons move from zinc to hydrogen.

- 1) Place zinc into 10 mL beaker
- 2) Fill pipet with 5 mL of hydrochloric acid
- 3) Squirt the hydrochloric acid into the 10 mL beaker
- 4) To clean up, pour the contents of the 10 mL into a 250 mL beaker containing sodium bicarbonate

Equation for Reaction:

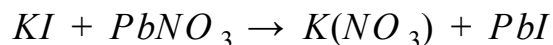


Double Displacement

Lead nitrate and potassium iodide form dissolved potassium nitrate and a lead iodide precipitate. In a double displacement reaction ionic compounds exchange ions and form two new ionic compounds.

- 1) Place 5 drops of 0.25 M potassium iodide in a watch glass
- 2) Add 5 drops of 0.125 lead nitrate into the watch glass
- 3) Rinse precipitate into waste

Equation for Reaction:

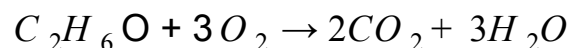


Production of a Gas:

In this reaction the combustion of ethanol will be observed. In a combustion reaction CO_2 & H_2O are always products.

- 1) Place 10 drops of ethanol into a watch glass
- 2) Light and drop a match into the ethanol
- 3) Once cooled, throw the match into the trash

Equation for Reaction:



Physical/Chemical Changes of Energy:

In the physical change of energy water and heat will react together to complete a physical change in energy. After awhile, you will see the water start to boil. In a physical change, a substance changes from one state to another.

- 1) Pour 20 mL of water into a cup
- 2) Hold cup over a heat source
- 3) Turn heat source off and pour out water

For the chemical change of energy we have a classic volcano erupting type reaction. Once baking soda and vinegar are both added to the beaker, observers will see a eruption of sorts. A chemical change in energy is typically due to the breaking and formation of bond.

- 1) Pour 5 mL of baking soda into a 250 mL beaker
- 2) Pour 5 mL of vinegar into the 250 mL beaker
- 3) Be sure to complete reaction in a controlled area, as it may spill over

Lighting of an LED

In this reaction an LED will light up. Through the use of a circuit which connects a battery to an LED, the finished product will have a result seen by the LED light lighting up.

Picture of classic LED breadboard circuit setup:

