SCH 3U0

TYPES OF CHEMICAL REACTIONS LAB

PURPOSE

To study the four types of chemical reactions in the laboratory and to describe chemical reactions using balanced chemical equations.

PROCEDURE

1. Place about one cm of $CuSO_4 * 5H_20$ crystals in a clean, dry test tube and heat until no further changes are observed. Record all observations.
   http://www.youtube.com/watch?v=ONWfvyvavP0
2. Obtain 1/3 of a test tube of Na_2SO_4 solution and describe it. Add an eye dropper full of $BaCl_2$ solution to the Na_2SO_4 and observe.
   http://www.youtube.com/watch?v=BnBZ5PsPu8E
3. Obtain and describe a 3cm long strip of Mg ribbon. Using tongs, hold this strip of Mg in the flame of a Bunsen burner. DO NOT LOOK DIRECTLY AT THE RESULTANT FLAME. Describe the products formed.
   http://www.youtube.com/watch?v=ScCl0BqHaDI&feature=related
4. Obtain 1/3 of a test tube of dilute H_2SO_4. Add a piece of sanded mossy zinc metal to the aid and observe. Bring a flaming splint to the mouth of the test tube and observe. *(The flame goes out and makes a loud "pop" sound)*
   http://www.youtube.com/watch?v=A0mZWumct-s
5. Clean an iron nail with a piece of sandpaper. Place the nail in a test tube and cover it with a solution of $CuSO_4$. Leave the reaction for several minutes. Return to the station, remove the nail and observe it.
   https://www.youtube.com/watch?v=TgRRv968KXs
6. Place a dropper full of lead(II)nitrate in a test tube. Observe. Add another dropper full of potassium iodide. Observe the reaction. Let the reaction sit for a few minutes and observe again. (PLEASE DISPOSE OF THE WASTE IN THE CONTAINER PROVIDED).
   http://www.youtube.com/watch?v=nKC9-FYb5No&feature=related
7. TEACHER DEMONSTRATION
   Potassium chlorate crystals were placed in a test tube and heated until the crystals melted into liquid form and bubbles were observed. A glowing splint was placed at the mouth of the test tube and it re-lit.
   https://www.youtube.com/watch?v=fLic3zmH94s

OBSERVATIONS:

Record your observations in a chart with the following headings:

Reaction Number	Reactants	Appearance before reaction	Appearance after the reaction
1	$CuSO_4 * 5H_20$ (s)	An aegean coloured powdery solid	Left with a yellowish and slightly green solid with water forming inside the tube

2	$Na_2SO_{4\,(aq)} + BaCl_{2\,(aq)}$	A clear aqueous liquid inside the test tube	A white precipitate of the barium sulfide is formed. It is cloudy in appearance. It looks like there is some Barium Sulfate left at the bottom of the test tube (insoluble). The sodium chloride left however is soluble therefore creates this sort of reaction. This suggests it should be a double displacement reaction.
3	$Mg\,(s) + O_2(g)$	Magnesium looks like a shiny metal, it reacts with oxygen in high temperatures. Before reaction it looks like a normal shiny metal.	During reaction it produces a bright and very intense light when lit. After the reaction, it turns into a brittle dry substance (Magnesium Oxide). When broken apart enough it becomes powdery.
4	$H_2SO_{4\,(aq)} + Zn_{\,(s)}$	The initial sulfuric acid is clear. The zinc looks like little flakes of grey metal.	When the zinc is added to the aqueous sulfuric acid - it starts to form bubbles which are in the form of hydrogen gas. When the flaming splint is brought close to the beaker's mouth, the flame does indeed go out and make a large pop sound. This could also be done by putting a balloon on top of the beaker and collecting the hydrogen gas that way. Then putting a candle heating the balloon which would also give the same reaction.

5	$Fe_{(s)} + CuSO_{4\ (aq)}$	The copper sulfate solution looks deep bluish. The iron nails look like how normal iron looks - gray metallic color.	After reaction, the iron nails developed a reddish brown layer on them. The resultant aqueous solution also changed, and had become faded (light green) -> (Ferrous Sulphate). The reddish brown layer was the copper which was also left behind in the reaction.
6	$KI_{(aq)} + Pb(NO_3)_{2\ (aq)}$	The potassium iodide solution is colourless. The lead (II) nitrate also looks colorless	After reaction, I see solid yellow lead (II) iodide being produced. It looks yellowish powdery. It looks beautiful and has a great aesthetic appeal to it.
7	$KClO_{(3)}(s)$	The potassium chlorate is shown to be a white type of powdery solid. The test tube is clear and the flame is burning. A splint is also lit whilst the potassium chlorate heats up. The splint then goes inside the test tube.	The intensity really gets high after a while when the splint is placed inside the test tube. It is quite a sight, and after what is produced, is a lot of cloudy gas coming out (Gaseous Oxygen) and once it dies down, what is left is solid potassium chloride which is in similar color to potassium chlorate.

ANALYSIS:

1. Write the balanced chemical reaction including states of reactants and products. Fill out the chart below.

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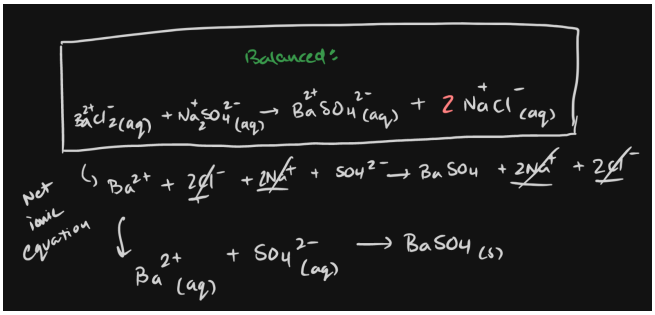
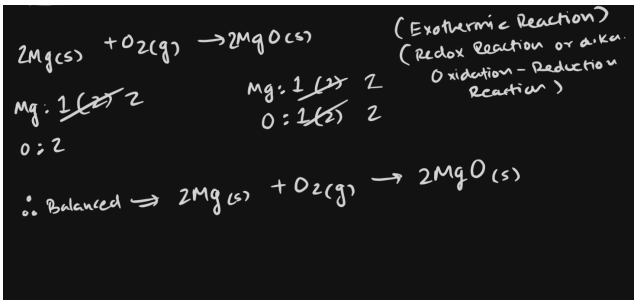
Reaction #	Balanced *chemical* equation	Type of chemical reaction
1	Balanced: $CuSO_4 * 5H_20$ (s) -> $CuSO_{4\,(s)}$ + $5H_20$ (g)	Decomposition
2	Unbalanced Form: $Na_2SO_{4\,(aq)} + BaCl_{2\,(aq)} \rightarrow BaSO_4 + NaCl$ Balanced Form: 	Double Displacement (Replacement)
3	Unbalanced form: Mg (s) + O_2(g) -> MgO (s) Balanced form: 	Combustion/Synthesis
4	All balanced after the single displacement occurs Acid + Metal -> Salt + Hydrogen $H_2SO_{4\,(aq)}$ + Zn $_{(s)}$ -> $ZnSO_{4\,(aq)}$ + H_2 (g) The other part of the boom can be represented by doing this (exothermic reaction): Unbalanced: $H_2 + O_2 \rightarrow H_2O$ Balanced: $2H_2 + O_2 \rightarrow 2H_2O$	Single Displacement (Replacement) For the boom: Combustion/Synthesis

	We saw THIS reaction through "flame" or an "explosion"	
5	Balanced form: $Fe_{(s)} + CuSO_{4\ (aq)} \rightarrow FeSO_{4(aq)} + Cu_{(s)}$	Single displacement (Replacement)
6	Unbalanced: $KI_{(aq)} + Pb(NO_3)_{2\ (aq)} \rightarrow PbI_{2\ (s)} + KNO_{3\ (aq)}$ Balanced: $2KI_{(aq)} + Pb(NO_3)_{2\ (aq)} \rightarrow PbI_{2\ (s)} + 2KNO_{3\ (aq)}$	Double Displacement (Replacement)
7	Unbalanced: $KClO_3(s) \rightarrow KCl(s) + O_2(g)$ Balanced: $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$	Decomposition Reaction

Learning Goals	**Success Criteria** **Met Criteria**
I have investigated the different types of chemical reactions.	• I have given an accurate claim for each type of reaction and source of error. • I have used most evidence from this lab to support my claims.
I have communicated my scientific thought using appropriate conventions and terminology.	• I have explained my evidence using relevant chemistry. • I have communicated my analysis using appropriate conventions and terminolog related to chemical reactions.

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