

Report Form for A First Synthesis Reaction—Preparing Alum from Aluminum

Name _____

1. For each of the reactions below, provide the following (8 points each for a total of 36 points):
 - (a) briefly describe the physical changes you observed during the reaction, including changes in color, formation or dissolution of precipitates, etc.
 - (b) identify the type(s) of reaction(s) taking place (i.e. oxidation–reduction, precipitation, acid–base, complexation)
 - (c) for reactions 2, 3, and 4, (but not for reaction 1) provide a balanced chemical equation, indicating the physical state of each reactant and product; remember that you can include water, H_2O , as a product or a reactant in any reaction

Reaction 1: the relevant chemical species are H_2 , $\text{Al}(\text{OH})_4^-$, Al , KOH , and K^+

Reaction 2: the relevant chemical species are $\text{Al}(\text{OH})_3$, H_2SO_4 , $\text{Al}(\text{OH})_4^-$, and SO_4^{2-}

Reaction 3: the relevant chemical species are $\text{Al}(\text{OH})_3$, $\text{Al}_2(\text{SO}_4)_3$, and H_2SO_4

Reaction 4: the relevant chemical species are K_2SO_4 , $\text{Al}_2(\text{SO}_4)_3$, and $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$

2. If the reactions used to synthesize alum behave ideally, and if you recover completely the aluminum at each step, then you should obtain 17.6 g of alum for each gram of aluminum in your original sample. Given the mass of aluminum with which you began this experiment, how much alum should you have obtained? This is the expected or theoretical yield. Show your work.

How much alum did you actually obtain? What percentage of your expected yield did you obtain? This is your actual yield. Show your work.

If your actual yield is less than your theoretical yield, then propose at least one (and more if you can) explanation for this result. If your actual yield is greater than your theoretical yield, then propose at least one (and more if you can) explanation for this result. The best answers to this question will identify specific steps where the loss or gain in mass occurs, and will explain how you might gather evidence in support of this hypothesis. Do not list human error as an explanation.