Chemistry 3A

Introductory General Chemistry

Experiment 4b

Rolling for Compound Initiative

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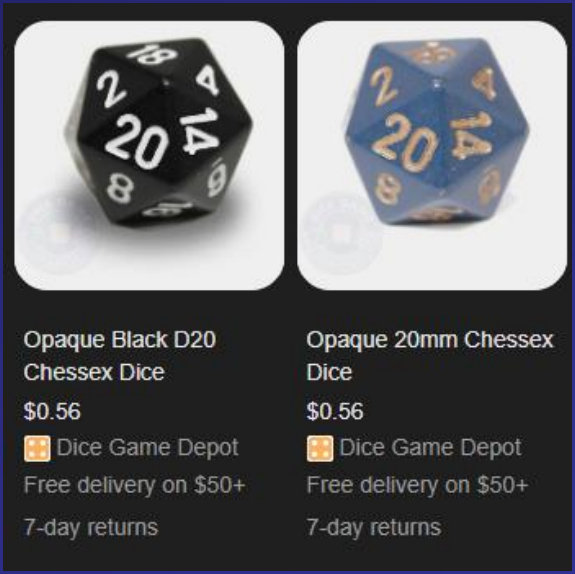
Introduction

The “Language of Chemistry” is our purpose here

Decahedral (10-sided) and Icosahedral (20-sided) dice will be used to generate names for chemical compounds in this experiment

These are actually online dice provided by Google



Background: Identify Compound Type

We talked about chemical compound naming in lecture. In this experiment, your knowledge & learning are reinforced.

Identifying Compound Type

- **Ionic compound**
  - metal elements are the cations (positively charged ions)
  - nonmetal elements are the anions (negatively charged ions)
  - They are ionic compounds because the **bonds** are ionic
  - Ions can be
    - Monatomic (single element): Na^+,Cl^-,Fe^{3+}, etc.
    - Polyatomic (many elements): NH_4^+, NO_3^-, PO_4^{3-}, $C_2H_3O_2^-$, etc.

Background: Identify Compound Type

Identifying Compound Type (cont.)

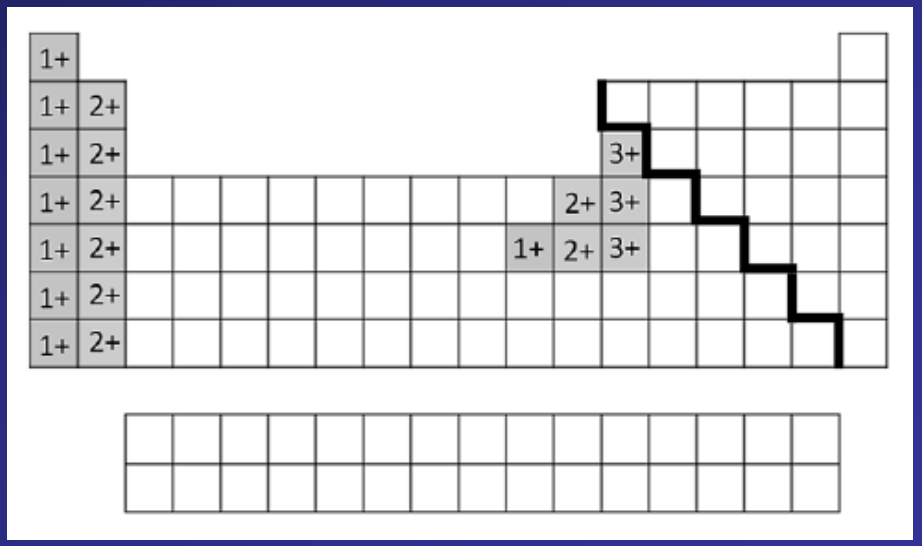
- **Molecular Compound**
  - In contrast to ionic compounds, these are not electrically charged (not ions!)
  - Composed of nonmetal element bonded to each other by the **sharing** of valence shell electrons (covalent bonds)
- **Acid**
  - Acids are substances that can **donate** protons (H^+ ions)

    This is the definition of Bronsted-Lowry. There is another definition called a Lewis acid, which an element/compound that can accept an electron pair, but you don't need to know this
  - The reaction is **$HA \leftrightarrow H^+ + A^-$**, where **A** is a nonmetal or polyatomic substance that will be an anion

Background: Rules for Naming

Ionic compounds

- *Type I metal cations + polyatomic cation*
  - all Group 1 and 2 elements
  - Group 13: Al^{3+}, Ga^{3+} (gallium), In^{3+} (indium)
  - Group 12: Zn^{2+}, Cd^{2+}
  - Group 11: Ag^{+}
  - Polyatomic: ammonium
- With monatomic and polyatomic anions
  - Monatomic: Nonmetal stem + ***-ide***
  - Polyatomic: suffix usually ***–ite*** or ***-ate***



Background: Rules for Naming

Ionic compounds

- *Type II metal cations*
  - All metal elements NOT a Type I cation
  - Element name + Roman numeral for charge
- With monatomic and polyatomic anions
  - Monatomic: Nonmetal stem + ***-ide***
  - Polyatomic: suffix usually ***–ite*** or ***-ate***

Background: Rules for Naming

Molecular compounds

- Add a prefix indicating count of element atoms to the first and second elements

Number	Prefix		Number	Prefix
1	*mono-		6	hexa-
2	di-		7	hepta-
3	tri-		8	octa-
4	tetra-		9	nona-
5	penta-		10	deca-

- 2nd element gets suffix –ide
- * mono- prefix omitted for 1st element name

Background: Rules for Naming

Protic Acids with Monatomic Anions

(acids donating H^+)

- Add the prefix **hydro-**
- Then add root name of (nonmetal) element
- Then add suffix **–ic** followed by word **acid**

Hydrochloric acid, hydrobromic acid, hydroiodic acid

Oxyacids in polyatomic anions

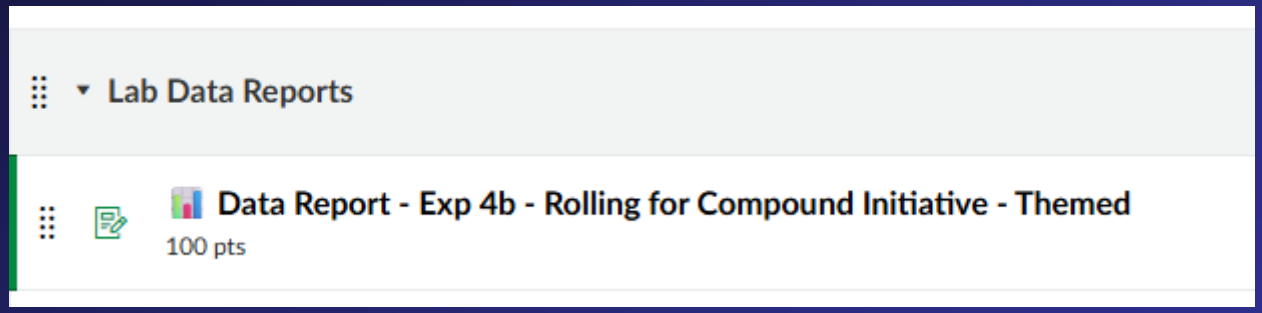
- Polyatomic anion ends in **–ate**:
  Change suffix to **–ic** add **acid**
  H_2SO_4 sulfuric acid
- Polyatomic anion ends in **–ite**:
  Change suffix to **–ous** add **acid**
  H_2SO_3 sulfurous acid

Equipment You Will Use

- None of the usual equipment and consumables of the chemistry laboratory will be utilized in this experiment
- You will use your Canvas account to find the Experiment 4b Assignment and go through the feature to assist you in completing the report

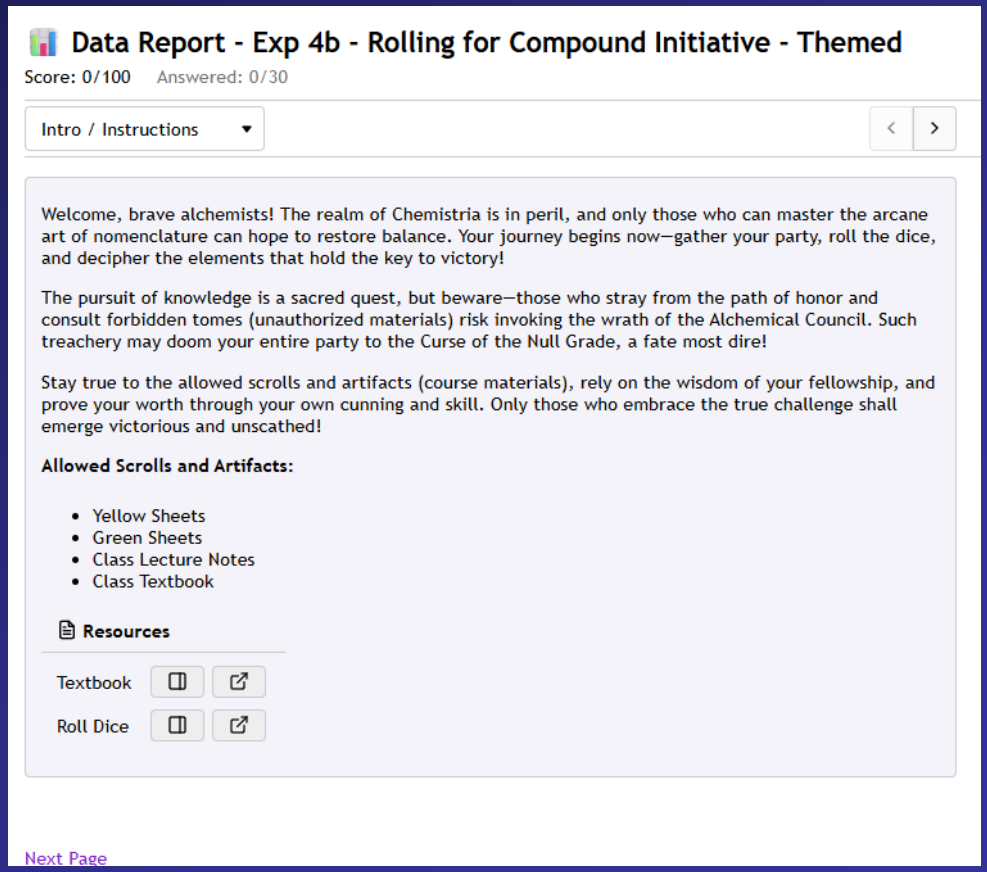
Canvas-Find Assignment

- In Canvas, look in **Assignments** for Lab Data Reports, and look for Data Rep
- Select (click on) the assignment



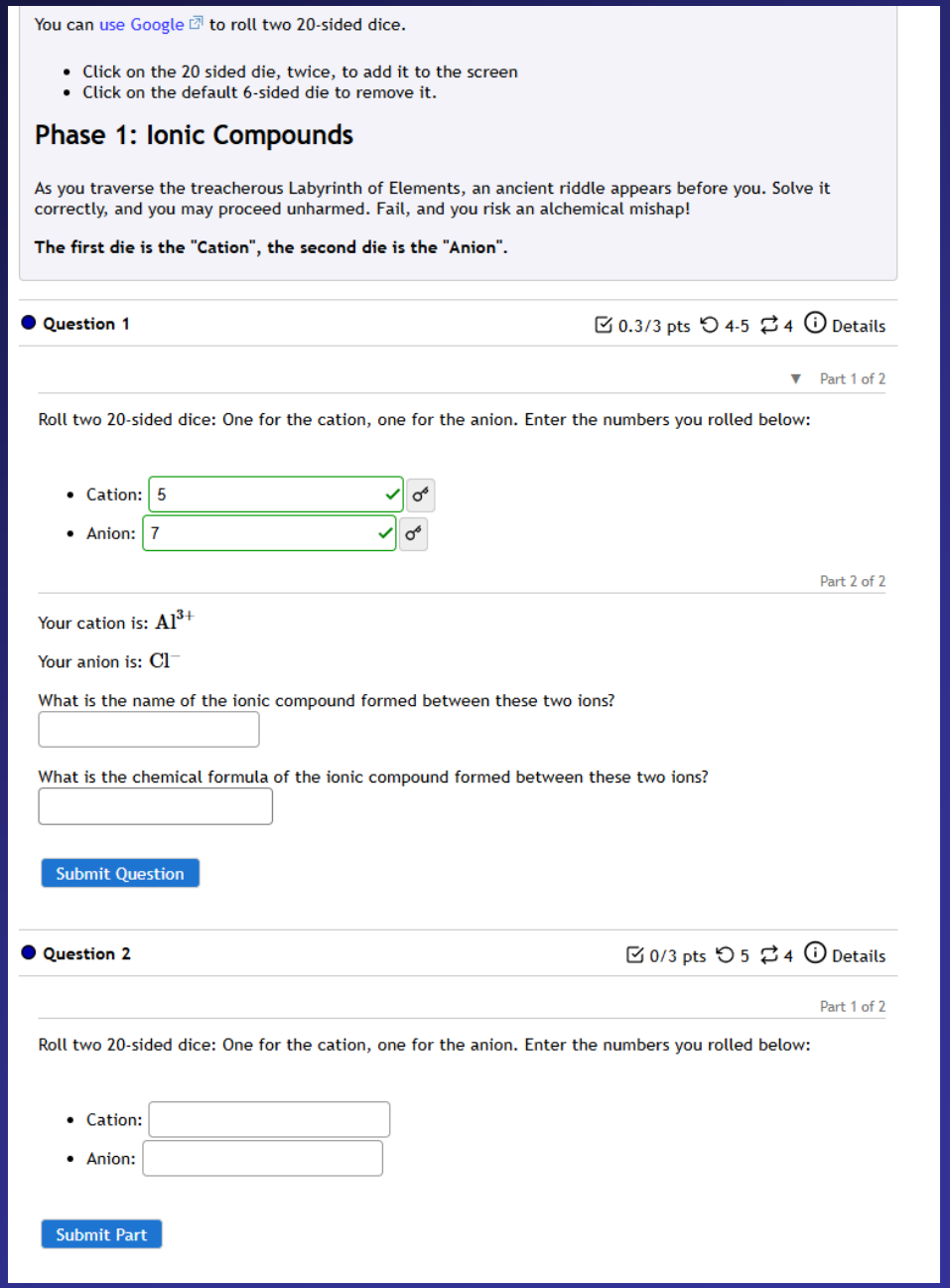
Canvas-Open First View

- The first page just tells you about the experiment and it provides links to your textbook if you wish to use it and to the Google dice roller, which will be demonstrated to you



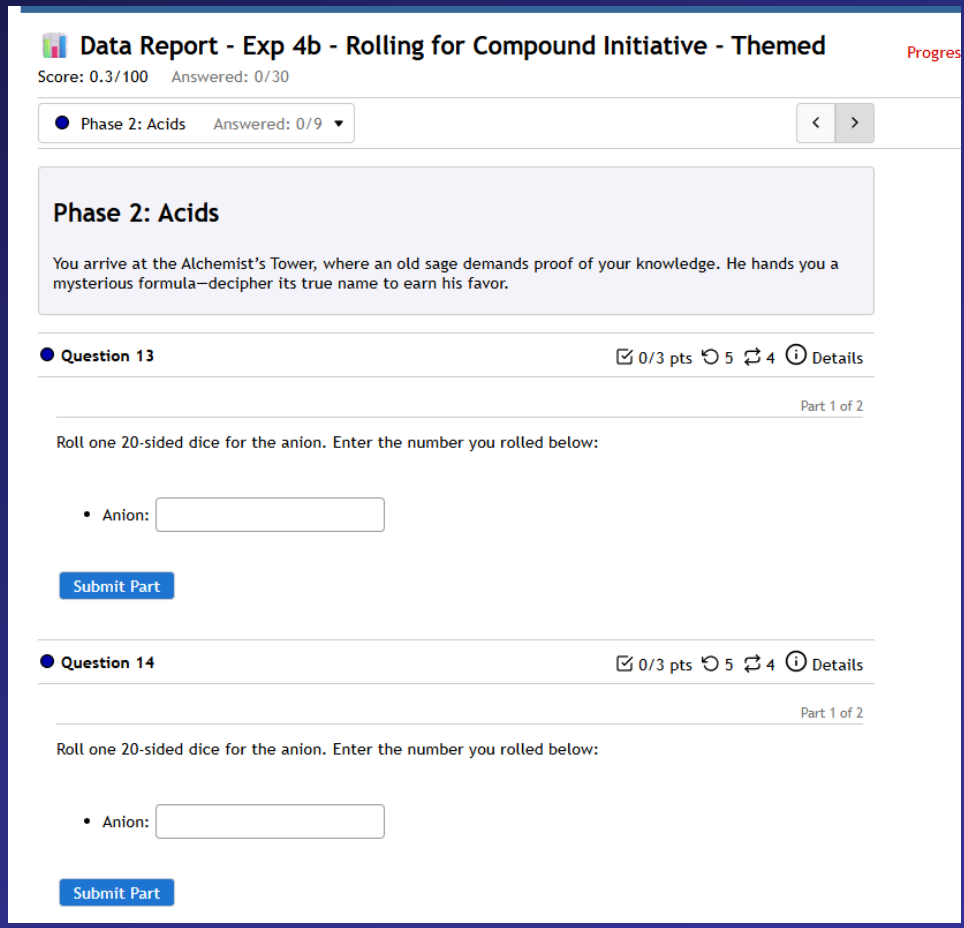
- The subsequent pages will be interactive forms that allow you to put dice rolls values into entries to generate random cations and/or anions. You will use these to build chemical formulas and to test your ability to name compounds

- The form will check/validate your responses as correct



- As you work through the pages of the form, you will record your results in your regular lab manual

- There are some things you need to fill out that are not in the form, such as Type I or Type II cations, and other data



Clean Up

- No clean up was required for this experiment