Question #: 1

Which safety device is located at the point labeled by the number 3?

A. safety shower  
B. eye wash station  
C. fire extinguisher  
D. spill kit
Question #: 2

Which chemical is classified with the chemical hazard symbol below?

[Chemical hazard symbol image]

A. sodium carbonate  
B. water  
C. sodium hydroxide  
D. ethanol

Question #: 3

Identify the following items as cheating or not cheating. Write out the full words, "cheating" or "not cheating". Do NOT abbreviate words.

1.) using your classmates data as your own  __1__
2.) using data you collected yourself  __2__
3.) making up data  __3__
4.) asking others what is on an exam before you take it  __4__
5.) working on your report by yourself  __5__

1. __________  
2. __________  
3. __________  
4. __________  
5. __________
Question #: 4

Which **four** are **true** of a Works Cited page?

A. Page is not numbered in your report.
B. Placed after the body of the paper.
C. "Work(s) Cited" is centered, without quotation marks, italics, or underlining.
D. Includes all quoted, paraphrased, or summarized sources.
E. Does not include sources where titles are used in the text.
F. Font type should be different than the font in the body of the paper.
G. Margins should be changed to 1.5 inches all around.
H. All lines should be double-spaced.

Question #: 5

Identify the following pieces of laboratory equipment. All responses must be **specific** to the items shown.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Identity</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Equipment Image]</td>
<td>![Identity Image]</td>
</tr>
<tr>
<td>Equipment</td>
<td>Identity</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td><img src="image1.png" alt="Equipment Image 1" /></td>
<td>2</td>
</tr>
<tr>
<td><img src="image2.png" alt="Equipment Image 2" /></td>
<td>3</td>
</tr>
<tr>
<td><img src="image3.png" alt="Equipment Image 3" /></td>
<td>4</td>
</tr>
<tr>
<td><img src="image4.png" alt="Equipment Image 4" /></td>
<td>5</td>
</tr>
</tbody>
</table>

1. ________
Question #: 6

A student collected a series of mass and volume measurements for different sized pieces of aluminum foil in lab. A graph of their data is shown below. Using the graph, what is the average density of the aluminum foil?

Report your answer to **two** significant figures. Do **NOT** include units in your answer.

The density of the aluminum foil is __1__ g/mL.

[Graph of Mass versus Volume of Aluminum Foil]

1. __________

Question #: 7

What is the mass percent composition of oxygen in (NH₄)₃PO₄? Report your answer to **three** significant figures. Do **NOT** include units or a percent sign in your answer.

__1__ % oxygen

1. __________
Question #: 8

250. g of iron(III) oxide reacts with 325 g of carbon following the reaction below.

\[ 2\text{Fe}_2\text{O}_3 + 3 \text{C} \rightarrow 4 \text{Fe} + 3 \text{CO}_2 \]

1. What is the limiting reagent? ___1___
2. How much of the **excess** reagent is leftover at the end of the reaction? Report your answer with **three** significant figures. Do **NOT** include units in your answer. ___2___ g

Question #: 9

Consider the **unbalanced** reaction

\[ \text{C}_4\text{H}_{10}(l) + \text{O}_2(g) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(l) \]

If 20.00 g of butane (C₄H₁₀, 58.12 g/mol) reacts with excess oxygen gas, and only 55.22 g of CO₂ (44.01 g/mol) forms, what is the percent yield for this reaction?

A. 9.58 %
B. 98.2 %
C. 17.9 %
D. 91.1 %

Question #: 10

pH indicators can be used to monitor the change in pH of a reaction. These indicators work because they change colors over particular pH ranges, as shown in the following diagram.

Three common pH indicators, methyl orange, bromothymol blue, and phenolphthalein, were mixed together to form an indicator solution. Over what pH range would the solution be orange?

A. 0.0 — 3.0
B. 0.0 — 6.00
C. 3.0 — 7.5
D. 4.5 — 6.0

Question #: 11

Balance the chemical reaction by filling in the blank coefficients below with the smallest possible whole numbers. If the coefficient is 1, enter the number 1.

\[ _1 \text{H}_2\text{SiCl}_2 + _2 \text{H}_2\text{O} \rightarrow _3 \text{H}_8\text{Si}_4\text{O}_4 + _4 \text{HCl} \]

1. _________
2. _________
3. _________
4. _________
Question #: 12

A test tube containing an unknown solution was reacted with various reagents and the results shown below were produced. What is the identity of the unknown?

<table>
<thead>
<tr>
<th>Reagent</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NaOH</td>
<td>no reaction</td>
</tr>
<tr>
<td>HCl</td>
<td>smell of rotten eggs</td>
</tr>
<tr>
<td>NH₄Cl</td>
<td>no reaction</td>
</tr>
<tr>
<td>H₂SO₄</td>
<td>smell of rotten eggs</td>
</tr>
</tbody>
</table>

A. CuSO₄  
B. AgNO₃  
C. Na₂S  
D. NaBr

Question #: 13

What is the net ionic equation for the reaction between the reagents in aqueous solution shown below?

lead(II) nitrate + potassium iodide

Do NOT balance the reaction. Enter ionic charges without superscripts; e.g., Ca²⁺. All parentheses must be used correctly in chemical formulas.

1. _________
2. _________
3. _________
4. _________
5. _________
6. _________
**Question #: 14**

Put the following steps used in carrying out a measurement using a pH probe in order, ranking them from the **first** step to the **last**. Enter only a **letter** for each answer.

A. Rinse probe, then place in storage solution.
B. Calibrate probe using two buffers, rinse probe.
C. Remove probe from storage solution, rinse probe.
D. Observe readout on meter of sample solution pH.
E. Place probe in solution to be measured.

Answers:
Step 1: 1
Step 2: 2
Step 3: 3
Step 4: 4
Step 5: 5

1. __________
2. __________
3. __________
4. __________
5. __________

**Question #: 15**

What volume of 0.750 M NaOH is necessary to exactly neutralize 25.4 mL of 0.750 M H₃PO₄? Hint: write the balanced chemical reaction.

A. 8.46 mL
B. 25.4 mL
C. 76.2 mL
D. 175. mL
Question #: 16

Various samples of DNA bases, including an unknown, were reacted with potassium permanganate and the following data collected. What is the identity of the unknown?

<table>
<thead>
<tr>
<th>Sample</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>green</td>
</tr>
<tr>
<td>B</td>
<td>blue</td>
</tr>
<tr>
<td>C</td>
<td>clear</td>
</tr>
<tr>
<td>D</td>
<td>peach</td>
</tr>
<tr>
<td>Unknown</td>
<td>blue</td>
</tr>
</tbody>
</table>

A. A  
B. B  
C. C  
D. D

Question #: 17

Consider the reaction given below. The {element} that is oxidized is __1___. The oxidizing agent is __2___.

\[
\text{HNO}_3 + \text{HI} \rightarrow \text{NO} + \text{I}_2 + \text{H}_2\text{O}
\]

1. __________  
2. __________
**Question #: 18**

Identify the oxidation number for the indicated atom in the following compounds. Enter your answers as whole numbers (i.e. +1, −3, etc). You **must indicate the sign** (+ or −) of the charge to receive credit.

1. **Cr in Cr(OH)_3**
2. **S in H_2SO_4**
3. **N in NO_3^−**
4. **Ba in BaCl_2**
5. **I in Mg(IO_3)_2**

   1. __________
   2. __________
   3. __________
   4. __________
   5. __________

**Question #: 19**

How many **electron groups** are predicted by the VSEPR rules to be present on the krypton atom in KrF_4?

   A. 6
   B. 4
   C. 5
   D. 2
Question #: 20

What is the hybridization of the central carbon in CH$_3$CN and the predicted bond angle CCN?

A. $sp^2$, 180°
B. $sp$, 180°
C. $sp^2$, 120°
D. $sp^3$, 109°