**Chemistry SAC task: Summary report of practical investigations**

Summary report of selected practical investigations into the properties of acids and bases

**Scope**

Students conduct a series of investigative learning tasks on acids and bases. They then answer directed questions to explain the links between acids and bases theory and experimental behaviour.

**Part A: Acids and Bases Introduction**

You might already have some notions about what acids and bases are. With your partner complete the following tasks.

**Task One (Prior Knowledge)** – List as many examples of acids and bases as you can (name and/or formula)

**ACIDS BASES**

**What makes something an acid?**

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**Properties of acids and bases**

You are provided with 5 samples of liquids, labelled from 1 to 5.

Add a small piece of magnesium to a dimple tray.

Add about 1 mL of liquid 1. Record your observations.

Repeat for all 5 liquids.

Add a small piece of blue litmus paper to liquid 1. Record your observations.

Repeat for all 5 liquids.

Repeat using red litmus.

What conclusion can you draw bout the properties of acids?

What conclusion can you draw bout the properties of acids?

Are there liquids that are neither acid nor base?

The liquids you used were:

1. NaOH 2. H2SO4 3. Water 4. HCl 5. KOH

Complete the following table

|  |  |  |
| --- | --- | --- |
| Acid and its formula | Neutral and its formula | Base and its formula |
|  |  |  |
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**Acids/bases and their formulas**. Is there a way of using the chemical formula to define an acid?

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**Part B: pH**

pH is a measure of how strong an acid or a base is. We can test pH by adding an indicator, either a paper strip or a few drops of universal indicator solution.

Activity for the front bench of the class. The class has a set of liquids on the front bench. (vinegar, lemon juice, milk, baking soda, dilute caustic soda etc) Test the pH of each and line the liquids up in order of pH.

Use the large paper provided to make a pH line and place the liquids on the line.

Do the results match what you would expect?

Make a summary of how pH works – what is the pH of acids? Bases? What happens to pH as the acid gets stronger?

**Part C: Reactions of acids**

**Acids plus carbonate**

Add a spatula of sodium carbonate to a test tube. Add some HCl. Test the gas produced with a match.

What happened to the match? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which gas is produced? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Write a balanced equation for the reaction.

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Repeat the reaction using calcium carbonate.

Write an equation for the reaction.

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Write a general equation for the reaction occurring between an acid and a carbonate.

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**Acids plus metals**

Add a small piece of magnesium to some hydrochloric acid in a test tube. Test the gas.

Identify the gas. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Write a balanced equation for the reaction occurring when a pop test occurs.

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Write a balanced equation for the reaction occurring between the magnesium and the hydrochloric acid.

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Add a small piece of zinc to sulphuric acid.

Write a balanced equation for this reaction.

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Write a general equation for the reaction occurring between an acid and a metal

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**Acids and bases**

Add a few mL of hydrochloric acid to a test tube.

Add a few drops of indicator.

Add sodium hydroxide until there is a colour change.

Is there a gas produced? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Write a balanced equation for the reaction occurring.

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Repeat this procedure using sulphuric acid and potassium hydroxide.

Write a general equation for the reaction between an acid and a base.

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**Summative questions**

Use the experimenting you have completed as evidence to complete the following structured questions

Use your textbook to copy the accepted definition of an acid and a base;

1. What are the properties of acids?

What are the properties of bases?

2. Can you use the chemical formula of a liquid to identify if it is an acid or a base?

How does the chemical formula relate to the definitions of acids and bases.

3. What is the pH scale and how does the pH relate to the structure and concentration of the

liquid?

4. What are the general reactions of

acid + metal 🡪

acid + carbonate 🡪

acid + base 🡪

Give one example of each.

5. How could the reaction between an acid and a base be used to estimate the concentration of a

sample of acid?