**Student worksheet**

**Practical 2: The reactions of a phenol substituted compound – methyl-4-hydroxybenzoate**

**Procedure**

1. **Solubility and pH**
2. Half fill a test tube with boiling water from a kettle.
3. Place it in a beaker of boiling water to keep it warm.
4. Add 5 drops of universal indicator.
5. Add half a level spatula of methyl- 4 hydroxybenzoate and place back in the water bath.
6. Has the compound dissolved?
7. Record the colour of the indicator.
8. **With sodium hydroxide**
9. Add 1cm3 of 0.1M sodium hydroxide to a test tube.
10. Add 5 drops of universal indicator and place in a water bath to warm.
11. Add half a level spatula of methyl-4-hydroxybenzoate and place back in the water bath.
12. Record all observations
13. **With Sodium**
14. Place a level spatula of the phenolic compound in a **DRY** test tube and warm gently with a bunsen burner until it melts.
15. Add a **SMALL** piece of dried sodium
16. Record your observations.
17. Dispose of this carefully by adding about 2cm3 of ethanol to react with any unreacted sodium.
18. **With Bromine**
19. Half fill a test tube with boiling water from a kettle.
20. Place it in a beaker of boiling water to keep it warm.
21. Add half a level spatula of methyl- 4 hydroxybenzoate and place back in the water bath.
22. Add ¼ of a pipette of bromine water.
23. Record all observations.

**Questions:**

1. Draw a diagram showing the intermolecular forces that exist between phenol in water.
2. Write a balanced chemical equation showing how phenol behaves as an acid.
3. Write a balanced chemical equation for the reaction between phenol and sodium hydroxide.
4. Write a balanced chemical equation for the reaction between phenol and sodium.
5. Write a balanced chemical equation for the reaction between phenol and bromine.
6. Comment on the relative ease of reaction between phenol and bromine compared with benzene and bromine.

**Analysis of results**

1. Describe the solubility of phenol.
2. What does the colour of the full range indicator tell you about the pH of phenol?
3. Can phenol be neutralised by sodium hydroxide?
4. What gas do you think is given off when phenol reacts with sodium?

**Equipment/materials**

* Pipettes
* Spatulas
* Glass rods
* Methyl – 4 - hydroxybenzoate
* Full range indicator
* 0.1M sodium hydroxide
* Bromine water (fume cupboard)
* Sodium, tile, tweezers and scalpel
* Ethanol
* Kettle
* Filter paper

**Safety**

* Perform the experiment in a well-ventilated room.
* Wear a lab coat and tie long hair back.
* Wear safety goggles.
* Wear chemical-resistant gloves when handling bromine

 

Corrosive Oxidising

 

Harmful Flammable

**Objective**

* Identify the properties and reactions of phenol.

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