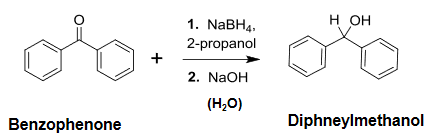
**CH 246: ORGANIC CHEMISTRY II LABORATORY (Spring 2021)**

**Title:** Ketone Reduction

1. **Purpose: (1 point)**

**The purpose of this experiment is to illustrate ketone reduction by preparing diphenylmethanol from benzophenone by sodium borohydride reduction.**

1. **Drawing of structure of the main compound or balanced chemical equation if synthesis is performed: (1 point)**



**3. Reagents and the major product (up to 5 points)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Name** | **M.W.**  (0.5 pts) | **Density**  (0.5 pts) | **Amount (grams/mL)**  (0.5 pts) | **Moles**  (0.5 pts) | **Hazards/Precautions**  **(MSDS data) and melting point or boiling point** (2 pts) | **Role of the reagent** (1 pts)\* |
| Benzophenone | 182.0694 | 1.11 g/cm3 | 0.55 grams | 0.003 | May cause eye and skin irritation. May cause cancer.  MP: 49°C  BP: 305°C | Reactant |
| Sodium borohydride | 37.82 | 1.07 g/cm3 | 0.06 grams | 0.0015 | Causes eye and skin burns. Water, acid, or high temperatures can liberate flammable gas. | Reactant |
| 2-propanol | 60.09 | 0.7850 g/cm3 | 3 mL | 0.0392 | Flammable liquid and vapor. Causes eye irritation. | Solvent |
| Sodium hydroxide | 40 | 2.13 g/cm3 | 3 mL 10% solution | 0.01598 | Causes eye and skin burns. Causes digestive and respiratory tract burns.  MP: 318°C  BP: 1390°C | Reactant |
| Dichloromethane | 84.93 | 1.33 g/cm3 | 3 x 5 mL | 0.235 | Corrosive, causes eye, skin, respiratory tract irritation, cancer.  MP: -97°C  BP: 40°C | Solvent |
| Diphenylmethanol | 184.24 | 1.1 g/cm3 |  |  | May cause eye and skin irritation. May cause respiratory and digestive tract irritation.  MP: 66°C  BP: 297°C | Product |

**\*** Mention role as either reactant, solvent, catalyst or product

**4. Calculations: (1 point)**

Show each calculation for moles of reagents and for theoretical and actual yield. Fill in the box with the limiting reagent and theoretical yield:

Benzophenone

The limiting reagent is

The theoretical yield is

**5. Procedure (up to 2 points)**

|  |  |
| --- | --- |
| **Procedure** | **Observations and Lab Data** |
| A summary of the procedure done with bullet points) | Color changes, exothermic or endothermic reactions, gas generation, etc.; tare weights for flasks, etc. |
| * In a 25 mL round bottomed flask place 0.55 g of benzophenone. * Add a slurry of 0.06 g sodium borohydride in 3 mL of 2-propanol. * Add boiling chips and reflux the mixture for 30 minutes on a heating mantle. * Allow solution to cool to room temperature. * Decompose borate ester complex: Add 3 mL 10% aqueous sodium hydroxide solution and swirl the reaction mixture vigorously until the precipitate has dissolved completely. * Break up any resistant lumps carefully with the aid of water. Add 5 mL of water and 5 mL of dichloromethane. * Extract the diphenylmethanol by shaking it with two successive 5 mL portions of dichloromethane. * Combine the extract, transfer them into a distillation apparatus, and carefully distill off the dichloromethane with a heating mantle. * On cooling and standing the residue will crystallize to give product. * Measure the weight, melting point, and TLC to confirm the product. * Put two spots on TLC: pure benzophenone and the product from crystallized product. Use 20% ethyl acetate and 80% hexane. |  |

**6.** Results; include actual yield in grams and % yield.

**Results (need to get signed by instructor or TA):**