Name:

**Chapter 4 Aromatics**

**Test Overview**

**1. Bromination** (2 Questions: 1 including all steps, director analysis, and resonance forms)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reactants | Catalysts | Formation of Electrophile | Resonance  (show the 3 resonance structures) | Intermediate  (Abbreviated Resonance Form) | Products  (Label Inorganic and Organic) |
| +  Add Here |  |  |  |  |  |

**2. Cholrination** (1 Question)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reactants  Add Here | Catalysts | Formation of Electrophile | Resonance  (show the 3 resonance structures) | Intermediate  (Abbreviated Resonance Form) | Products  (Label Inorganic and Organic) |
| + |  |  |  |  |  |

**3. Sulfonation** (1 Question)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reactants | Catalysts | Formation of Electrophile | Resonance  (show the 3 resonance structures) | Intermediate  (Abbreviated Resonance Form) | Products  (Label Inorganic and Organic) |
| +  Add Here |  |  |  |  |  |

**4. Nitration** (5 Questions)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reactants | Catalysts | Formation of Electrophile | Resonance  (show the 3 resonance structures) | Intermediate  (Abbreviated Resonance Form) | Products  (Label Inorganic and Organic) |
| +  Add Here |  |  |  |  |  |

**5-6 Alkylation (4 Questions)**

**5. 1st Method: Alkylation with an Alkyl Halide**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reactants | Catalysts | Formation of Electrophile | Resonance  (show the 3 resonance structures) | Intermediate  (Abbreviated Resonance Form) | Products  (Label Inorganic and Organic) |
| + CH3(CH2)4Cl  Add Here |  |  |  |  |  |

**6. 2nd Method: Alkylation with an Alkene**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reactants | Catalysts | Formation of Electrophile | Resonance  (show the 3 resonance structures) | Intermediate  (Abbreviated Resonance Form) | Products  (Label Inorganic and Organic) |
| + CH3CH=CHCH3  Add Here |  |  |  |  |  |

**7. Acylation (1 Question)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reactants | Catalysts | Formation of Electrophile | Resonance  (show the 3 resonance structures) | Intermediate  (Abbreviated Resonance Form) | Products  (Label Inorganic and Organic) |
| + Br(CH2)2C=OCH3  Add Here |  |  |  |  |  |

**Intermediates of Reactions** (See #1-7 intermediates above): 2 Questions

**Stability of Products/Resonance**(See #1-7 resonance forms above and answer the questions below):6 Questions

8. What carbocation is most stable?

a. What director allows for this cation to be formed?

9. What is 4th resonance?

a. What two conditions allow for 4th resonance to form?

b. What director allows for 4th resonance to occur?

10. What occurs when an electropositive element and a carbocation are placed next to each other?

a. What director alleviates this problem?

**Ring Activators and Deactivators** (2 Questions)

11. Generally, what type of directors’ act as ring activators?

a. Provide an example:

b. What is the exception to this rule?

* + - Provide an example

12. Generally, what type of directors’ act as ring deactivators?

a. Provide an example:

b. What is the exception to this rule?

* + - Provide an example

**Organic Synthesis** (3 Questions: 1 including all steps)

13. Perform a Chlorination of Benzene followed by Sulfonation

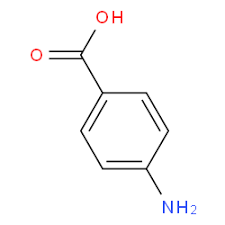
|  |  |  |
| --- | --- | --- |
| **Step 1: Reactants** | **Catalyst** | **Products** (Label Organic and Inorganic) |
| +  Add Here |  |  |
| **Step 2: Reactants** | **Catalyst** | **Products** (Label Organic and Inorganic) |
|  |  |  |
| **Short-Cut** | | |
|  | | |

14. Perform a Sulfonation of Benzene followed by Chlorination.

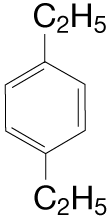
|  |  |  |
| --- | --- | --- |
| **Step 1: Reactants** | **Catalyst** | **Products** (Label Organic and Inorganic) |
| +  Add Here |  |  |
| **Step 2: Reactants** | **Catalyst** | **Products** (Label Organic and Inorganic) |
|  |  |  |
| **Short-Cut** | | |
|  | | |

**Levels of Substitution:** (4 Questions)

15. Mono-substitution (See #1-7)

16. Tri-substitution: Nitrate the following molecules (Label all new products and show your work)

a.

b. 

**Lab:** Understand any similarities/differences that exist as far as consumption of salicylic, old aspirin, and acetylsalicylic (new aspirin).

**Extra Credit:** Calculations (Possible mole conversions and/or limiting reagent)