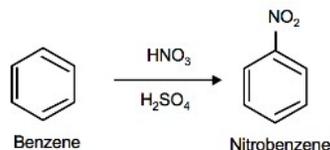


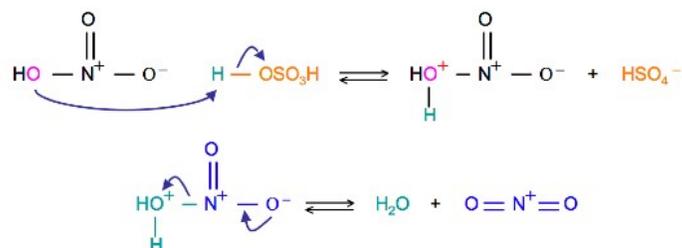
## 18.3: NITRATION OF BENZENE (AN EAS REACTION)

### NITRATION OF BENZENE

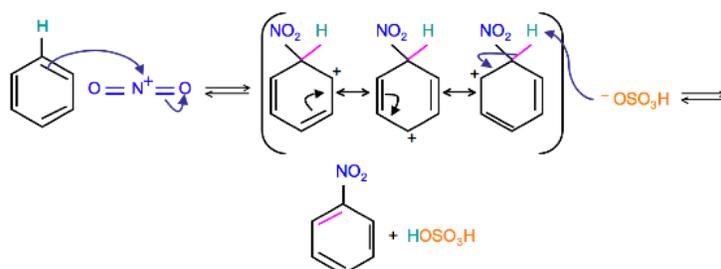
Sulfuric acid catalyzes the nitration of benzene. It is important to note the chemical formula for the nitrate group bonded to benzene is  $-\text{NO}_2$ . The chemical formula and name are assigned from an organic chemistry perspective which does not align with the inorganic perspective.



**Step 1:** Nitric acid ( $\text{HNO}_3$ ) is protonated by sulfuric acid which causes the loss of a water molecule and formation of a nitronium ion, a strong electrophile.



**Steps 2 and 3:** Two pi electrons from benzene form a sigma bond with the nitronium ion to create the sigma complex. Bisulfate deprotonates the sigma complex to restore the aromatic ring as shown below.

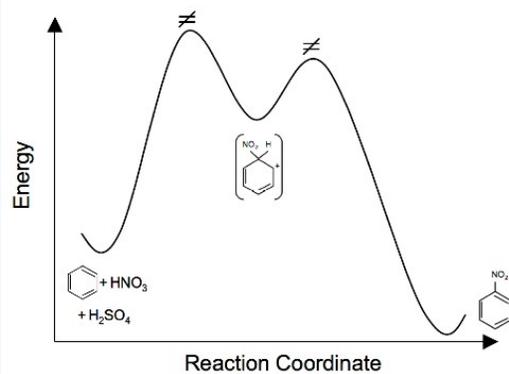


#### Exercise

6. Draw an energy diagram for the nitration of benzene. Draw the intermediates, starting materials, and products. Label the transition states.

**Answer**

6.



## CONTRIBUTORS AND ATTRIBUTIONS

- Dr. Dietmar Kennepohl FCIC (Professor of Chemistry, [Athabasca University](#))
- Prof. Steven Farmer ([Sonoma State University](#))
- William Reusch, Professor Emeritus ([Michigan State U.](#)), [Virtual Textbook of Organic Chemistry](#)
- Catherine Nguyen

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