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Synthesis of aniline from nitrobenzene lab report

How is nitrobenzene converted into aniline. Aniline synthesis. Synthesis of aniline from nitrobenzene. How to make aniline from nitrobenzene.

Looking forward to seeing everyone at the meeting tomorrow and discussing our strategies. Apparatus: Procedure: First, combine 25 g of granulated tin and 12 g of nitrobenzene in a 500-mL round-bottomed flask. Create an ice-water bath, then add 55 mL of concentrated hydrochloric acid while swirling well to promote the reaction. Let the mixture react until the temperature reaches 60°C; cool briefly in ice just long enough to prevent the temperature from rising over 60°C; continue to swirl, cool as needed, and keep the temperature between 55°C and 60°C for 15 minutes. Remove the thermometer, clean it with water, and place the flask on a heating mantle with frequent swirling until droplets of nitrobenzene are no longer present in the condenser and the color caused by the formation of an intermediate reduction product has faded (about 15 min). Next, dissolve 40 g of sodium hydroxide in 100 mL of water and cool to room temperature. At the end of the reduction reaction, cool the acid solution on ice while gradually adding the alkali solution. This neutralizes the aniline hydrochloride, resulting in the release of aniline, which is now volatile in steam. Perform steam distillation with a three-neck flask: one opening should be stoppered, the second for a dropping funnel, and the third for a distillation head. Heat the flask with a Bunsen burner to prevent it from filling with water from condensed steam. Estimate the volume of distillate by measuring the volume of water in a second flask filled to the level of liquid in the receiver. Aniline is a colourless oily liquid with a boiling point of 180°C and melting point of -60°C, exhibiting a characteristic unpleasant smell. It is sparingly soluble in water but readily soluble in organic solvents such as ethanol, ether, and benzene. Aniline is highly toxic in nature. Chemically, aniline's properties can be attributed to its amino group, which renders it basic in nature due to the presence of a lone pair of electrons on the nitrogen atom. This basicity leads to several reactions: * Alkylation reaction: The replacement of hydrogen atoms by alkyl groups (-R) results in secondary, tertiary, and quaternary ammonium compounds. * Acylation reaction: The substitution of hydrogen atoms with acyl groups (RCO-) yields various derivatives. * Benzoylation reaction: The introduction of a benzoyl group (C6H5CO-) at the amino group position produces distinct compounds. * Carbylamine reaction: A test for primary amines, resulting in an offensive smell when chloroform is warmed with the amine in the presence of alcoholic KOH. * Diazotization reaction: The formation of benzene diazonium chloride upon treatment with NaNO2 and dilute HCl. Aniline's reactivity can also be attributed to its benzene ring, which acts as an electron-releasing group. This property enables the lone pair of electrons on the nitrogen atom to participate in resonance with the benzene ring, affecting the orientation of incoming electrophiles: * Sulphonation reaction: Aniline undergoes sulphonation upon heating with concentrated H2SO4. * Nitration of aniline: The nitration process is facilitated by acetylation, allowing for the introduction of a nitro group at ortho and para positions. * Halogenation (Bromination) of aniline: Aniline reacts with bromine water to produce a white precipitate of 2,4,6-tribromoaniline. * Coupling reaction of aniline: The coupling of aniline with diazonium salts results in colored azo-compounds called azo-dyes. Coupling reaction uses and applications in various industries