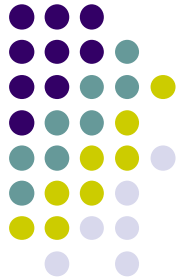
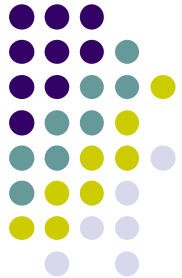
Exp 09
Silver mirror reaction

Principle

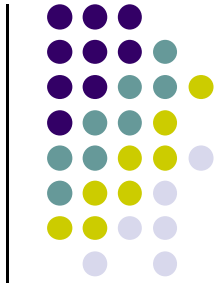


- The silver mirror reaction is an oxidation-reduction reaction.
- Positive charge silver ions can be reduced to silver atoms by glucose in base and ammonia-containing solutions.
- The precipitated silver atoms are adsorbed on the surface of the glass and generate a silver mirror。



- Silver ions react with aldehydes in an base solution of ammonia to obtain precipitates of carboxylic acids and metallic silver.
- This precipitate appears in the form of a silver mirror. It is called a silver mirror reaction, which is also called the Tollen’s test, and the silver ammonia ion is alkaline. The solution is called Tollen's reagent.

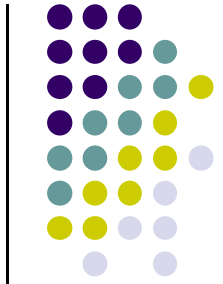
Equation



$$RCHO(l) + 2Ag(NH_3)_2^+ (aq) + 3OH^-(aq) \rightarrow$$

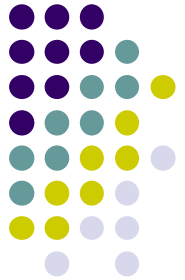
$$RCOO^-(aq) + 2Ag(s) + 4NH_3(aq) + 2H_2O(l)$$

Application in life



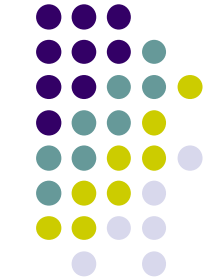
- The silver mirror reaction can make a mirror on glass, but in fact the silver mirror reaction is not fit for the mirror, because its too expensive. And if possible, the silver mirror reaction is used to extract silver ◦
- Can metalize non-conductive surfaces
- Acts as an indicator to distinguish between organic substances of aldehydes and ketones ◦

Material



- 20 ml glass bottle
- 0.6M silver nitrate
- 10% glucose
- 33% ammonia
- 2.5M Sodium Hydroxide

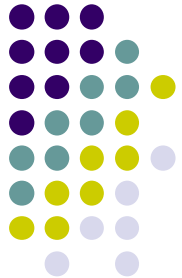
Procedure



- Take a tube and wash it. After drying it, dry the outside with a tissue
- Add 3 drops of 0.6 M $AgNO_{3(aq)}$ (Do not touch skin, otherwise it will not be washed)
- Add 3 drops of 2.5 M NaOH(aq) mix evenly (look carefully for color changes and precipitates?)
- Add 15 drops 2 M of ammonia solution and shake vigorously to mix until the solid precipitate is completely dissolved in the test tube.

- Add 2 drops of 10% glucose solution
- Using parafilm sealing test tube mouth, shake up and down, about 10 minutes
- Use 5 drops HNO_3 to wash the Ag metal.(if don't bring back)

Notification



- Silver ammonia solution must not be allowed to evaporate, heat, or store directly, otherwise explosion may occur.