

EXAMEN : Baccalauréat général - Série S-SVT ou S-SI	Session 2014
EPREUVE : Evaluation spécifique de Langue en section européenne	
PHYSIQUE-CHIMIE en langue ANGLAISE	
Thème : Transformation chimique	Sujet N°13

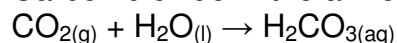
DISAPPEARING INK CHEMISTRY

Disappearing ink is a water-based acid-base indicator (pH indicator) that changes from a colored to a colorless solution upon exposure to air. The most common pH indicators for the ink are thymolphthalein (blue) or phenolphthalein (pink).

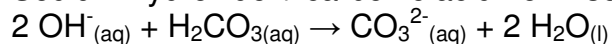
When the ink is sprayed onto a porous material (cotton tee-shirt) the water in the ink reacts with carbon dioxide in the air to form carbonic acid. The carbonic acid then reacts with the sodium hydroxide in a neutralization reaction to form sodium carbonate. Neutralization of the base causes a color change of the indicator and the stain disappears:



Carbon dioxide in the air reacts with water to form carbonic acid :



Sodium hydroxide + carbonic acid form sodium carbonate + water :



Here's what you need and how to make your own disappearing ink :

- 0.10 g thymolphthalein for blue ink or phenolphthalein for red ink dissolved in a mixture of ethanol and water.
- 20 drops of sodium hydroxide until the solution turns a dark blue or red. The pH of the ink solution is 10-11, but after exposure to air will drop to 5-6.

The color will vanish more quickly if you apply a cotton ball dampened with vinegar or if you blow on the spot.

Caution : Never spray disappearing ink into a person's face. Preparing/handling the sodium hydroxide solution requires prudence as the base is caustic. In case of skin contact, immediately rinse with water.

stain : tache, teinte

Questions :

1. Present and comment on this document.
2. Focus on at least one chemistry topic such as acid-base reaction involving carbonic acid. Explain the role of the vinegar or the air at the end of the text.
3. According to you, what are the advantages and disadvantages of chemistry ?