Testing Liquids for Polarity

Objective
To test a number of liquids in order to find out if their molecules are polar.

Introduction
In this experiment you will study the effect of a charged rod on a stream of liquid from a burette. A deflection of the stream indicates that the liquid consists of polar molecules. The extent of the deflection, under standard conditions, shows how polar the molecules are.

Materials
6 labelled beakers, 6 labelled burettes each corked and containing the following liquids: cyclohexane, cyclohexene, distilled water, pentanol, methyl ethanoate, propanone. Polythene rod, piece of fur or suitable cloth.

Safety
Cyclohexene has an irritant vapour. All organic liquids mentioned in the list are flammable.

Procedure
1. Rub the polythene rod with the fur. This will give it a negative charge.
2. Position the beaker beneath the jet of one of the burettes as shown in the diagram. Remove the cork and allow a stream of the liquid to run form the burette with the tap fully open.
3. Bring the charged rod close to the stream of liquid and note any deflection on an arbitrary scale from 0 to 3 (0 = no deflection, 3 = greatest deflection). Record your results in a suitable data table.
4. Pour the liquid from the beaker back into the labelled burette to avoid waste. Replace the cork in the burette, so that it is ready for other students.
5. Repeat the above procedure with each liquid in turn. Try to standardize the conditions, otherwise your rating of the deflection will be worthless. The liquid level in the burettes, the tap aperture, the position of the rod, and the extent to which the rod is charged should always be the same.

Discussion Questions
1. Explain the effect of the charged rod on a jet of water.
2. What do you think would happen with a rod of opposite charge? Explain your answer.
3. Place the liquids in an approximate order of decreasing polarity. Interpret this order in terms of the structure of each molecule and comment particularly on the different results in the following pairs of liquids: trichloromethane and tetrachloromethane.
4. How would the different densities of the liquids affect the results?

Conclusion