Separate Co^{2+} & Ni^{2+} Ions Present In the Given Mixture By Using Ascending Paper Chromatography & Determine Their R_f Values

Apparatus

Gas jar, glass rod, filter paper strip (What man No. 1 filter paper), jar cover, fine capillary tube.

Chemicals Requirement

Sample solution containing cobalt (II) and nickel (II) ions, acetone, concentrated aqueous ammonia, Rubeanic acid spray reagent.

Procedure

1. Take a What man filter paper strip (20 x 2 cm) and draw a line with pencil above 3 cm from one end. Draw another line lengthwise from the centre of the paper as shown in Fig.

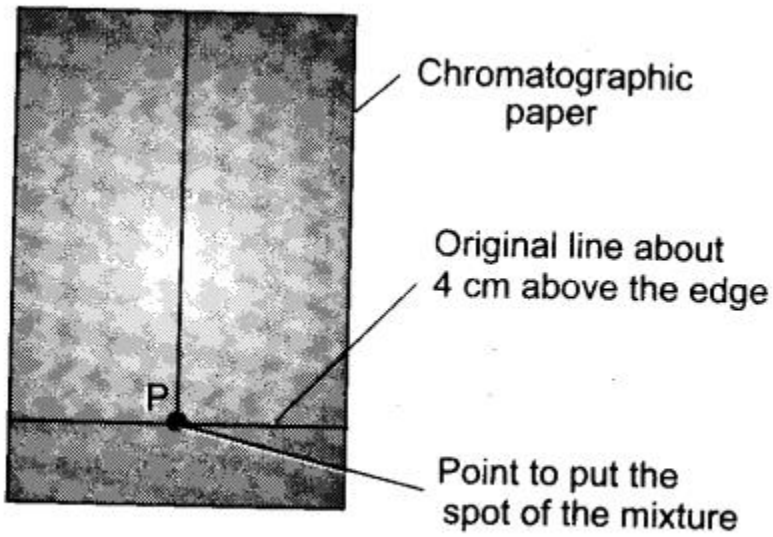

Fig. Spotting of the mixture.

2. With the help of fine capillary tube, put a drop of the mixture of red and blue inks at the point P. Let it dry in air. Put another drop on the same spot and dry again. Repeat 2-3 times, so that the spot is rich in mixture.
3. Suspend the filter paper vertically in a gas jar containing the solvent (eluent) with the help of a glass rod in such a way that the pencil line (and the spot) remains about 2 cm .above the solvent level (50% alcohol + distilled water).

4. Cover the jar and keep it undisturbed. Notice the rising solvent along with the mixture of red and blue inks. After the solvent has risen about 15 cm you will notice two different spots of blue and red colours on the filter paper.
5. Take the filter paper out of the jar and mark the distance that the solvent has risen on the paper with a pencil. This is called the solvent front.
6. Dry the paper. Put pencil marks in the centre of the blue and red spots.
7. Measure the distance of the two spots from the original line and the distance of the solvent from the original line.
8. Calculate the Revalues of the blue and red inks by using the formula :

$$R_f = \frac{\text{Distance travelled by the blue or red ink from the point of application}}{\text{Distance travelled by the solvent from the original line}}$$

After elution and drying, place the paper in a large, dry, covered beaker containing a smaller beaker of concentrated aqueous ammonia. After about two minutes, remove the paper and spray it on both sides with rubeanic acid reagent. Allow it to dry. Nickel becomes visible as blue purple band while cobalt becomes visible as yellow orange band. Evaluate R_f values of the two ions.

Observations and Calculations

Colour of the spot	*Distance travelled by different components*	*Distance travelled by solvent*	*R_f values*
Blue purple (Ni^{2+})	A cm	X cm	A/X
Yellow orange (Co^{2+})	B cm	X cm	B/X

Result

Revalue of Ni^{2+} =……
Revalue of Con^{2+} =……..
The above experiment can be carried by using a mixture of
(i) Iron (II) and cobalt (II) (ii) Iron (II) and nickel (II)
(iii) Copper (II) and iron (II) (iv) Copper (II) and nickel (II)
(v) Iron (II) and zinc (II) (vi) Lead (II) and Cadmium (II).