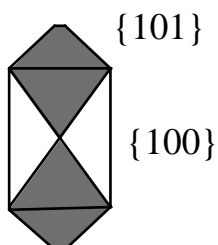


DYEING CRYSTALS

Researchers have shown that molecules in solution – even molecules that are very different from the crystal molecules and ions – can arrange themselves on a growing crystal surface so that they make specific non covalent bonds. If these interactions are strong enough, and crystal growth is fast enough, the crystal can actually grow around and entomb the impurity. However, this only works for molecules with particular structures that match structural features of the growing crystals.

In this lab, we will attempt to grow dyed crystals of KH_2PO_4 (potassium dihydrogen phosphate; also called KDP) with an azo dye. These dyes will tend to selectively stain the pyramid faces (called $\{101\}$ in crystallographic language). See below.



Crystallization is an Art. Crystal growth is effected by an array of subtle factors; concentration of the solution, amount of heat used to dissolve, rate of cooling, rate of evaporation and stillness of the crystal solution all can make a critical difference in the shape and beauty of the crystals you grow.

We will grow our crystals over a 5 day period. On Wednesday we will prepare the solution and on Monday (paint lab day) we will recover the crystal and see how beautiful they are! The most beautiful and unique crystals will receive 3 extra credit points.

Divination powers: Some say that the crystals that form can be an indicator of your future (much like tea leaves). With the proper interpretation of your crystal shape you can perhaps tell if you will make it into medical school/ pharmacy/ when/if you'll meet your perfect mate and much much more!

PROCEDURE

Incorporation of Dye into crystals of potassium dihydrogen phosphate (KDP):

You will make a crystallization solution containing the dye Chicago Sky Blue or Amaranth Red (your choice).

Label a large beaker or crystallization dish with your name and lab section.

Weigh 17 grams of potassium dihydrogen phosphate (KDP), and transfer into your beaker. Add 50 mL of distilled water and a magnetic stirrer.

Cover the beaker with a watch glass and place the beaker on a hot plate. Stir the solution with heat and continue stirring until all solid has dissolved (if the KDP does not dissolve after 10 minutes you may turn up the heat a little bit or add a little more water).

While the solution is still warm, add 3 mL of Chicago Sky blue dye solution or 4 mL of Amaranth Red instead of your dye (keep heating). Once the dye has mixed for one minute, cover the solution with a watch glass and quickly and carefully place this solution somewhere safe and still.

We will recover the crystals on Monday.