

EXPERIMENT NO: 4 FORMULA AND COMPOSITION OF A HYDRATE

❖The aim of this experiment is to determine the percentage of water in a hydrated compound and to find the formula of the hydrate.

❖Hydrates are crystalline compounds in which one or more molecules of water are combined with each formula unit of salt.

❖This water of hydration is not bounded tightly into the crystalline structure and can be driven off by heating a sample of a hydrate.

❖If the hydrate is colored, a color change usually results upon heating.

❖Each hydrate salt has a fixed number of water molecules associated with it, called waters of hydration or water of crystallization.

❖When a salt holds waters of hydration, we call it a hydrated salt. The compound without the water is said to be anhydrous.

❖Some anhydrous salts can absorb moisture from the air to become hydrated.

❖These salts are as said to be hygroscopic. Some hygroscopic salts are useful as drying agents.

❖A common example is silica gel, made from sodium silicate, Na_2SiO_3 , which is usually packaged with optical or electronic devices shipped by boat.

❖There are some hygroscopic compounds that can absorb so much moisture from their surroundings that they eventually dissolve in the absorbed water.

❖For example, sodium hydroxide pellets are so hygroscopic that they dissolve in the water they absorb from the air.

❖Another example of this type of compound is calcium chloride, CaCl_2 . This type of compound is said to be deliquescent.

❖Some active pharmaceutical ingredients are extremely sensitive to humidity.

❖If left in contact with moisture in the air even for short periods of time, these crystalline materials become deliquescent, turning into a paste or even a liquid.

❖A good example of this type of deliquescent material is sodium valproate.

❖Sodium valproate is the sodium salt of valproic acid and is an anticonvulsant used in the treatment of epilepsy, anorexia nervosa, anxiety disorder, posttraumatic stress disorder, and bipolar disorder, as well as other psychiatric conditions requiring the administration of a mood stabilizer.

❖ Typically, the pharmaceutical industry control this effect by using restrictive (and expensive) environmental controls in manufacturing and formulation areas.

❖ The unique properties of functional polymers may provide an alternative solution to this problem, thus the use of a resinate can eliminate deliquescence without the need for expensive environmental measures.