- **DRYING AGENTS**

After an organic solvent has been in contact with an aqueous solution, it will be "wet", *i.e.* it will contain some dissolved water even though the organic solvent will typically have a very low miscibility with water. The amount of water dissolved varies from solvent to solvent. In order to remove the dissolved water a drying agent is used. If water droplets or worse, a layer of water is clearly visible, then use a separatory funnel before using a drying agent.

Drying Agents Commonly Used for Drying Solutions in Organic Solvents

Substance	Capacity	Speed	Intensity	Cost	Convenience	Suitability
Calcium Chloride	H	M	H	L	H	a
Calcium sulfate (Drierite)	L	H^+	H^+	M	H	b
Magnesium sulfate	H	H	M,H	L	M	c
Molecular sieves, 4Å	H	H	H		H	c
Potassium carbonate	M	M	M		M	d
Sodium sulfate	H^+	L	L	L	M	e

H: high M: medium L: low

a. Combines with alcohols, phenols, amines, amino acids, amides, ketones, and some aldehydes and esters. It should not be used to dry solutions containing compounds of these types unless it is desired to remove them also. Some calcium hydroxide may be present that will combine with acids. The hexahydrate is unstable above 30°C.
b. Generally useful. The hemihydrate is stable to at least 100°C.
c. Generally useful.
d. Combines with acids and phenols. It should not be used to dry solutions containing acids unless it is desired to remove them also.
e. Generally useful. The decahydrate is unstable above 32°C.

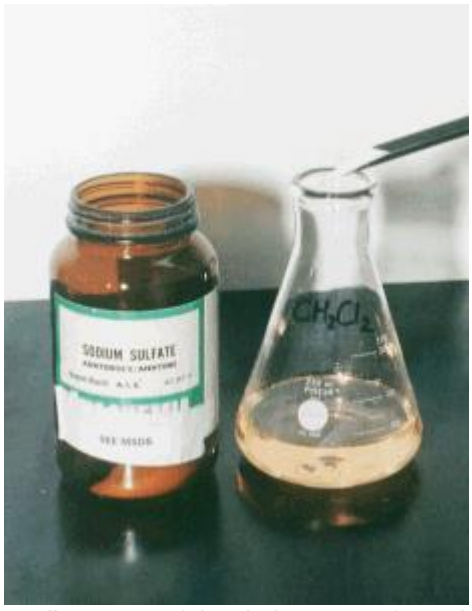
Common drying agents are anhydrous inorganic salts that acquire waters of hydration when exposed to moist air or a wet solution. For the most common drying agents such as sodium sulfate or magnesium sulfate, the crystals form larger clumps when they absorb water. After standing for a short period the crystals are removed by filtration or decantation, and the solution is then relatively free of water.

Use drying agent (quick link to video : drying agents)

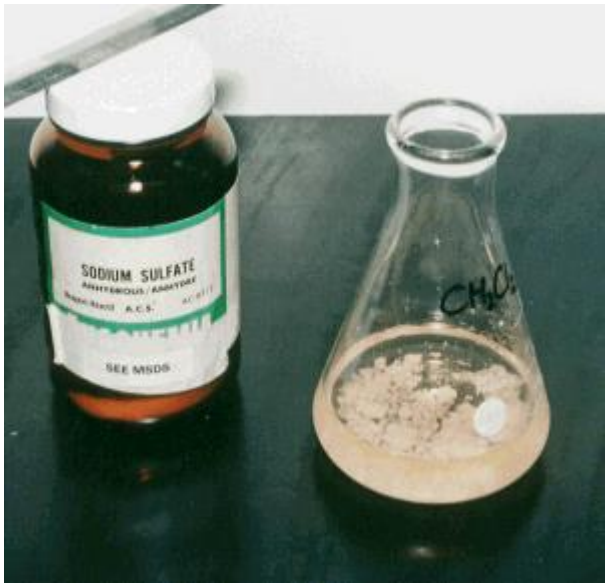
In order to use a drying agent such as sodium sulfate or magnesium sulfate, the drying agent is just added to the solution using a spatula then the solution is stirred or swirled or shaken and set aside to settle for a couple of minutes. If the solution is dry then there still should be fine drying agent still visible (note that most undergraduates tend to add too much drying agent). If not, add a little more drying agent and repeat the process. If the solution is dry, then remove the drying agent by filtration.

Anhydrous magnesium sulfate is a common drying agent

A wet solution with drying agent added



Add a small amount of the drying agent from the tip of a spatula.



If you look carefully, you can see the clumps of the drying agent that has absorbed water.