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Vibra-Dryer

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One of the sources of anhydrous $MgCl_2$ being evaluated is a company called Caledon. The material is claimed to have the advantage of a very low potassium content but the disadvantage of containing organic compounds which may include toluene. Toluene is an aromatic hydrocarbon. It can act as a scintillator, it is a suspected carcinogen and it is a powerful solvent. It is soluble in water at room temperature to the extent of about 0.05%. It is known to attack several plastics which SNO wishes to be able to use; the acrylic of the AV, the polyurethane of the special O-rings used in valves, the polysulphone of UF membranes and housings, the PVC and C-PVC of certain items such as flowmeters and gauge guards which may need to be used in the pipework system and it may attack RO membranes. It is therefore essential that toluene and any similar compounds should be removed if this material were to be used. orig

The most obvious method of removing such organic compounds from anhydrous $MgCl_2$ would be some type of oven. Bearing in mind that contact with ordinary air must be kept to the absolute minimum because the material is hygroscopic and would absorb water vapour irreversibly, a vacuum oven is probably to be preferred. An ordinary oven would require large volumes of dry air or gas, or a recirculatory system with the organic liquids being removed by a condenser or an absorber. According to the people who import it, activated carbon made from coconuts grown in Sri Lanka is the best you can get. But they would say that, wouldn't they? It may even be true.

A variation on the gas-circulation idea is to pass the gas through the material instead of just over it, but this remains a batch process which is labour-intensive and with risks of errors or contamination. The process industry has developed various types of continuous dryers which are more suitable for handling larger quantities. One of these is the vibrating dryer, and the accompanying figure illustrates a typical design. The material to be dried descends a series of vibrating and gently sloping shelves while vapour is removed by a counter-current flow of hot gas.

