eppendorf

Chemical Compatibility of Eppendorf Consumables

Clemson University Safety Retreat

August 11th, 2022

Eddie Bondo
Senior Territory Manager
Western NC, all of SC

1

eppendorf

Well-Known Eppendorf Products

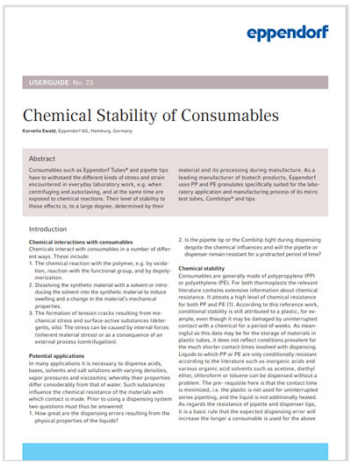




2

eppendorf

Chemical Stability Guide - Consumables



eppendorf

USERGUIDE No. 23

Chemical Stability of Consumables

Kornelia Ewald, Eppendorf AG, Hamburg, Germany

Abstract

Consumables such as Eppendorf Tubes® and pipette tips have to withstand the different kinds of stress and strain encountered in everyday laboratory work, e.g. when centrifuging and autoclaving, and at the same time are exposed to chemical reactions. Their level of stability to these effects is, to a large degree, determined by their material and its processing during manufacture. As a leading manufacturer of biotech products, Eppendorf uses PP and PE granulates specifically suited for the laboratory application and manufacturing process of its micro test tubes, Combitips® and tips.

Introduction

Chemical interactions with consumables

Chemicals interact with consumables in a number of different ways. These include:

1. The chemical reaction with the polymer, e.g. by oxidation, reaction with the functional group, and by depolymerization.
2. Dissolving the synthetic material with a solvent or introducing the solvent into the synthetic material to induce swelling and a change in the material's mechanical properties.
3. The formation of tension cracks resulting from mechanical stress and surface-active substances (detergents, oils). The stress can be caused by internal forces (inherent material stress) or as a consequence of an external process (centrifugation).

Potential applications

In many applications it is necessary to dispense acids, bases, solvents and salt solutions with varying densities, vapor pressures and viscosities; whereby their properties differ considerably from that of water. Such substances influence the chemical resistance of the materials with which contact is made. Prior to using a dispensing system two questions must thus be answered:

1. How great are the dispensing errors resulting from the physical properties of the liquids?
2. Is the pipette tip or the Combitip tight during dispensing despite the chemical influences and will the pipette or dispenser remain resistant for a protracted period of time?

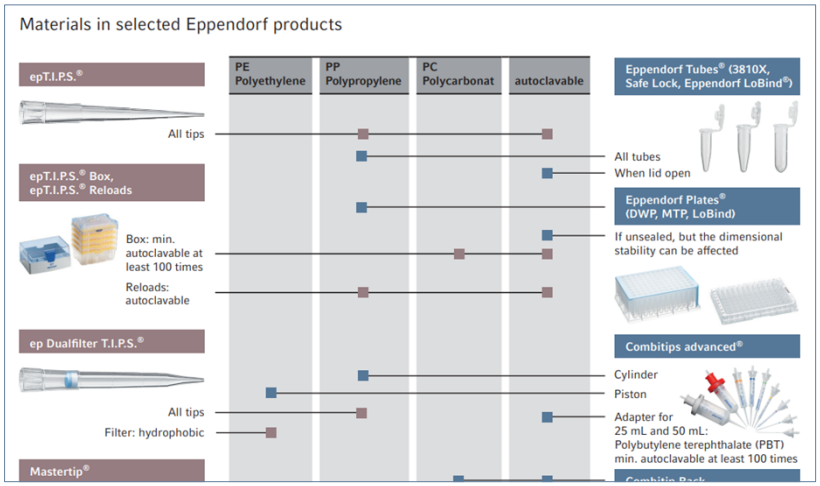
Chemical stability

Consumables are generally made of polypropylene (PP) or polyethylene (PE). For both thermoplasts the relevant literature contains extensive information about chemical resistance. It attests a high level of chemical resistance for both PP and PE [1]. According to this reference work, conditional stability is still attributed to a plastic, for example, even though it may be damaged by uninterrupted contact with a chemical for a period of weeks. As meaningful as this data may be for the storage of materials in plastic tubes, it does not reflect conditions prevalent for the much shorter contact times involved with dispensing. Liquids to which PP or PE are only conditionally resistant according to the literature such as inorganic acids and various organic acid solvents such as acetone, diethyl ether, chloroform or toluene can be dispensed without a problem. The pre-requisite here is that the contact time is minimized, i.e. the plastic is not used for uninterrupted series pipetting, and the liquid is not additionally heated. As regards the resistance of pipette and dispenser tips, it is a basic rule that the expected dispensing error will increase the longer a consumable is used for the above

3

eppendorf

Using this Guide…



4

eppendorf

Using this Guide…

Chemical resistance of PP and PE

Chemicals	Concen-tration in %	Other names	Tempe-rature °C	PE[*1]	PP[*2]	PC[*3]	Steam pressure at 20 °C (hPa)	Density at 20 °C (mg/µL)	Viscosity at 20 °C (mPas)	Remarks
Acetaldehyde	40	Ethanal	20 60	0 3	1 1	3	1006	0.78		
Acetic acid	25-60	Ethane acid	40 60	1 1	1 1	0		1.06	1.22	
Acetone	100	Dimethylketone	20 60	2 3	1 2	3	246	0.79		
Ammonium hydroxide	30		60	1	2	0	483	0.89		

1 = resistant; the material does not change even after longer contact with the substance.
2 = conditionally resistant; if the material gets in contact with the substance only for a short time it does not change.
3 = non-resistant; the material already changes after a short contact with the substance.
0 = no existing value.

5

eppendorf

Thanks!

For questions, please come visit me at my table…

6