Table 4 Parameters of Alumina Pore Structure

Type of alumina	Pore diameter (nm)	Specific surface area (m^2/g)	Pore volume (mL/g)
60 (Type E)	6	180–200	0.3
90	9	100–130	0.25
150 (Type T)	15	70	0.2

suitable types for this purpose. Retention of sample molecules by adsorption on aluminas is influenced not only by the type of sorbent but also by the effect of humidity in a non-negligible way. Because of the high density of hydroxyl groups, aluminas tend to adsorb water molecules from the surrounding atmosphere and thereby become deactivated. Without due note being taken of this property of aluminas, reproducibility of analytical results can be affected. Some typical applications of aluminas in adsorption thin-layer chromatography are listed in Table 5.

3. Partition Chromatography

Aluminas are not used widely as supports for liquid stationary phases. As with silica gels in partition chromatography, aluminas with larger pores, such as Al_2O_3 150, are preferred for this purpose. Examples of partition chromatographic mechanisms on alumina are the separations of diterpenes (68) and water-soluble vitamins (69).

C. Inert Silicon Dioxides

A series of sorbents that are used exclusively in partition chromatography are various wide-pore silicas. They are distinguished by having a very low specific surface area. Therefore, in partition chromatography almost no adsorption interactions contribute to the selective retention of the solutes. Natural products (diatomaceous earth, commonly known as kieselguhr) as well as synthetic silicon dioxides (silica 50,000) are employed to prepare these TLC phases.

1. Diatomaceous Earth

Diatomaceous earth (kieselguhr) is found in natural deposits. It consists mainly of the skeletons of dead diatoms. The composition of diatomaceous earth is dependent on its origin and on the cleaning process carried out before its use in chromatography. An average of 90% of the diatomaceous earth matrix consists of SiO_2. The remaining 10% consists of Al_2O_3, Fe_2O_3, MgO, Na_2O, K_2O, CaO, and TiO_2 in various proportions. Depending on the batch, secondary by-products may influence the chromatographic behavior of the diatomaceous earths. This means that the reproducibility of the results obtained on such materials cannot be guaranteed in all cases. Because diatomaceous earths have a natural origin, parameters determining the chromatographic properties can be declared only as ranges: medium pore size varies from 1000 to 10,000 nm (very large pores), and an average pore volume of 1–3 mL/g demonstrates the high porosity of the system.

Table 5 Applications on Layers of Alumina in Adsorption Chromatography

Substance class	Reference
Alkaloids	62,63
Carbohydrates	64
Flavonoids	65
Inorganic ions	66
Pesticides	67