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Bio-Beads® SM-2 Hydrophobic Adsorbents Applications Bibliography

Bio-Beads SM adsorbents are neutral, macroporous polymeric beads of high surface area for adsorbing organics from aqueous solutions. Each bead is composed of a large number of highly crosslinked microspheres, giving it high surface area and uniform pores. Bio-Beads adsorbents can be used with a variety of solvents, including alcohols, petroleum ether, diethyl ether, hexane, and solvent mixtures, as well as with aqueous media. They have excellent physical stability and withstand temperatures to 250 °C.

Bio-Beads SM-2 nonpolar polystyrene adsorbents are particularly useful for the adsorption of nonpolar substances or surface active agents from aqueous solutions.

The following reference cite the use of Bio-Beads SM-2 adsorbents for the analysis of organic compounds, drugs, biologicals, foods, pesticides, chemicals, metals, and detergents. For more information on Bio-Beads SM adsorbents, request the Bio-Beads SM Instruction Manual.

Applications for Bio-Beads SM-2

Application	Reference
Organics	
Trace organics in water	Wigilius, B., Boren, H., Cvarlberg, G. E., Grimvall, A., Lundgren, B. V. and Savenhed, R., *J. Chromatog.*, 391, 169-182 (1987).
	Junk, G.A., Richard, J. J., Grieser, M. D., Witiak, D., Witiak, J. L., Arguello, M. D., Vick, R., Svec, H. J., Fritz, J. S. and Calder, G. V., *J. Chromatogr.*, 99, 745-762 (1974).
	Jahanir, L. M. and Samuelson, O., *J.Chromatogr.*, 193, 197-206 (1980).
	Moore, R.A. and Karasek, F. W., *Inter. J. Environ. Anal. Chem.*, 17, 187-202 (1984).
	Osterroht, C., *J. Chromatogr.*, 101, 289-298 (1974).
Chlorinated hydrocarbons in water	Picer, N. and Picer, M., *J. Chromatogr.*, 193, 357-369 (1980).
Separation of nitro- and chlorophenols	Grieser, M.D. and Pietrzyk, D. J., *Anal. Chem.*, 45, 1348-1353 (1973).
Organic bases	Chu, C. and Pietrzyk, D. J., *Anal. Chem.*, 46 (3), 330-340 (1974).

Application	Reference
Drugs	
Retention and sorption of sulfas	Rotsch, T. D., Sydor, R. J. and Pietrzyk, D. J., *J. Chrom. Sci.*, 17, 339-344 (1979).
Separation of cannabinoids from cannabis extract	Hendriks, H., Batterman, S., Bos, R., Huizing, H. J. amd Malingre, Th. M., *J. Chromatog.*, B205, 444-450 (1981).
Determination of benzo[a] pyrene in cigarette smoke condensate	Robinson, J. L., Marshall, M. A., Draganjac, M. E. amd Noggle, L. C., *Anal. Chim. Acta*, 115, 229-238 (1980).
Narcotic antagonists in human urine	Digregorio, G.J., *J. Chromatogr.*, 101, 424-427 (1974).
Drugs in urine	Roerig, D. L., Lewand, D., Mueller, M. and Wang, R. I. H., *J. Chromatogr.*, 110, 349-359 (1975).
	Bastos, M. L., Jukofsly, D. and Mule, S. J., *J. Chromatogr.*, 81, 93 (1973).
Morphine and codeine in urine	Ulrich, L. and Ruegsegger, P., *Arch. Toxicol.*, 45, 241-248 (1980). German.
Morphine in urine	Kullberg, M. P. and Gorodetzky, C. W., *Clinical Chem.*, 20 (2), 177-183 (1974).
Methaqualone in blood plasma	Hux, R. A., Mohammed, H. Y. and Cantwell, F. F., *Anal. Chem.*, 54, 113-117 (1982).

Application	Reference
Drugs in blood	Schlicht, H. J. and Gelbke, H. P., *Z. Rechtsmedizin*, 81, 25-30 (1978).
Pharmaceutical drug syrups	Mohammed, H. Y. and Cantwell, F. F., *Anal. Chem.*, 50 (3), 491-496 (1978).
Extraction of drugs from human stomach fluid	Ibrahim G., Andryauskas, S. amd Bastos, M. L., *J. Chromatrogr.*, 108, 107-116 (1975).
Polar and non-polar drug metabolites	Dieterle, W., Faigle, J. W. and Mory, H., *J. Chromatogr*., 168, 27-34 (1979).

Biological

Purification of aminobenzyl-phosphonic acid	Landt, M., Boltz, S. C. amd Butler, L. G., *Biochem.*, 17 (5), 915-919 (1978).
Free rhodamine	Spack, E. G., Jr., Packard, B., Wier, M. L. and Edidin, M., *Anal. Biochem.*, 158, 233-237 (1986).
Crude plasma clean-up	Tamura, M., Harris, T. M. Higashimori, K., Sweetman, B. J., Blair, I. A. and Inagami, T., *Biochem.*, 26, 2797-2806 (1987).
Leukotrienes from plasma prostaglandins	Salari, H. and Steffenrud, S., *J. Chromatogr*., 378, 35-44 (1986).
Prostaglandins	Hamberg, M., *Anal. Biochem.*, 55, 368-378 (1973).
Prostaglandins adsorption from biological fluid	Leffler, C. W., Desiderio, D. M. and Wakelyn, C. E., *Prostaglandins*, 21, 227-241 (1981).
Isolation of proline and proline from fossil bone	Stafford, T. W., Duhamel, R. C., Haynes, C. V. and Brendel, K., *Life Sciences*, 31, 931-938 (1982).
Anabolic steroids in animal tissue and urine	Verbeke, R., *J. Chromatogr*., 177, 69-84 (1979).
Steroids from urine	Shacklleton, C. H. L., Sjovall, J. and Wisen, O., *Clin. Chim. Acta*, 27, 354-356 (1970).
Extraction of steroids	Bradlow, H. L., *Steroids*, 11, 265 (1968).
Bile acids	Okuyama, S., Uemura, D. amd Hirata, Y., *Bulletin of Chemical Society of Japan*, 52 (1), 124-126 (1979).
Bile acids	Schwartz, H. P., v. Bergmann, K. and Paumgartner, G., *Clinica Chimica Acta*, 50, 197-206 (1974).

Application	Reference
Cobalamins	Fenton, W. A. and Rosenberg, L. E., *Anal. Biochem.*, 90, 119-125 (1978).
Phosphatidyl-ethanolamine from plasma	Salari, H., *J. Chromatogr.*, 419, 103-111 (1987).
Glucuronides	Delaborde, S., Loosli, H. R., Ponelle, M., Griesser, R. amd Maurer, G., *J. High Resolution Chromatography & Chromatography Communications*, 10, 71-76 (1987).
Impregnation of resin with pentafluoro-benzyl bromide microbial fatty acid analysis	Rosenfeld, J. M., Hammerberg, O. and Orvidas, M. C., *J. Chromatogr.*, 378, 9-16 (1986).
Plant hormones	Stafford, A. E., Kunhle, J. A., Corse, J. and Hautala, E., *J. Chromatogr.*, 294, 485-488 (1984).
Captopril (derivatized in blood)	Funke. P.T., Ivashkiv. E., Malley. M.F. and Cohen, A.I., *Anal. Chem.*, 52, 1086–1089, (1980).

Food

Flavonoids from aqueous fractions	Rosler, K. H. and Goodwin, R. S., *J. Natural Products*, 47 (1), 188 (1983).
Acid dyes	Uematsu, T., Kurita, T. and Hamada, A., *J. Chromatogr*., 172, 327-334 (1979).
Naringin and limonin from grapefruit juice	Chandler, B. V. and Johnson, R.l., *Proc. Int. Soc. Citriculture*, 2, 885-888 (1981).
Triadimefon in grape wine	Nickless, G. and Spitzer, T., *J. Chromatogr*., 208, 409-413 (1981).

Environmental

Indium treated adsorbent to concentrate humic complexes	Hiraide, M., Arima, Y. and Mizuike, A., *Anal. Chim. Acta*, 200, 171-179 (1987).
Hydrocarbons, PCBs and fatty acids in sea water	Gomez-Bellnchon, J. I., Grimalt, J. O. and Albaiges, J., *Environ. Sci. Technol.*, 22, 667-685 (1988).
Polynuclear hydrocarbons from water	Navratil, J. D., Sievers, R. E. and Walton, H. F., *Anal. Chem.*, 49 (14), 2260-2263 (1977).

Application	Reference
Pesticides	
Aminocarb insecticide from water	Levesque, D. and Mallet, V. N., *Intern. J. Environ. Anal. Chem.*, 16, 139-147 (1983).
Carbamate insecticides	Sundaram, K. M. S., Szeto, S. Y. and Hindle, R., *J. Chromatogr.*, 177, 29-34 (1979).
Chlorinated pesticides	McNeil, E. E. and Otsen, R., *J. Chromatogr.*, 132, 277-286 (1977).
Ethyl and methyl parathion	Paschal, D. D., Bicknell, R. and Dresbach, D., *Anal. Chem.*, 49, (11) 1551-1554 (1977).
Fenitrothion and its degradation products	Volpe, G. and Mallet, V. N., *Chromatographia*, 14 (6), 333-336 (1981).
Organophosphorous pesticides	LeBel, G. L., Williams, D. T., Griffith, G. and Benoit, F. M., *J. Assoc. Off. Anal. Chem.*, 62, No. 2, 241-249 (1979).
Chemical	
Carboxylic acid from aqueous solutions	Jahanginr, JL. M. and Samuelson, O., *J. Chromatogr.*, 237, 371-379 (1982).
	Hasanain, M. A. and Hines, A. L., *Ind. Eng. Chem. Process Des. Dev.*, 20, 621-625 (1981).
Use in HPLC column as ground material	Baum, R. G., Saetre, R. and Cantwell, F. F., *Anal. Chem.*, 52 (1), 15-19 (1980).
Benzenesulfonic acids	Rotsch, T. D. and Pietryzk, D. J., *Anal.Chem.*, 52 (8),, 1323-1327 (1980).
Use in TLC as stationary phase	Pietryzk, D. J. Ritsch, T. D. and Leuthauser, S. W., *J. Chromatogr. Sci.*, 17, 555-561 (1979).
Metals	
Metal cation adsorption	Mackey, D. J., *J. Chromatogr.*, 242, 275-287 (1982).
Metal ion adsorption using pyrocatechol loaded adsorbent	Brajter, K., Olbrych-Sleszynska, E. and Staskiewicz, M., *Talanta*, 35 (1), 65-67 (1988).
Resin impregnation with TBP for extracting actinides from fission products	Green, L. W., Elliot, N. L. and Longhurst, T. H., *Anal. Chem.*, 55, 2394-2398 (1983).

Application	Reference
Detergents	
Triton X-100 detergent	Holloway, P. W., *Anal. Chem.*, 53, 304-308 (1973).
	Drexler, G., Eichinger, A., Wolf, C. and Seighart, W., *J. Immun. Methods*, 95, 117-122 (1986).
	Bonomi, F. and Kurtz, D. M., Jr., *Anal. Biochem.*, 142, 226-231 (1984).
	Welling, G. W., et. al., *J. Chromatogr.*, 297, 101 (1984).
	Metsikko, K., van Meer, G. and Simons, K., *The EMBO Journal*, 5 (13), 3429-3435 (1986).
Cholate detergent	Bonomo, E. A. and Swaney, J. B., *J. Lipid Research*, 29, 380-384 (1988).
	Jinks, D. C. and McElhaney, R. N., *Anal. Biochem.*, 164, 331-335 (1987).
Deoxycholate	Horigome, T. and Sugano, H., *Anal. Biochem.*, 130, 393-396 (1983).
	Lorusso, D. J. and Green, F. A., *Science*, 188, 66 (1974).
	Shechter, I. and Bloch, K., *J. Biol. Chem.*, 246 (24), 7690-7696 (1971).
NP-40 detergent	Momoi, T., *Biochem. Biophys. Res. Commun.*, 87, 541-549 (1979).
Emulgen 911	Gibson, G. G., and Schenkman, F. B., *J. Biol. Chem.*, 253, 5957-5963 (1978).
	Warner, M., *J. Biol. Chem.*, 257 (21), 12995-13000 (1982).
Emulphogene BC-720	Brunch, R. C., Thotakura, N. R. and Bahl, O. P., *J. Biol. Chem.*, 261 (20), 9450-9460 (1986).
Coating microtiter plates with detergent soluble membrane proteins	Drexler, G., Eichinger, A., Wolf, C. and Sieghart, W., *J. Immunological Methods*, 95, 117-122 (1986).

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