

Workplace atmospheres - Ultrafine, nanoparticle and nano-structured aerosols - Inhalation exposure characterization and assessment

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Terms and definitions	1
3 Symbols and abbreviated terms	4
4 Background	5
4.1 Nanoaerosols (including ultrafine aerosols) and potential health effects	5
4.2 Lung deposition of nanoparticles	6
4.3 Transport of nanoparticles in the body	9
4.4 Physical behaviour of nanoaerosols	9
4.4.1 Formation	9
4.4.2 Coagulation	10
4.4.3 Transport	11
4.5 Physiological basis for defining nanoparticles and nanoaerosols	11
4.5.1 General	11
4.5.2 Biologically-relevant definitions of particle diameter	11
4.5.3 Biological significance of particle size	12
4.5.4 Significance of nanoparticle agglomeration/aggregation	12
4.5.5 Summary	12
5 Sources of occupational nanoaerosols	13
6 Characterizing exposure to occupational nanoaerosols	15
6.1 Exposure assessment strategies	15
6.1.1 Introduction	15
6.1.2 Considerations for exposure assessment strategies	15
6.1.3 Sampling	16
6.1.4 Miscellaneous	18
6.1.5 Exposure assessment strategies -- Summary	18
6.2 Particle ensemble characterization methods	18
6.2.1 General	18
6.2.2 Mass concentration	18
6.2.3 Surface-area concentration	19
6.2.4 Number concentration	20
6.3 Size-resolved characterization	21
6.3.1 Measuring size distribution using particle mobility analysis	21
6.3.2 Measuring particle size distribution using inertial deposition	22
6.3.3 Electrical low pressure impactor measurements	23
6.3.4 Diffusion batteries	23
6.4 On-line chemical analysis	23
6.5 Single particle analysis	24
6.5.1 General	24
6.5.2 Electron microscopy imaging and analysis methods	25
6.5.3 Single particle analysis in the scanning force microscope	25
7 Summary	26
Annex A (informative) Electron microscopy sample collection and preparation	27
Bibliography	30