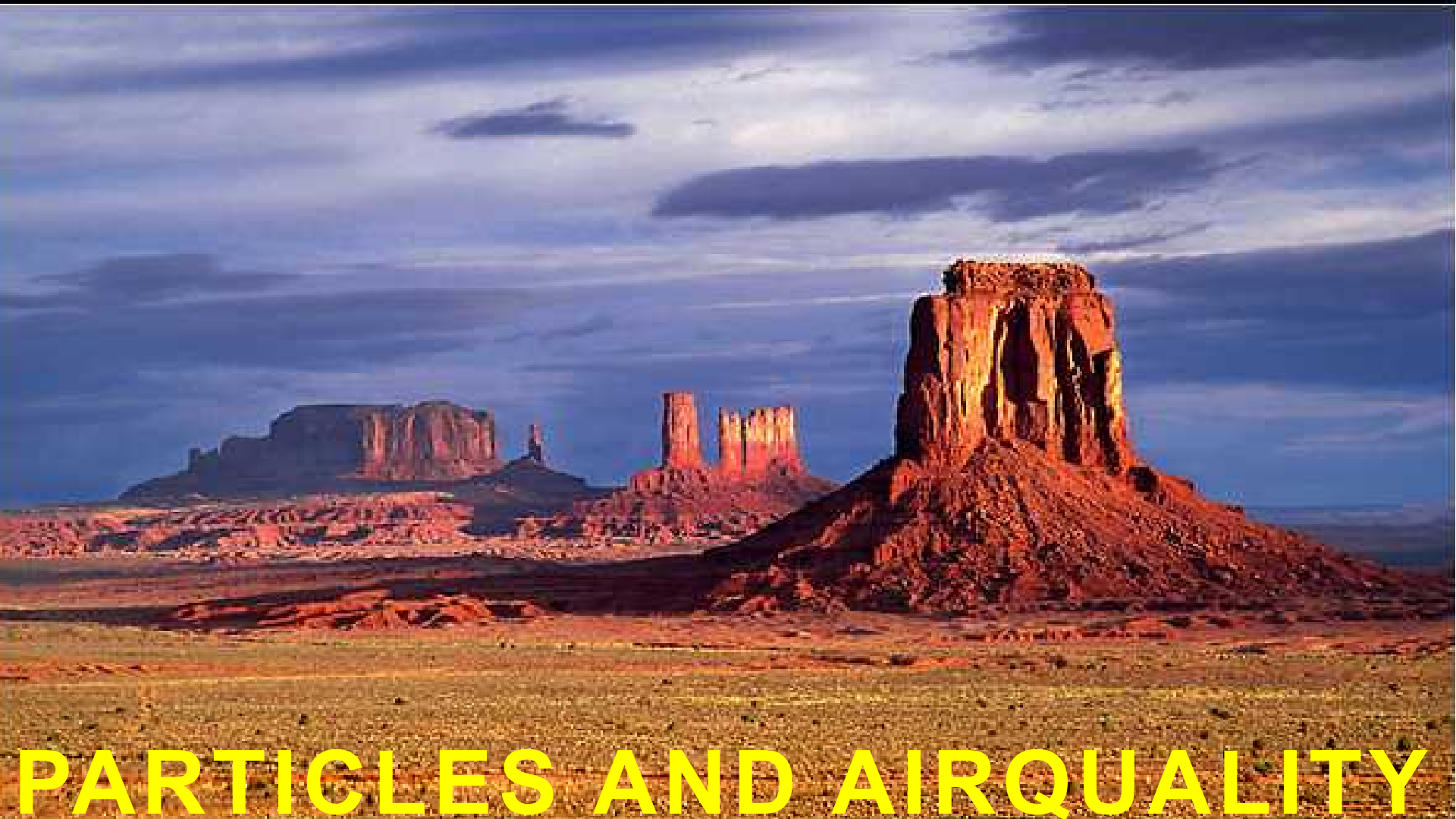
Vibeke Halkjaer-Knudsen, PhD.
Sandia National Laboratories
Albuquerque
New Mexico
USA

SAND2013-7635C

Sandia National Laboratories

HEPA FILTERS

what are they, why and how do they work

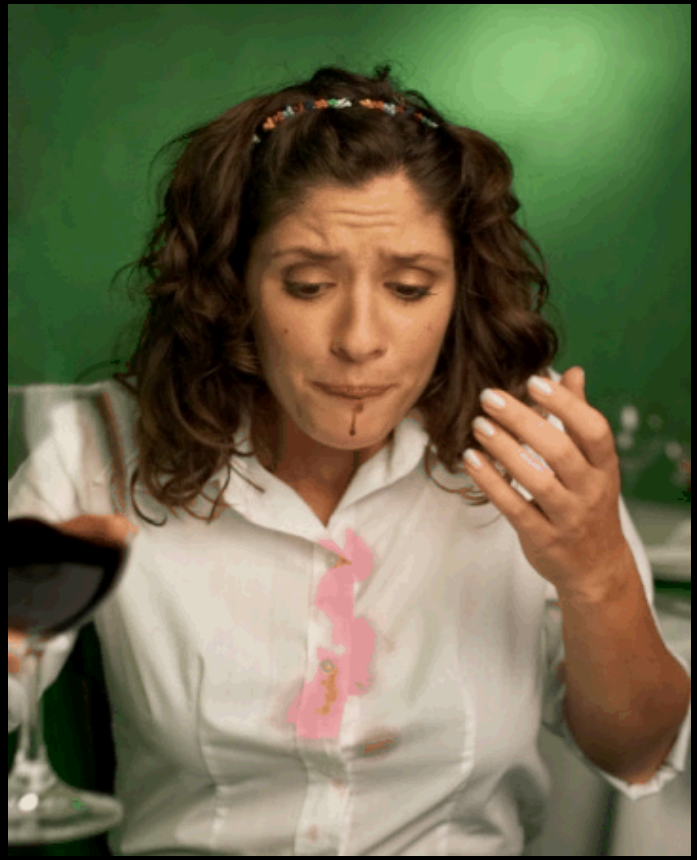

PARTICLES AND AIRQUALITY

Molecular size (approximate < 0.001μm)

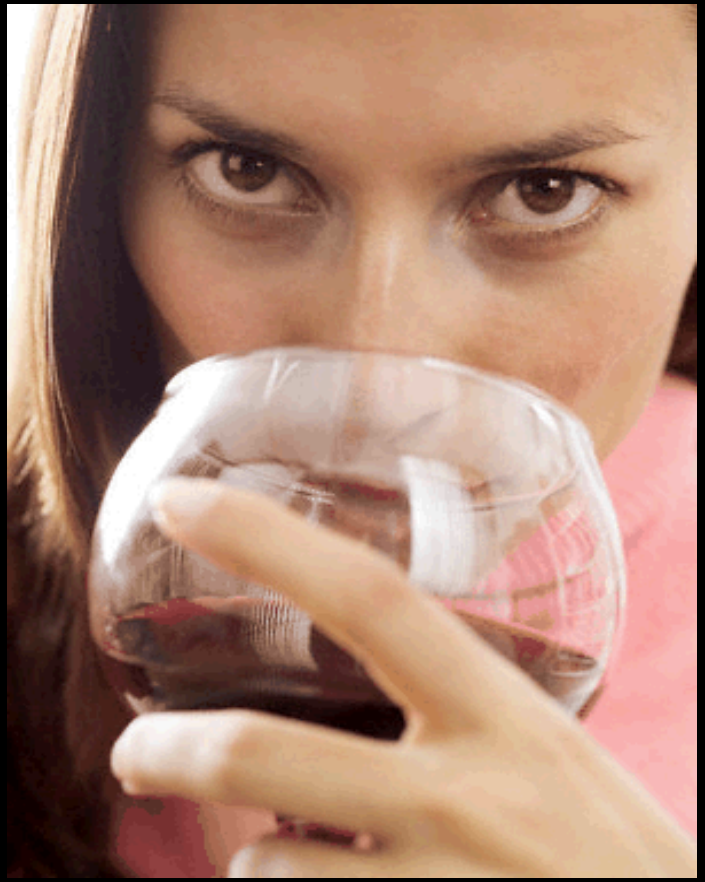
Random movement in air stream

Filtration by adsorption or absorbtion

GASSES



Adsorb



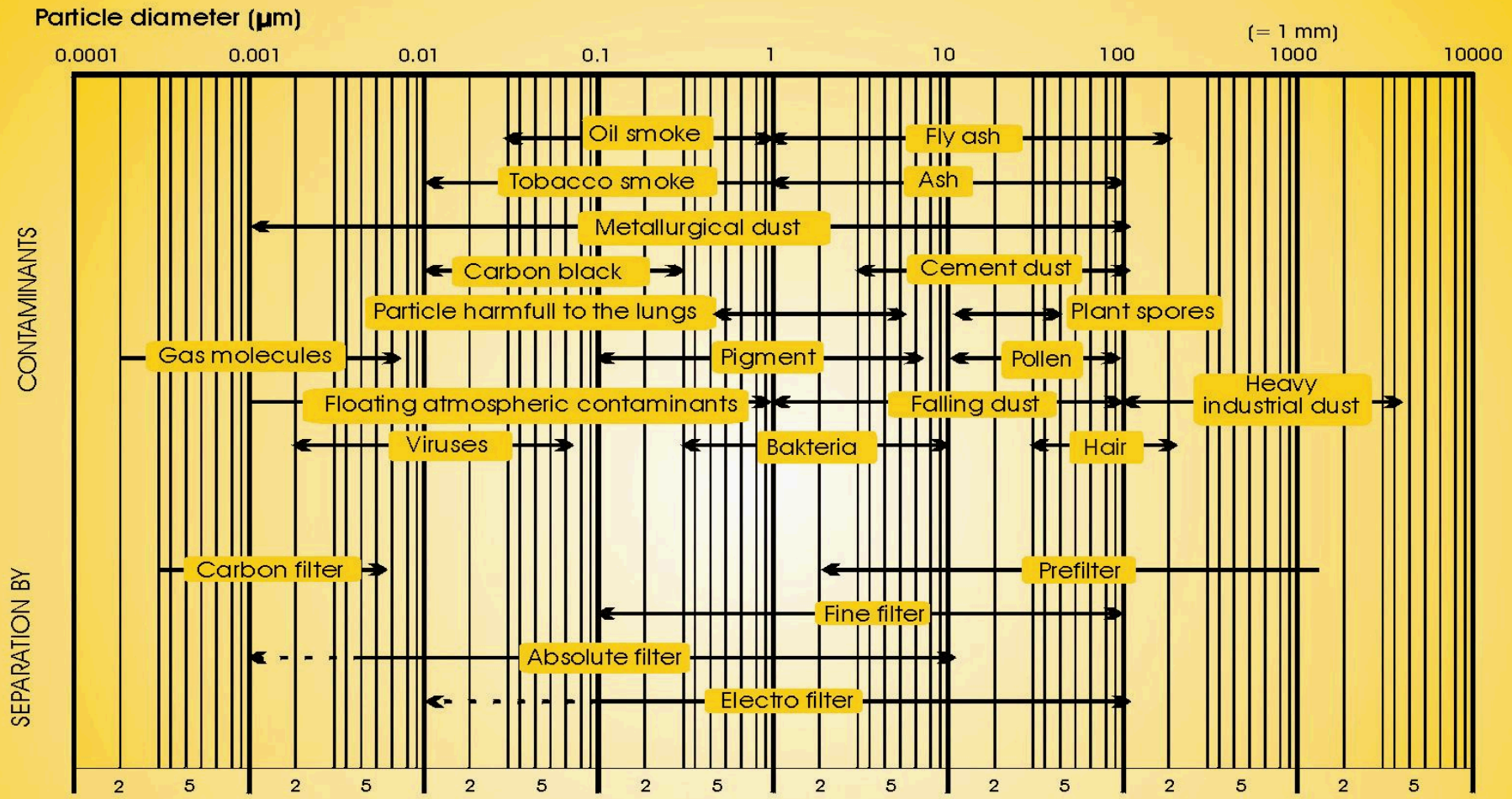
Absorb

Solid or liquid (approximate > 0.001μm)

Small; random movement, similar to gas

Large; air velocities, gravitation, shape affects movement

Filtration by different collecting mechanisms


Particle diameter (µm)
0.0001
0.001
0.01
0.1
1
10
100
1000
(= 1 mm)
10000
CONTAMINANTS
Oil smoke
Fly ash
Tobacco smoke
Ash
Metallurgical dust
Carbon black
Cement dust
Particle harmfull to the lungs
Plant spores
Gas molecules
Pigment
Pollen
Floating atmospheric contaminants
Falling dust
Heavy industrial dust
Viruses
Bakteria
Hair
SEPARATION BY
Carbon filter
Prefilter
Fine filter
Absolute filter
Electro filter
2
5
2
5
2
5
2
5
2
5
2
5
2
5
2
5