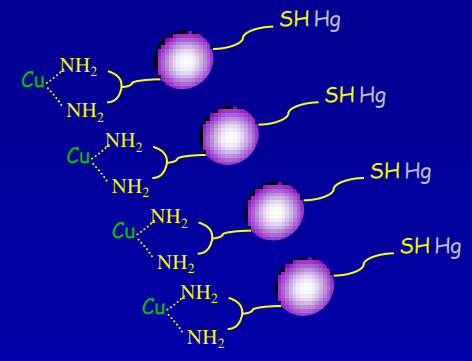
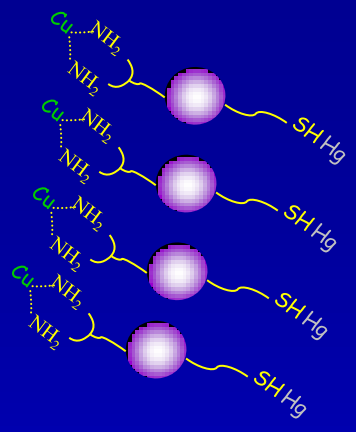


# Nano-Materials for Extraction of Pollutants from Water Samples And Health Risk of Nano- Materials

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Ministry of Health, Makkah AL-Mukarramah

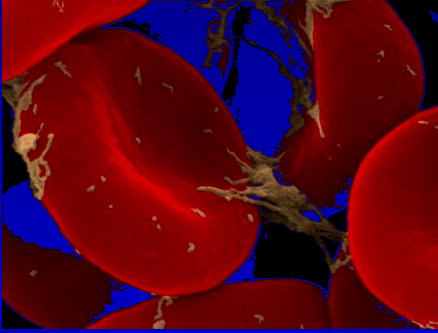
[www.nozor.com](http://www.nozor.com)    [nozor@yahoo.com](mailto:nozor@yahoo.com)



- 1- What is Nano-Technology?
- 2- Extraction of Pollutants.
- 3- Risk of Nano materials.

# Nanomater

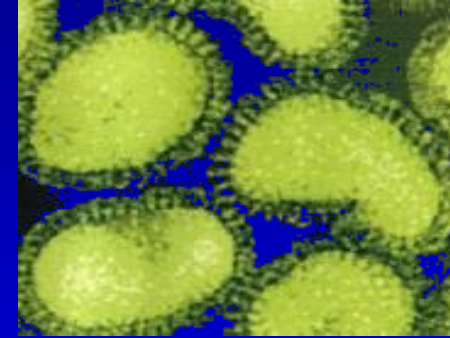
Nano-meter abbreviated as 1 nm = 1/1000,000,000 of a meter



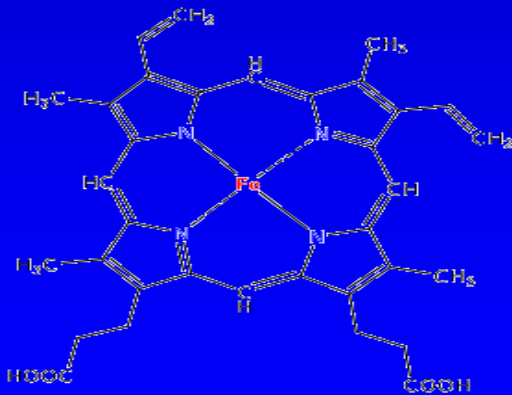
SEM of Human red blood cell, 8000 nm, Biology.com



SEM of *M. paratuberculosis*, 1000 nm ohnes.org



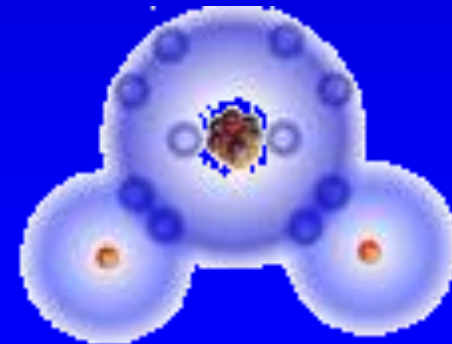
SEM of influenza virus, 80-250 nm



Hemoglobin molecule, 5.5 nm

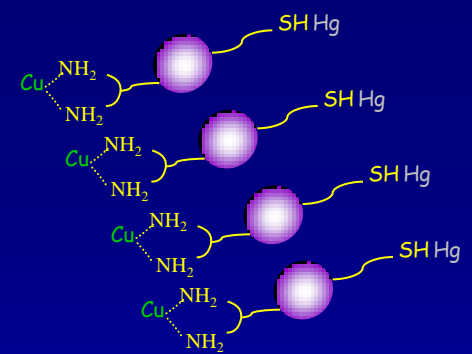


DNA, 2 nm in Diameter

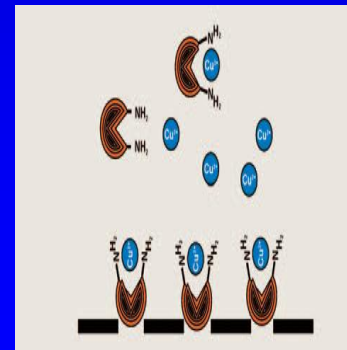


Water molecule > 1 nm

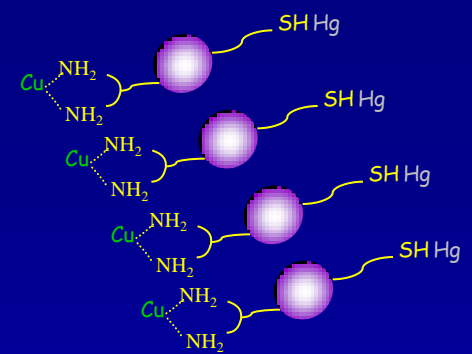
# Nano-Technology



**Nanotechnology** is Synthesis, Modification and Application of Nano-Materials. This new field of science deals with materials or structure ranging from sub-nanometer to several hundred nanometer. At this size materials possess new physical properties



# Extraction of Pollutants



## Extraction of Environmental Pollutants Based on New Nano-Solid-Phase Dispersion Extraction (NSPDE)

This technique is based on the dispersion of modified silica nano particles (Nano-Scavengers) in water samples to extract the analytes such as As, Cd, Hg and Pb.

# Preparation of Nano-scavengers

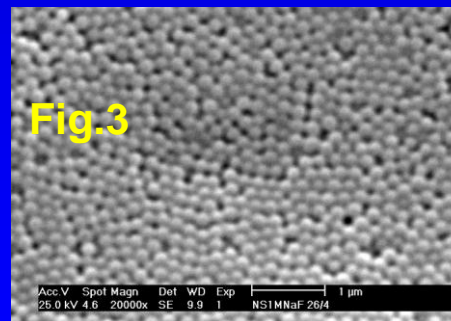
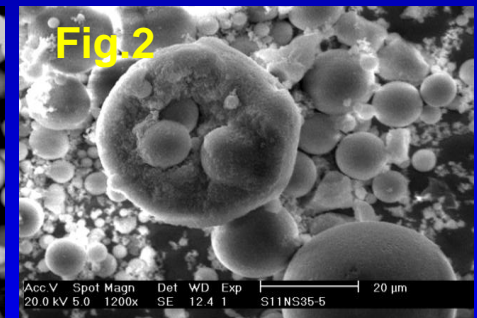
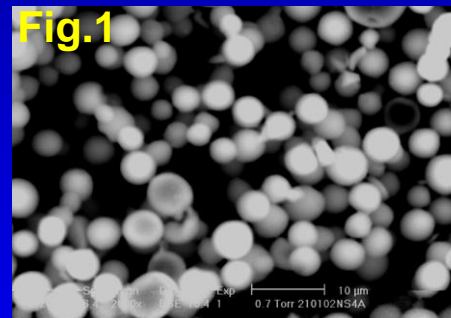
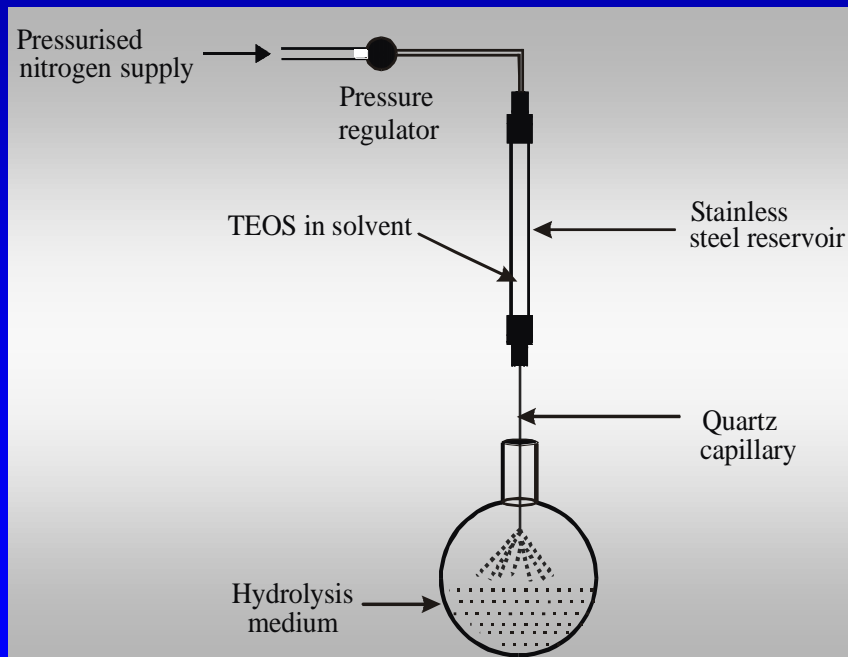
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**The preparation was performed in two steps :**

1. Synthesised of spherical silica particles, *ca.* 200 nm in diameter having a narrow size distribution.
2. Modification of the silica particles with different types of organosilane agents to increase the affinity of the surface to extract trace metals, pesticides and polynuclear aromatic hydrocarbons

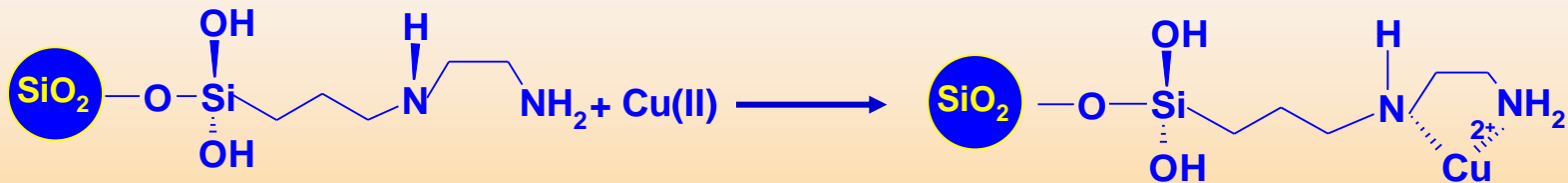
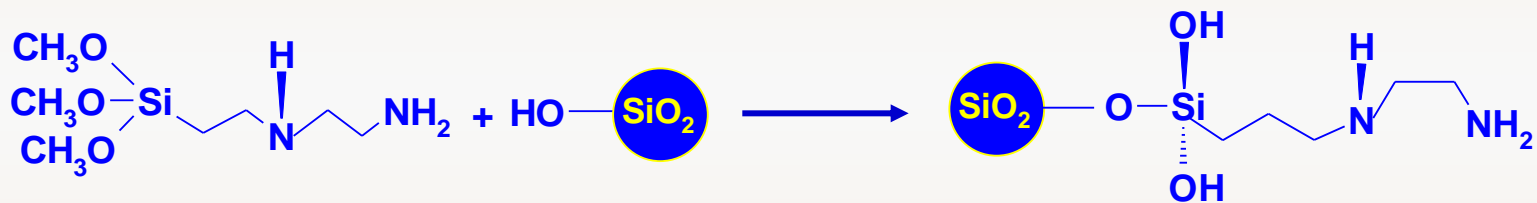
# Synthesised of Spherical Silica Nano Particles

The particles were synthesised by both a conventional sol-gel (Fig1) and new spray technique (Fig. 3&4). The parameters influencing their formation and monodispersity such as the concentration of TEOS, solvent, temperature, pH and type of agitation were investigated.



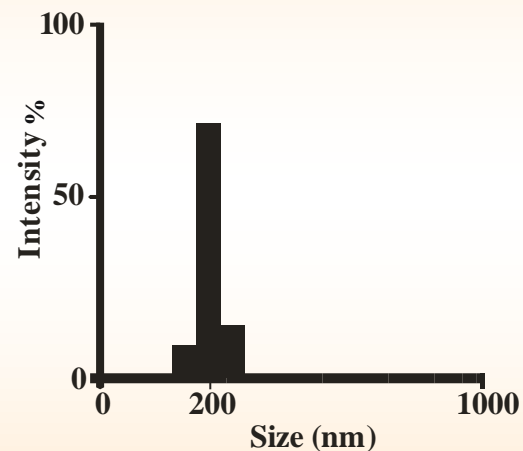
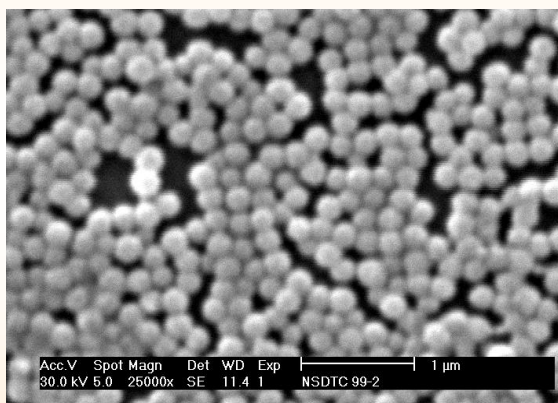
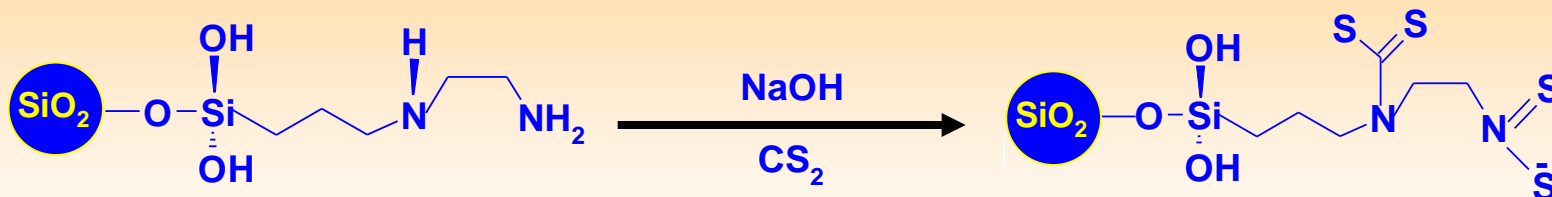
# Amino-Nanoscavenger

The particles were modified with N-[3-trimethoxysilyl] propyl]-ethylenediamine and its dithiocarbamate to the pre-concentration of Cu, Cd, Pb and Ni.





# Dithiocarbamate-Nanoscavenger



Pre-concentration factor	Recovery % Cd	Recovery % Cu	Recovery % Pb	Recovery % Ni
10	102 ± 6.4	98.8 ± 1.5	93.1 ± 1.6	94.5 ± 1.8
25	100 ± 0.7	96.7 ± 1.6	92.1 ± 2.3	92.5 ± 2
50	99.3 ± 1	96.6 ± 1.1	91 ± 1.7	91.8 ± 1.7

# The advantages of using Nanoscavengers

Nanoscavengers have many advantages over other extraction systems such as liquid-liquid extraction, solid phase extraction cartridges and solid phase extraction disks

1. Large numbers of samples can be quickly treated, and this can be carried out at the sampling location, stabilizing the analyte during transportation. If the filtration process is carried out in the field, the approach minimises the weight and volume of sample to be transported at the same time protecting the analyte against contamination or loss; by binding it on the nanoscavenger.

# The advantages of using Nanoscavengers

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## 2. Green Chemistry

Nanoscavengers can be used for extraction of many inorganic and organic contaminants from natural water. They involve the use of only small quantities of organic solvent. (500-fold can be achieved with only 1 mL of organic solvent)

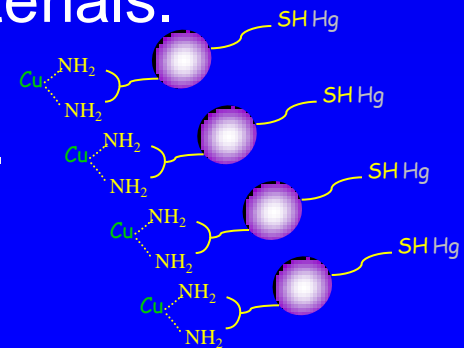
## 3. Saving time

Around 60 minutes is a total time needed for the pre-concentration of analyte from 500 ml sample

# Risk of Nano-Materials

## Why we have to take care about Nano-materials?

- Due to the size of Nano-materials they can access to the blood stream and they are able to cross cell membrane and access to heart, brain, liver, kidneys, bone marrow and nervous system.
- The size of particle is a key point when doing risk assessment. However, the chemical modification, Shape, Surface area, Surface charge are also important factors.
- It is important to assess any Nano-Materials individually and taken to account the properties of each Nano-materials.
- The Consumer of Nano-materials are increased.





Thank you for your attention